

Supplement to the agenda for

General scrutiny committee

Wednesday 18 July 2018

10.00 am

**Council Chamber, The Shire Hall, St Peter's Square, Hereford,
HR1 2HX**

Supplement 3 - Appendix 3 - Hereford Transport Package Stage 2 Environmental Assessment Report	Pages
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6. HEREFORD TRANSPORT PACKAGE (HTP)	
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Balfour Beatty

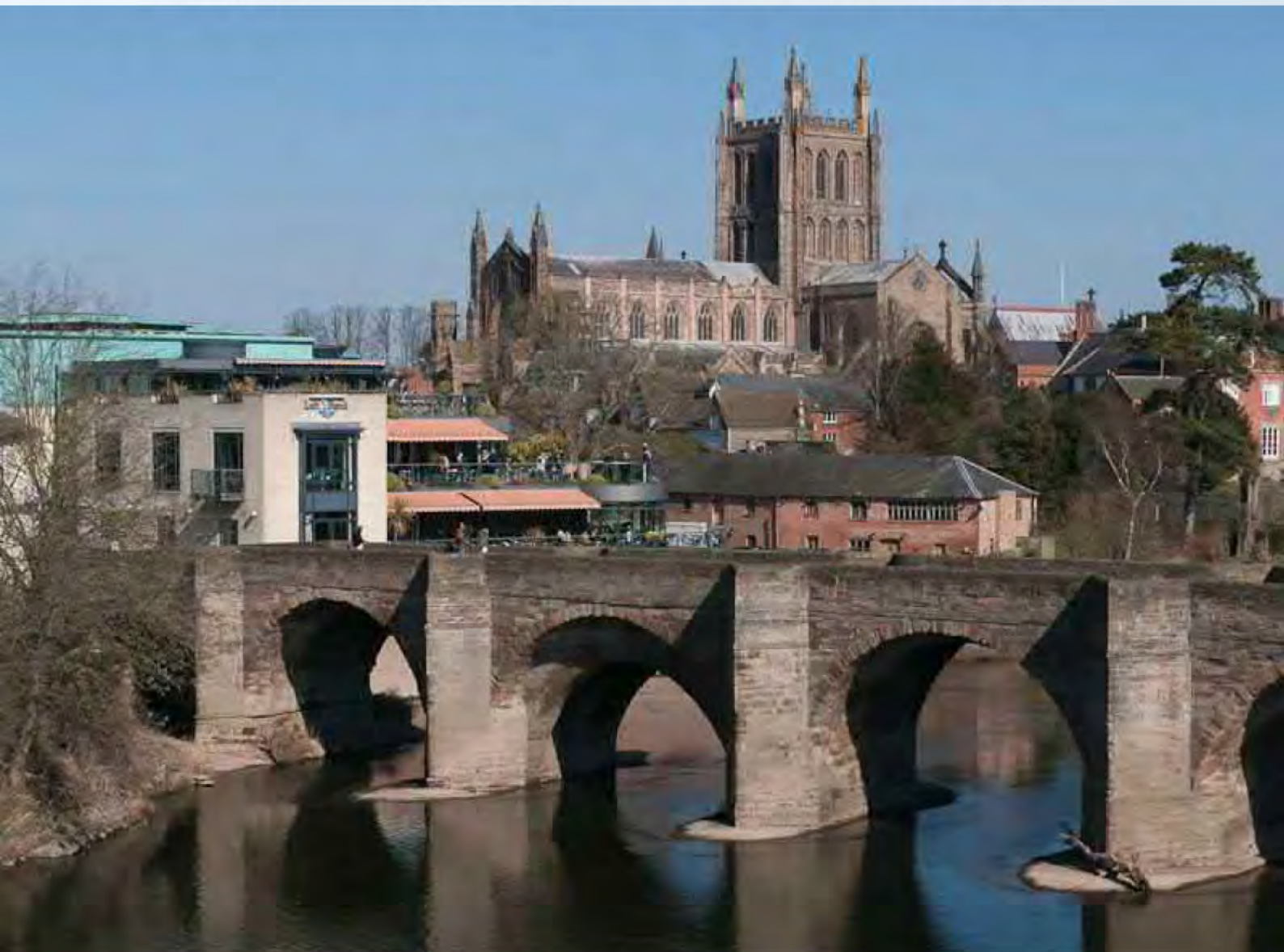


Working for Herefordshire

Herefordshire Council

HEREFORD TRANSPORT PACKAGE: HEREFORD BYPASS

Stage 2 Environmental Assessment Report



Herefordshire Council

HEREFORD TRANSPORT PACKAGE: HEREFORD BYPASS

Stage 2 Environmental Assessment Report

PROJECT NO. 70024065

OUR REF. NO. 70024065-WSP-XX- XX-RP-EN-00007_V02

5 JULY 2018



Alternative Format:

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QUALITY CONTROL

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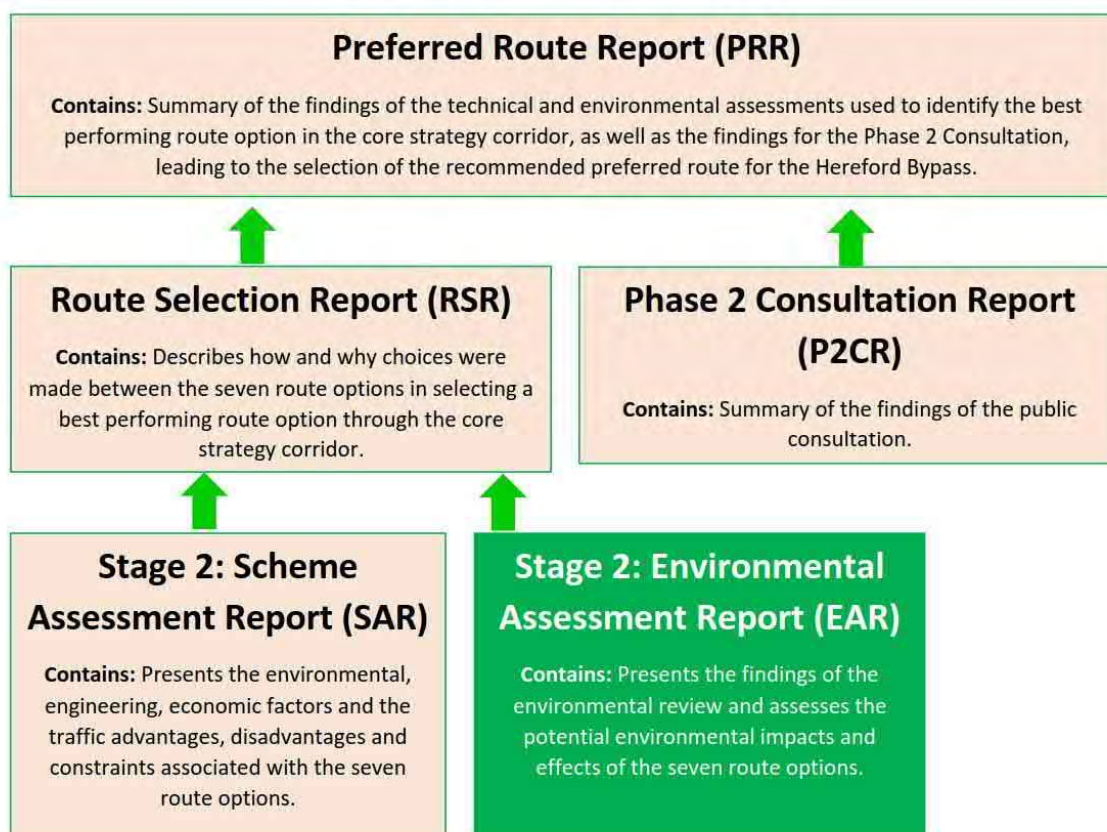
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1 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

- 1.1.1. WSP has been commissioned by Balfour Beatty Living Places on behalf of Herefordshire Council to prepare a Stage 2 Environmental Assessment Report (EAR) that will inform the selection of a preferred route for the proposed Hereford Bypass to the west of Hereford.
- 1.1.2. This EAR presents the findings of an environmental review and assessment of the potential environmental impacts and effects of the short list of seven possible route options for the Hereford Bypass ("the proposed Scheme"). The EAR has been completed in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11, for all environmental factors set out in the Infrastructure Planning (EIA) Regulations 2017. The Stage 2 EAR has been prepared to help identify a preferred route for the Hereford Bypass which will be subject to a more detailed assessment including a statutory Environmental Impact Assessment and subsequent Environmental Statement.
- 1.1.3. Along with the Stage 2 Scheme Assessment Report (Report No. 70024065-WSP-XX-XX-RP-HE-0003) and the Route Selection Report (Report No. 70024065-WSP-XX-XX-RP-HE-0004) the findings of this report will inform the Preferred Route Report (Report No. 70024065-WSP-XX-XX-RP-HE-0006) to be taken forward to Cabinet for a decision on the Preferred Route. The suite of supporting documents to the PRR are shown below:



1.2 SCOPE AND CONTENT

- 1.2.1. This report updates the Stage 1 EAR produced for the scheme. The updates in this report are based on the further design work that has been undertaken to refine the seven shortlisted options identified in the Corridor Assessment Framework report, as well as further qualitative and quantitative environmental assessments that have been undertaken, including modelling and surveys.
- 1.2.2. The structure and scope of the EAR is set out in Table 1-1.

Table 1.1 - Structure and Scope of this Report

Report Chapter	Purpose
Chapter 1: Introduction	Provides an overview of the purpose and scope of this report and the legislative and policy context within which the scheme is being progressed.
Chapter 2: The Project	Sets out the need for and objectives of the scheme, as well as providing an overview of the scheme itself and the physical context within which it is proposed to be located.
Chapter 3: Assessment of Alternatives	A summary of the alternative options considered to-date.
Chapter 4: Environmental Assessment Methodology	Sets out the level of assessment being applied, any general assumptions made in undertaking the assessment as well as any limitations to the assessment.
Chapter 5: Air Quality	Sets out the legislative and policy context specific to this topic area, the study area assessed for the topic area, the baseline conditions, potential impacts of the scheme, assessment methodology applied, any topic-specific assumptions made in undertaking the assessment, design mitigation and enhancement measures to be applied, and the overall assessment of the effects on the scheme for the topic area.
Chapter 6: Noise and Vibration	As above.
Chapter 7: Landscape	As above.
Chapter 8: Cultural Heritage	As above.
Chapter 9: Ecology	As above.
Chapter 10: Water and Drainage	As above.
Chapter 11: Geology and Soils	As above.
Chapter 12: Materials	As above.
Chapter 13: People and Communities	As above.
Chapter 14: Climate	As above.
Chapter 15: Combined and Cumulative Effects	Provides an overview of the assessment methodology applied and the overall assessment of the cumulative effects of the scheme.
Chapter 16: Conclusion	Summarises the potential effects associated with the scheme.
Chapter 17: Environmental Constraints Plans	Contains the general environmental constraints plans produced for the assessment.

1.3 PLANNING POLICY AND LEGISLATION

NATIONAL PLANNING POLICY

1.3.1. The following is a list of national planning policy sources which will be considered within this Stage 2 EAR and in the preparation of the Development Consent order (DCO) application:

- National Policy Statement for National Networks (NNNPS) ¹;
- National Planning Policy Framework (NPPF) ²; and
- Planning Practice Guidance (PPG) ³.

LEGISLATION

1.3.2. The following is a non-exhaustive list of legislation that will be taken into within this Stage 2 EAR and in the preparation of the DCO application:

- Planning Act 2008;
- Planning (Listed Buildings and Conservation Area) Act 1990;
- Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended);
- Highway and Railway (Nationally Significant Infrastructure Project) Order 2013;
- Infrastructure Act 2015;
- National Parks and Access to Countryside Act 1949;
- Climate Change Act 2008;
- The Natural Environment and Rural Communities Act 2006;
- Conservation of Habitats and Species Regulations 2010;
- Protection of Badgers Act (1992);
- Environmental Protection Act 1990;
- Environment Act 1995;
- Countryside and Rights of Way Act 2000;
- The National Parks and Access to the Countryside Act 1949;
- Water Framework Directive (Council Directive 2000/60/EC) (as amended);
- Air Quality Directives (Council Directive 2008/50/EC);
- The Wildlife and Countryside Act 1981 (as amended);
- Equality Act 2010;
- Water Resources Act 1991 (SI 57) (as amended by the Water Act 2003);
- Flood and Water Management Act 2010.
- Highways Act 1980;
- The Control of Pollution (Amendment) Act 1989;
- Waste Minimisation Act 1998;
- The Waste and Emissions Trading Act 2003;
- The UK Biodiversity Action Plan (UK BAP) 1994 (as amended);
- The UK Post-2010 Biodiversity Framework (2012);
- Air Quality Standards Regulations 2010; and
- The Noise Insulation Regulations 1988 (as amended).

¹ Department for Transport (2014), National Policy Statement for National Networks, available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf, accessed 01/05/2018.

² Communities and Local Government (2012), available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf, accessed 01/05/2018.

³ Ministry of Housing, Communities & Local Government (2016), available online at <https://www.gov.uk/government/collections/planning-practice-guidance>, accessed 01/05/2018.

LOCAL PLANNING POLICY

LOCAL PLAN CORE STRATEGY

1.3.3. Herefordshire Council has developed a Local Plan Core Strategy⁴ to guide development and change in the county up until 2031. In addition, the Core Strategy considers how to use the land, how the area functions and how separate parts of the county should develop or change over the next 20 years in response to key issues such as the need to:

- Providing more and better quality homes;
- Deliver improved infrastructure to support economic development;
- Promote a thriving local economy with successful city, town and village centres and provide sufficient employment land to meet business needs;
- Protect and conserve and enhance valued natural, historic and built environments;
- Meet the challenge of climate change;
- Create places that promote and enable healthy lifestyles; and
- Achieve sustainable development and reduce reliance on private car.

1.3.4. The Core Strategy sets out the overall strategic planning framework for Herefordshire. The Core Strategy needs to balance environmental issues with economic and social needs and ensure that development is sustainable and does not cause irreversible harm to important resources and features. It sets a vision of how the county should look and function and how development needs will be met up to 2031. It does not allocate land directly, but instead proposes broad strategic directions for growth in sustainable locations.

Table 1-2 - Core Strategy Policies relevant to the proposed Scheme

Policy Ref.	Policy description
Policy SS1	<i>When considering development proposals Herefordshire council will take a positive approach that reflects the presumption in favour of sustainable development contained within national policy. Planning applications that accord with the policies within the Core Strategy will be approved, unless material considerations indicate otherwise.</i>
Policy SS4	<i>New developments should be designed and located to minimise the impacts on transport network, ensuring journey times are the efficient and safe operation of the network are not detrimentally impacted. Development proposals should be accessible by and facilitate a genuine choice of modes of travel including walking, cycling and public transport. Herefordshire Council will work with the Highways Agency, Network Rail and train operators, developers and local communities to bring forward improvements to the local and strategic transport network to reduce congestion, improve air quality and road safety, including the provision of the Hereford Relief Road.</i>
Policy SS6	<i>Development should conserve and enhance those environmental assets that contribute towards the county's distinctiveness, in particular its settlement pattern, landscape, biodiversity and heritage assets and especially those with specific environmental designations.</i>

⁴ Herefordshire Local Plan Core Strategy (2015). Available online at <https://www.herefordshire.gov.uk/ldf>, accessed 01/05/2018.

Policy Ref.	Policy description
Policy SS7	<i>Development proposals will be required to include measures which will mitigate their impact on climate change. Key considerations include: taking into account the known physical and environmental constraints when identifying locations for development; minimising flood risk and making use of sustainable drainage methods; reduction, re-use recycling of waste methods, particularly on development sites.</i>
Policy SC1	<i>Development proposals which protect, retain or enhance existing social and community infrastructure or ensure that new facilities are available as locally as possible will be supported.</i>
Policy OS3	<i>In determining the appropriateness of proposals which results in the loss of an open space, sports or recreation facility, the following principles will be taken into account: clear evidence that the open space is surplus to the applicable quantitative standard; the loss of the open space results in an equally beneficial replacement or enhanced existing facility for the local community; the loss of the open space will not result in the fragmentation or isolation of a site which is part of a green infrastructure corridor.</i>
Policy MT1	<i>Development proposals should incorporate the following principles requirements covering movement and transportation: promote, and incorporate integrated transport connections and supporting infrastructure; encourage active travel behaviour to reduce numbers of short distance car journeys; protect existing local and long distance footways, cycleways and bridleways unless an alternative route of equal utility value can be used;</i>
Policy E4	<i>Herefordshire is promoted as a destination for quality leisure visits and sustainable tourism therefore development should support this by utilising, conserving and enhancing the county's unique environmental and heritage assets and by recognising the intrinsic character and beauty of the countryside.</i>
Policy LD1	<i>Development proposals should demonstrate the character of the landscape has positively influenced the design, scale and nature and site selection, protection and enhancement of the setting of settlements and designated areas; development should aim to conserve and enhance the natural, historic and scenic beauty of important landscapes and features, including Areas of Outstanding Natural Beauty (AONB), nationally and locally designated parks and gardens and conservation areas through design and management; maintain and extend tree cover where important to amenity, through the retention of important trees and the appropriate replacement of trees lost through development.</i>
Policy LD2	<i>Development proposals should conserve, restore and enhance biodiversity and geodiversity assets of Herefordshire through the retention and protection of nature conservation sites and habitats and not accepting</i>

Policy Ref.	Policy description
	<i>developments which are likely to harm or degrade protected sites.</i>
Policy LD3	<i>Development proposals should protect, manage and plan for the preservation of existing and the delivery of new green infrastructure.</i>
Policy LD4	<i>Development proposals should aim to protect, conserve and where possible enhance heritage assets and their settings in a manner appropriate to their setting.</i>
Policy SD1	<i>Development proposals should create safe, sustainable, well integrated environments for all members of the community.</i>
Policy SD1	<i>Development proposals should create safe, sustainable, well integrated environments for all members of the community. All developments should incorporate the following requirements: ensure proposals make efficient use of land; ensure new development does not contribute to, or suffer from, adverse impacts arising from noise, light or air contamination, land instability or cause ground water pollution; utilise sustainable construction methods which minimise the use of non-renewable resources and maximise the use of recycled and sustainably sourced materials.</i>
Policy SD2	<i>Development proposals that seek to deliver renewable and low carbon energy will be supported where they meeting the following criteria: the proposal does not adversely impact the international or national designated nature and heritage assets; does not impact residential amenity; does not result in any significant detrimental impact upon the character of the landscape and the built historic environment.</i>
Policy SD3	<i>Development proposals should reduce flood risk through the inclusion of flood storage compensation measures, or provide similar betterment to enhance the local flood risk regime; development will not result in the loss of open watercourses and culverts should be opened up where possible to improve drainage and flood flows; development should include sustainable drainage systems to manage surface water appropriate to the hydrological setting of the site; development should not result in an increase in run off, and should aim to reduce existing runoff rate and volumes where possible.</i>
Policy SD4	<i>Development should not undermine the achievement of water quality targets for rivers within the country.</i>

2 THE PROJECT

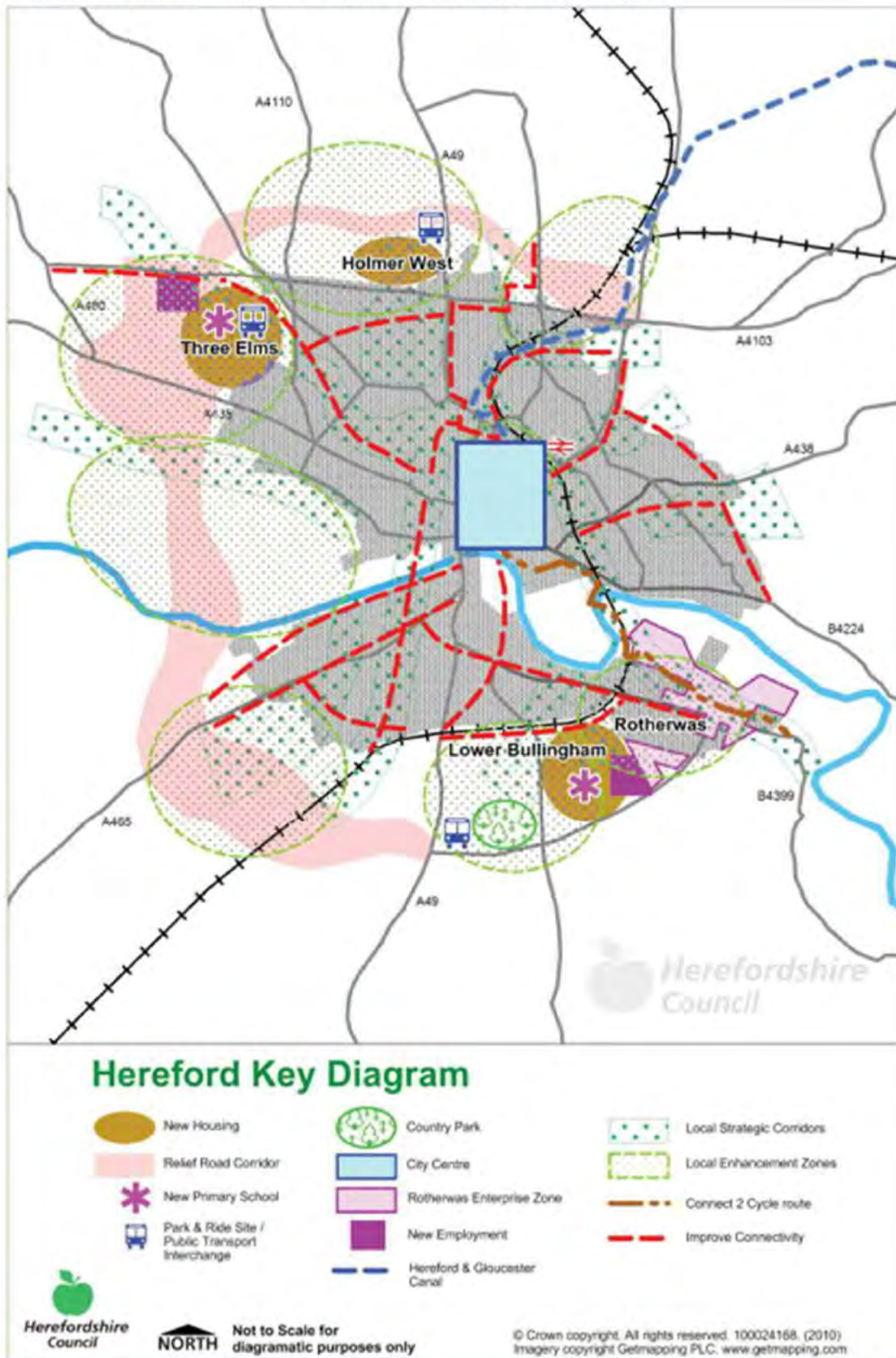
2.1 NEED FOR THIS SCHEME

- 2.1.1. The Herefordshire Local Plan Core Strategy 2011-2031 (Adopted October 2015) established the need for a bypass, referred to as the Hereford Relief Road in policy since 2007, as a means to achieve the Core Strategy housing and wider development aspirations. The bypass is an integral part of the Hereford Transport Package (HTP) which will include a series of walking, cycling, bus and public realm improvements.
- 2.1.2. The Study of Options Report (Amey, 2010) referred to an assessment of the Eastern Inner Corridor, Eastern Outer Corridor, Western Inner Corridor, and Western Outer Corridor around Hereford. The report recommended the Western Routes on the basis that it would have less of an environmental impact, particularly upon internationally and nationally important sites protected for their ecological value.
- 2.1.3. Following local feedback and feedback from the MP's for Herefordshire, the eastern bypass options were re-assessed including a route which would provide a partial bypass. This re-assessment confirmed the significant risks associated with a full eastern bypass and similar risks with a partial eastern bypass. They also confirmed that a partial eastern bypass would result in unacceptable traffic impacts on residential areas in the north east urban area of Hereford and residential communities immediately to the east of the urban area. In addition, economic and business analysis of the impact of a bypass also indicated that a western route would be likely to generate more jobs than a full eastern route (the economic assessment also indicated that a partial eastern bypass would provide much less benefit for the local economy).
- 2.1.4. The western inner corridor was preferred for the following reasons:
- The outer corridor has a much longer river crossing that would have a bigger environmental impact
 - We would be required to take further land from within the floodplain which may potentially increase flood risks
 - The landscape impact would be greater as the bypass would require a higher and longer bridge structure
 - As the corridor would be longer the construction costs would be higher
 - A larger corridor would potentially affect a larger number of landowners
- 2.1.5. This corridor is shown in diagrammatic form in the Hereford Key Diagram taken from the adopted Hereford Core Strategy 2015, as reproduced in Figure 2.1 below.

2.2 OBJECTIVES OF THE HEREFORD TRANSPORT PACKAGE (HTP)

- 2.2.1. The objectives of the HTP include:
- Encourage sustainable development: Creating attractive alternatives to car usage for journeys within the city
 - Encouraging healthier lifestyles: Encouraging people to walk and cycle for short distance trips
 - Facilitating economic growth: Reducing peak hour journey times across the city and improving access to the Hereford Enterprise Zone
 - Improving regional connectivity: Improving local and regional connections through better and more reliable journey times on the A49
 - Provide network resilience: Reducing the impact of accidents, breakdowns and maintenance work on the city's main road network
 - Improve air quality and reduce noise: Lowering levels of air pollution and noise from traffic in the city centre
 - Reduce severance: Improve connections for pedestrians and cyclists
 - Improving safety: Improve safety for all road users

Figure 2.1 - Herefordshire Local Plan Core Strategy Key Diagram



2.3 PROJECT LOCATION

- 2.3.1. The Hereford Bypass is located to the west of Hereford and the study area is illustrated in Figure 2.1 (identified as the Relief Road Corridor).
- 2.3.2. Herefordshire covers a land area of 2,180km² (excluding inland water) and is situated in the south-west of the West Midlands region, bordering Wales to the west.
- 2.3.3. A significant portion of the land within Herefordshire is predominantly rural (approximately 95% of land area classified as such), with its principal urban locations centred in the City of Hereford, and the market towns of Leominster, Ross-on-Wye, Ledbury, Bromyard and Kington.
- 2.3.4. The main roads located to the west, south west and north west of Hereford are the Trunk Roads A438, A49 and the A465 Abergavenny road. These roads are all single carriageway of varying standard and county roads. The A49 is a Trunk Road which falls under the responsibility of Highways England.
- 2.3.5. There are also several minor roads comprising the B4349 Clehonger Road which converges with the A465 near Belmont, and the B4352 which extends off the B4349 heads further west towards Hay on Wye. Between the A465 and A438 are several networks of minor roads which allow access to farms and small residential dwellings.
- 2.3.6. Environmental Constraints within and adjacent to the Core Strategy area include the River Wye Special Area of Conservation and Site of Special Scientific Interest, Ancient Woodland, Scheduled Monuments, Grade II* and Grade II listed structures and the River Wye and Yazor Brook and associated flood zones. A number of trees have been recorded in the Core Strategy area as being of Ancient, Veteran, Notable and with Tree Preservation Orders. There are also a number of residential areas, footpaths and bridleways, unregistered parks and gardens and sites of importance for nature conservation within the area. The Environmental Constraints Plans are located in Chapter 17.

2.4 PROJECT DESCRIPTION

- 2.4.1. The Corridor Appraisal Framework (CAF) reported the sifting of the 24 'long list' route options down to the seven 'short list' route options as illustrated in Figure 2-2.
- 2.4.2. The seven route options share commonalities as listed below:
 - Start at the A465 to the south, with the proposed western junction of the Southern Link Road (SLR), to provide an A49 to A49 bypass of the city centre, (in combination with the SLR).
 - End at a proposed junction with the A49 to the north of the city centre.
 - Provide connectivity with A438 Kings Acre Road and the A4103 Roman Road.
 - Have high level crossings of the River Wye and low level at Yazor Brook.
 - Avoid key environmental constraints and minimise disruption to the built environment.
 - The road standard for each route option would be the same.
 - Same horizontal alignment to the east of Canon Pyon Road.
- 2.4.3. These are briefly described individually below, however for more detailed scheme design information and route option descriptions please refer to the Stage 2 Scheme Assessment Report (70024065-WSP-XX-XX-RP-HE-00003). The designs for the route options are overlaid on the Environmental Constraints Plans in Chapter 17.

ORANGE ROUTE OPTION

- 2.4.4. The Orange route is 7.9km long and starts at the proposed SLR A465 roundabout taking a north east route to the eastern side of Forest View under Clehonger and Ruckhall Lanes and through Belmont Park cutting before a high level viaduct crossing of the Wye on a sweeping left hand curve. Rising the bypass passes over C1189 (Lower Breinton Road) before entering cutting and under Hill Road (Upper Breinton Road – U73022) and a Non-Motorised User (NMU) overbridge. On leaving the cutting the bypass falls towards a new roundabout on A438 Kings Acre Road east of The Bay Horse Inn. The bypass takes a diagonal path north west through the potential Three Elms development site passing over Yazor Brook to a new roundabout on the A4103 Roman Road at Towtree Lane. A right hand turn takes the bypass in cutting under Tillington and Canon Pyon Roads exiting on an easterly embankment over Lyde NMU underpass and terminating at a new roundabout on the A49 west of Holmer.

CYAN ROUTE OPTION

- 2.4.5. The Cyan route is 8.2km long and its route is common with the Orange route between its start at the proposed SLR A465 roundabout and where it diverges just south of C1189 (Lower Breinton Road). At this point the bypass rises passing over C1189 (Lower Breinton Road) before entering cutting and under Hill Road (Upper Breinton Road – U73022) and a NMU overbridge. On leaving the cutting the bypass falls towards a new roundabout on A438 Kings Acre Road immediately east of The Bay Horse Inn. The bypass again cut through the potential Three Elms development site, moving gradually away as it heads north passing over Yazor Brook to a new roundabout on A4103 Roman Road near The Bolts with connection to Towtree Lane. A right hand turn takes the bypass in cutting under Tillington and Canon Pyon Roads exiting on an easterly embankment over Lyde NMU underpass and terminating at a new roundabout on the A49 west of Holmer.

YELLOW ROUTE OPTION

- 2.4.6. The Yellow route is 7.9km long and its route is common with the Orange and Cyan routes between the start and where the Orange route diverges south of C1189 (Lower Breinton Road), where Orange and Cyan routes diverge at the proposed NMU footbridge north of upper Breinton. On leaving the cutting the bypass falls towards a new roundabout on A438 Kings Acre Road east of The Bay Horse Inn. The bypass takes a diagonal path through the potential Three Elms development site passing over Yazor Brook to a new roundabout on A4103 Roman Road east of Towtree Lane. A right hand turn takes the bypass in cutting under Tillington and Canon Pyon Roads exiting on an easterly embankment over Lyde NMU underpass and terminating at a new roundabout on the A49 west of Holmer.

RED ROUTE OPTION

- 2.4.7. The Red route is 8.1km long and starts at the proposed SLR A465 roundabout taking a northerly path to the western side of forest view under Clehonger and Ruckhall Lanes and through Belmont Park in cutting. The route option would then take the high level viaduct crossing of the Wye on a sweeping left hand curve at the same location as Orange, Cyan and Yellow routes. Upon exiting the viaduct the route option diverges from horizontal alignment of Orange, Cyan and Yellow routes. Rising the bypass passes over C1189 (Lower Breinton Road) before entering cutting and under Hill Road (Upper Breinton Road – U73022) and a NMU overbridge. On leaving the cutting the bypass falls towards a new roundabout on A438 Kings Acre Road immediately east of The Bay Horse Inn (location of which is shared with Cyan route). The bypass follows the western boundary of the potential Three Elms development site passing over Yazor Brook to a new roundabout on A4103 Roman Road between Towtree Lane and Bovingdon Park (location shared with Yellow route). A right hand turn takes the bypass in cutting under Tillington and Canon Pyon Roads exiting on an easterly embankment over Lyde NMU underpass and terminating at a new roundabout on the A49 west of Holmer.

OLIVE ROUTE OPTION

- 2.4.8. The Olive route is 7.8km long and shares its horizontal alignment with Red route from its starts at the proposed SLR A465 roundabout to immediately south of Ruckhall lane. The route option passes through Belmont Park in deep cutting before a straight high level viaduct crossing of the Wye. Rising the bypass passes immediately west of Warham House and over C1189 (Lower Breinton Road) before entering cutting and under Hill Road (Upper Breinton Road – U73022) and a NMU overbridge. At this point the route option converges back with the horizontal alignment of the Red route until the proposed junction with the A49.

BLACK 1 ROUTE OPTION

- 2.4.9. The Black 1 route is 8.3km long and has a common alignment with the Olive route from its start to Upper Breinton Rd where it has entered cutting and goes underneath a NMU overbridge. While in the cutting the bypass takes a left hand curve northwest exiting to fall towards a new roundabout on A438 Kings Acre Road east of Conifer Walk. The bypass passes immediately east of Hereford Livestock Market to a new roundabout on A4103 Roman Road west of Pinstone House. A right hand turn takes the bypass over Yazor Brook and ponds then in cutting under Tillington and Canon Pyon Roads exiting on an easterly embankment over Lyde NMU underpass and terminating at a new roundabout on the A49 west of Holmer.

BLACK 2 ROUTE OPTION

- 2.4.10. The Black 2 route is 8.7km long and shares its alignment with the Red route from its start until Upper Breinton Rd where it shifts to the Black 1 route, converging at the proposed NMU overbridge.

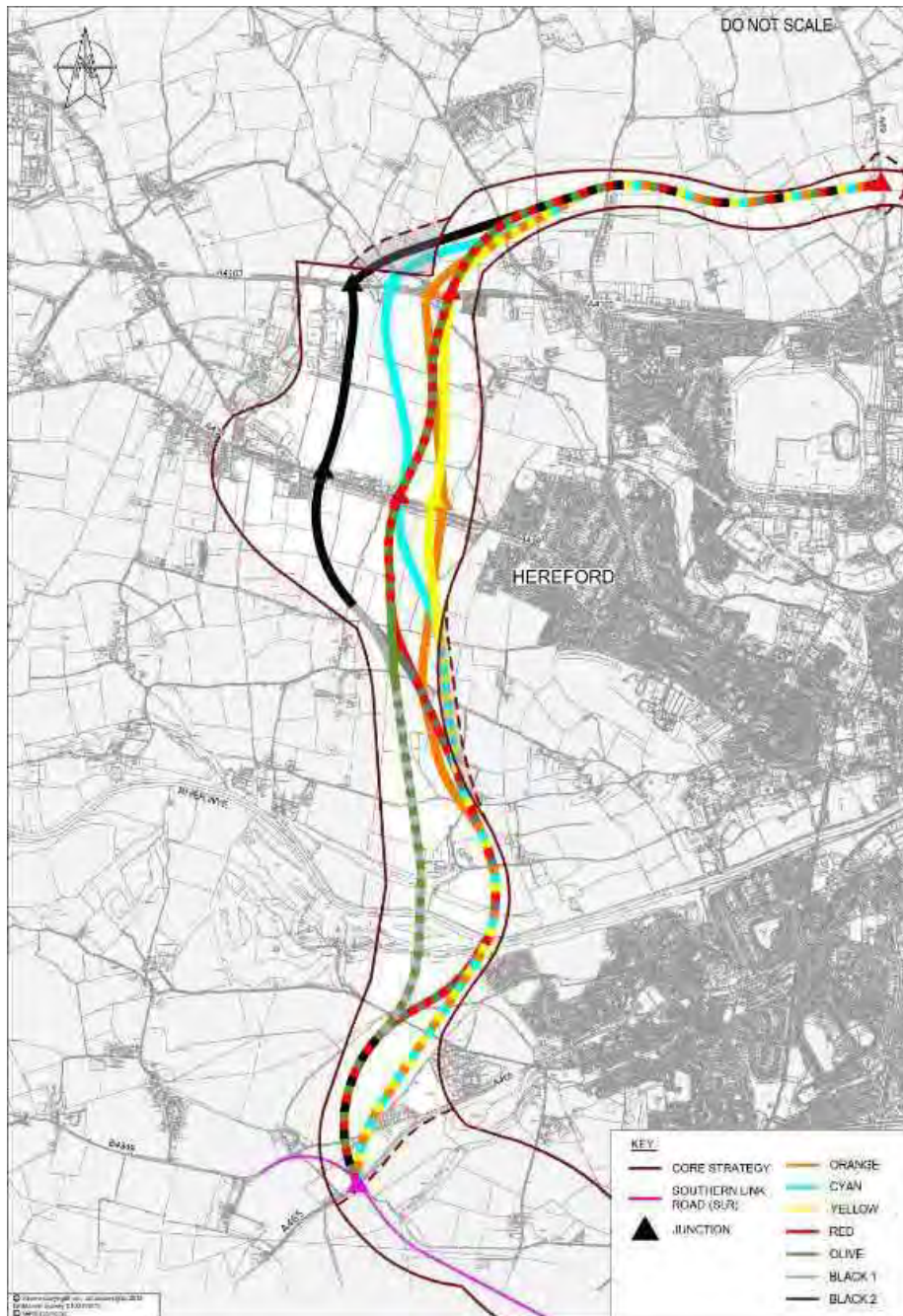


Figure 2-2 - Short list route options

3 ASSESSMENT OF ALTERNATIVES

3.1 LONG LIST OPTIONS

- 3.1.1. Section 2.1 outlines how the western inner corridor, as illustrated in Figure 2.1, was selected as the preferred corridor for the proposed Hereford Bypass.
- 3.1.2. Details of how the long list route option were development, assessed and sifting into a short list of route option is set out in the Corridor Assessment Framework report (70024065-WSP-XX-XX-TN-TR-00001) and summarised below.
- 3.1.1. A first phase of public consultation on the Hereford Transport Package (HTP) took place during Spring 2017. The aim of this consultation was to introduce the overall package (the proposed bypass supplemented by active travel measures) to the public, to provide an update on the ongoing work, to outline the future programme for the project, and to seek views on the package. A Phase 1 Consultation Report was prepared, the content of which has further informed the development of the route options.
- 3.1.2. Possible route corridors were identified via multi-disciplinary workshops involving a mix of transportation, highways and environmental staff. This ensured that a range of issues were included in the discussion, including traffic routeing, highway alignments and environmental constraints.
- 3.1.3. The route corridors also recognise the potential impact on existing development, particularly homes and businesses along Kings Acre Road and Roman Road. This was addressed by identifying locations on these largely east-west roads where a north-south bypass and junction would cause least disruption. A number of these locations were identified for each road, indicating the preferred crossing points.
- 3.1.4. Whilst the allocated development sites at Three Elms and Holmer West lie partly within the Core Strategy corridor, they were not included as a constraint in the identification of potential bypass route option.
- 3.1.5. The identification of possible route options drew upon work undertaken previously by the Council (as reported on the Council's website – <https://councillors.herefordshire.gov.uk/documents/s50035695/Hereford%20Relief%20Rd%20Cabinet%20Report%20final.pdf>) as well as considering possible new route options. All possible route options sat within, or very close to, the overall corridor identified in the Core Strategy.
- 3.1.6. By following the above process, 24 possible route corridors were identified. These are shown diagrammatically in Figure 3-1 and described in Table 3-1.

Table 3-1 - Hereford Bypass Long List Route Corridors

Route Corridor Name	Description
Black	A465(SLR) - Green - Wye(W) - Green - Black - A438 - Black - Green to A49 (All dual c/way option, no A4103 Junction)
Blue1	A465(SLR) - Blue(A465 online) - A465(Belmont) - Blue - Green - Wye(W) - Green - A438 - Green - A4103 - Green to A49
Blue2	A465(SLR) - Blue(A465 online) - A465(Belmont) - Blue - Red - Wye(outer E) - Red - A438 - edge Three Elms - A4103 - Red to A49
Brown1	A465(SLR) - Green1 - Wye(W) - Green1 - Brown1 - Red1 - A438 - edge Three Elms - A4103 - Red1 to A49
Brown	A465(SLR) - Green - Wye(W) - Green - Brown - Red - A438 - edge Three Elms - A4103 - Red to A49
Cyan	A465(SLR) - Orange - Wye(outer E) - Orange - Cyan - A438 - Purple - A4103 - Cyan - NC1 - Green to A49

Route Corridor Name	Description
Green1	A465(SLR) - Green - Green1- Wye(outer W) - Green1 - Green - A438/A80 - mid-Wyevale - A4103 - Green to A49 (orchard conflict)
Green2	A465(SLR) - Green - Wye(W) - Green - Green2 - Green - A438/A80 - mid-Wyevale - A4103 - Green to A49 (reduced orchard conflict)
Green	A465(SLR) - Green - Wye(W) - Green - A438/A80 - mid-Wyevale - A4103 - Green to A49 (imp corner Upper Hill Farm)
Orange	A465(SLR) - Orange - Wye(outer W) - Orange - A438 - mid Three Elms - A4103 - Green to A49
Purple	A465(SLR) - Orange - Wye(centre) - Brown - Red - A438 - Purple - A4103 - Purple - Green to A49
Red1	A465(SLR) - Red1 - Wye(E) - Red1 - Red - A438 - edge Three Elms - A4103 - Red - Green to A49
Red	A465(SLR) - Red - Wye(outer E) - Red - A438 - edge Three Elms - A4103 - Red - Green to A49
Sand	A465(SLR) - Green - Wye(W) - Green - A438/A80 - mid-Wyevale - A4103 - Sand(A4103 online) - Sand - Green to A49 (avoids Yazor Ponds)
PINK	A465(SLR) - Blue(A465 online) - WL1 - Wye(outer E) - WL1 - A438 - mid Three Elms - A4103 - NC1 - Green to A49
MINT	A465(SLR) - Blue(A465 online) - WL2 - Wye(outer E) - WL2 - A438/A80 - mid Wyevale/Livestock - A4103 - WL2(A4103 online) - NC2 - Green to A49
WL3	A465(SLR) - Blue(A465 online) - A465(Belmont) - WL3 - Wye(W) - WL3 - A438 - mid-Three Elms - A4103 - NC1 to A49
WL4	A465(SLR) - WL4 - Wye(W) - WL4 - A438 - mid-Three Elms - A4103 - NC1 to A49
WL5	A465(SLR) - Blue(A465 online) - A465(Belmont) - WL5 - Wye(W) - WL5 - A438/A80 - mid Wyevale/Livesock - A4103 - WL5(A4103 online) - NC2 to A49
WL6	A465(SLR) - WL6 - Wye(W) - WL6 - A438/A80 - mid Wyevale/Livesock - A4103 - WL6(A4103 online) - NC2 to A49
Yellow	A465(SLR) - Orange - Wye(outer W) - Orange - Cyan - Yellow - A438 - mid Three Elms - A4103 - Yellow - NC1 - Green to A49
Olive	A465(SLR) - Red - Olive - Wye(centre) - Olive - Red - A438 - edge Three Elms - A4103 - Red to A49

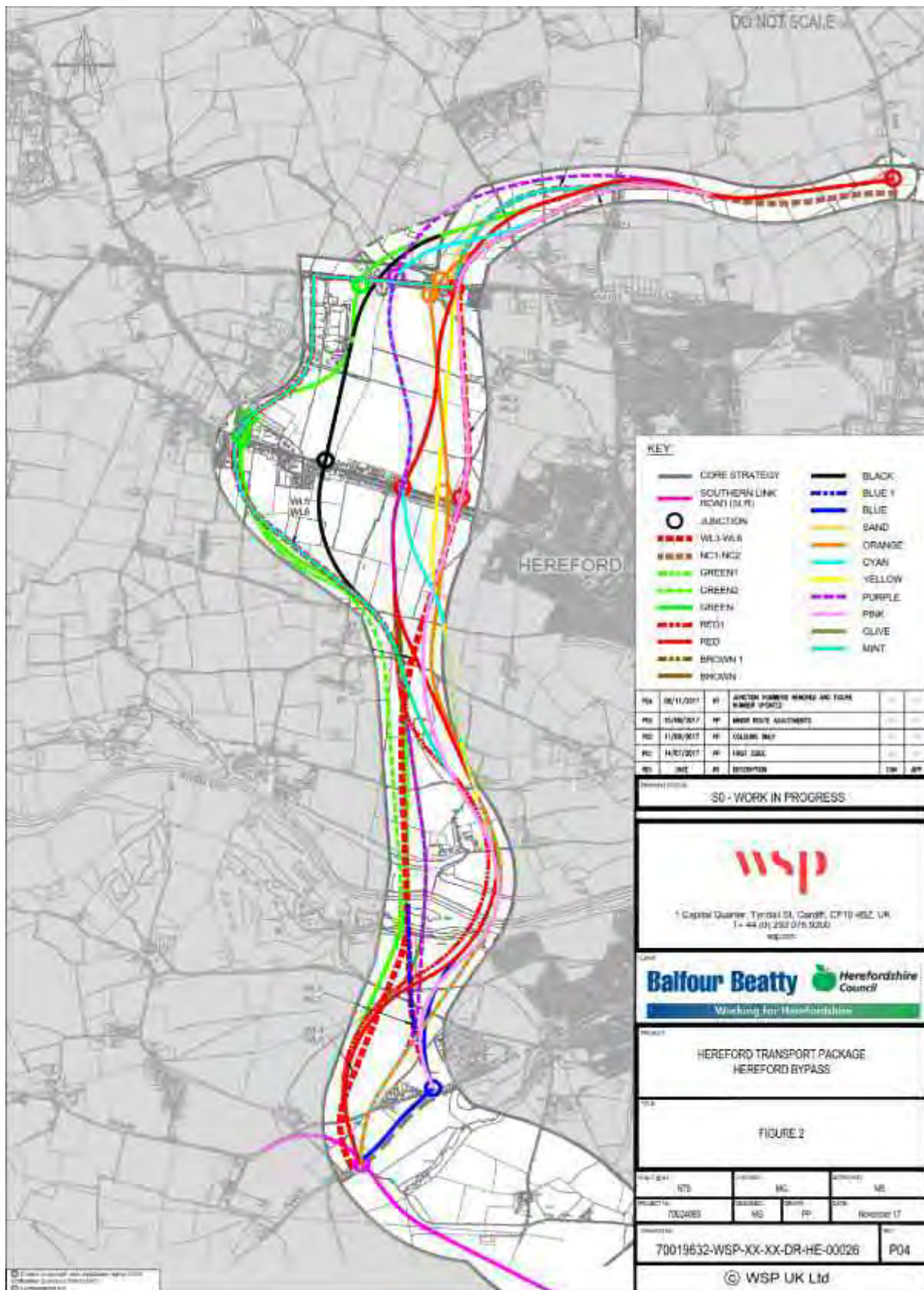


Figure 3-1 – Long list route corridors

3.2 RESULTS OF INITIAL SIFTING

- 3.2.1. In addition to the scoring of the criteria, and in accordance with WebTAG guidance on 'initial sifting', the 24 possible route options have also been reviewed to identify those which are unlikely to pass key viability or acceptability criteria. Two areas of key importance were identified – Ancient Woodland and A4194 Southern Link Road (SLR) Connectivity, and when applied reduce the number of possible route options from 24 to seven. As a consequence, this 'initial sifting' has been sufficient to reduce the number of possible route options to a suitable short list. This is explained further below.

ANCIENT WOODLAND

- 3.2.2. Routes that did not minimise the loss or deterioration of ancient woodland were not shortlisted. To justify loss or deterioration for any of these routes it would be necessary to demonstrate a need for, and benefits of, the scheme. The benefits would need to clearly outweigh that loss as follows:
- 'Development consent is unlikely to be granted for a bypass route that would result in the loss or deterioration ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless 'the national need for and benefits of the development, in that location, clearly outweigh the loss' (NNNPS Paragraph 5.32)*
- 3.2.3. Of the 24 long-listed options, 14 would directly affect ancient woodland and have therefore not been taken forward to the short list.
- 3.2.4. Paragraph 5.32 of the NNNPS also applies to veteran trees, although it is possible in this instance that the detailed design of the bypass can be altered to avoid individual trees. As such, route options which potentially impact on veteran trees have not been removed from the short list at Stage 1 of the assessment. Both ancient woodland and veteran trees should be viewed as irreplaceable and their loss cannot be mitigated.
- 3.2.5. Greenbank Meadow was considered to be designated open space. NNNPS Paragraph 5.174 states that the SoS:
- '...should not grant consent for development on existing open space, sports and recreational buildings and land, including playing fields, unless an assessment has been undertaken either by the local authority or independently, which has shown the open space or the buildings and land to be surplus to requirements, or the Secretary of State determines that the benefits of the project (including need) outweigh the potential loss of such facilities, taking into account any positive proposals made by the applicant to provide new, improved or compensatory land or facilities'.*
- 3.2.6. NNNPS Paragraph 5.181 then states that the SoS:
- '...should also consider whether mitigation of any adverse effects on green infrastructure or open space is adequately provided for by means of any planning obligations, for example, to provide exchange land and provide for appropriate management and maintenance agreements. Any exchange land should be at least as good in terms of size, usefulness, attractiveness, quality and accessibility. Alternatively, where Sections 131 and 132 of the Planning Act 2008 apply, any replacement land provided under those sections will need to conform to the requirements of those sections'*
- 3.2.7. It was assumed at Stage 1 of the assessment that compensation can be provided for Greenbank Meadow designated open space, and it is therefore not an overriding consideration.
- 3.2.8. Although the NNNPS recognises that historic assets, such as Grade II* listed buildings, are irreplaceable, all of the options affect such assets to a similar extent and are therefore not a deciding factor. The River Wye Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) would also be crossed by every option and has therefore not been used as a criteria in the sifting process.
- 3.2.9. Other policies relating to topics such as landscape impact, flood risk and local designations, encourage consideration of these aspects and mitigation of adverse impacts. However, the Examining Authority is not directed to refuse an application on the basis of these policies.

SLR CONNECTIVITY

- 3.2.10. Three of the remaining ten possible route options would require construction of an additional roundabout on the A465 to the east of the proposed junction with the SLR, along with local upgrades to the section of A465 between the two roundabouts. This arrangement would add complexity to the traffic movements, introducing an inefficient dog-leg for traffic travelling on both the SLR and the section of bypass north of the A465.

- 3.2.11. This layout would be less attractive for through traffic in using the bypass, and as such reduce the benefits which would accrue from such traffic diverting away from the existing A49 through the city. As reinforced by the results of the Phase 1 Consultation, the extent to which any bypass would remove traffic from the centre of Hereford is a very important consideration.

RESULTS

- 3.2.12. Of the 24 possible route options, 14 were rejected on the basis of considering their impact on ancient woodland and a further three have been rejected on the basis of poor connectivity to the SLR. The remaining seven route options are to be taken through to the short list for more detailed appraisal and examination in Stage 2 (this stage).

4 ENVIRONMENTAL ASSESSMENT METHODOLOGY

4.1 GENERAL SCOPING METHODOLOGY

4.1.1. The report sets out the environmental assessment as set out in the Design Manual for Roads and Bridges (DMRB) Volume 11: Environmental Assessment and Interim Advice Note 125/15: Supplementary guidance for users of DMRB Volume 11 'Environmental Assessment' namely:

- Air Quality;
- Green House gases;
- Noise and Vibration;
- Landscape;
- Cultural Heritage;
- Ecology and Nature Conservation;
- Water and Drainage;
- Geology and Soils;
- Materials and Waste;
- People and Communities;
- Population and Health;
- Climate Change; and
- Cumulative Effects.

4.1.2. The DMRB is intended for the assessment of trunk roads, and motorways, and is the most relevant and applicable set of guidance for the assessment of all highway projects. Therefore, it has been adopted for the assessment of the proposed Scheme. The assessment for each of the factors listed above area covered in one or more environmental assessment chapters in this report. The chapters have been written in accordance with the requirements presented in the DMRB Volume 11, Interim Advice Note (IAN) 125/15 for each of the relevant environmental factors. This is shown in Table 4-1.

Table 4-1 - Environmental factors and respective DMRB environmental topics

Factors contained within Regulation 5(2) of the Infrastructure Planning (EIA) Regulations	DMRB Topic
Air Quality	Chapter 5 Air Quality
Greenhouse Gases	Chapter 5 Air Quality; and Chapter 14 Climate
Noise and Vibration	Chapter 6 Noise and Vibration;
Landscape	Chapter 8 Cultural Heritage; and Chapter 7 Landscape
Cultural Heritage	Chapter 8 Cultural Heritage
Ecology and Nature Conservation	Chapter 9 Ecology
Water and Drainage	Chapter 11 Geology and Soils Chapter 10 Water Drainage
Geology and Soils	Chapter 11 Geology and Soils
Materials and Waste	Chapter 12 Materials
People and Communities	Chapter 13 People and Communities
Climate Change	Chapter 14 Climate
Population and Human Health	Chapter 5 Air Quality; Chapter 6 Noise and Vibration; Chapter 13 People and Communities; and Chapter 10 Water Drainage

- 4.1.3. A combination of simple and detailed assessments have been used in the preparation of the Environmental Assessment Report (EAR), as set out in the methodology sections of the individual topic chapters.
- 4.1.4. In each section the methodology describes;
- How the existing conditions were established;
 - Any consultations that have taken place during the assessment process; and
 - How the impacts were assessed and the criteria used to assess significance of effects.
- 4.1.5. Each topic has considered the potential environmental impacts associated with the construction and operation of the proposed Scheme.

4.2 ADDITIONAL TOPICS

POPULATION AND HUMAN HEALTH

- 4.2.1. There is no consolidated methodology or practise for the assessment of Population and Human Health, however, the scope of the assessment is covered by several different guidance notes covered by Highways England. They recognise the specific requirements of the National Policy Statement for National Networks (NNNPS) for consideration of health specifically within paragraphs. The following guidance will be utilised to address the impacts on population and human health;
- Air Quality: HA 207/0713, IAN 185/1514, IAN 175/1315, IAN 174/1316, IAN 170/1217;
 - Noise and vibration: HD 213/1118, IAN 185/1519;
 - Road Drainage and The Water Environment: HD 45/0920; and,
 - Equestrians, Cyclists, and Community Effects: DMRB Volume 11 Section3 Part 821.

4.3 ESTABLISHMENT OF EXISTING CONDITIONS AND PREDICTIVE TECHNIQUES

- 4.3.1. Available information was gathered and reviewed by various methods including literature research, desktop reviews of previous studies and reports, consultations, assessments, surveys, site visits and investigations and existing maps. The sources of information, survey methodologies and survey periods are provided under each of the specialist sections.

4.4 ASSESSMENT OF EFFECTS

- 4.4.1. The overall methodology under DMRB can be summarised generally, subject to topic specific variations, as a three-stage process as follows:
- Evaluating the value or importance of a resource and the sensitivity of the receptors;
 - Assessing the magnitude of the impact of the proposed Scheme on the resource receptor and if its adverse or beneficial; and
 - Determining the significance of effects which depend upon the value and magnitude above.

4.5 SENSITIVITY OF RECEPTORS

- 4.5.1. Receptors are defined as the physical resource or user group that would be subject to an impact or are representative of a group of individuals in the area of assessment. The baseline studies identify all potential environmental receptors.
- 4.5.2. Some receptors would be more sensitive than others to certain environmental impacts. The sensitivity of a receptor may depend upon its:
- Rarity and/or abundance;
 - Quality;
 - Location;
 - Statutory designation and its importance in a national, regional and local scale;
 - Historic or cultural associations;
 - Regenerative capacity or fragility;
 - Absorption capacity of the natural environment; and
 - Replicability.

- 4.5.3. Table 4-2 describes the criteria and descriptors that are used to determine the environmental value of an environmental resource or receptor.

Table 4-2 - Environmental sensitivity of resource or receptor and typical descriptors

Sensitivity	Criteria
Very High	High importance and rarity, international scale and limited potential for substitution.
High	High importance and rarity, national scale with limited potential for substitution.
Medium	High or medium importance and rarity, regional scale with limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

4.6 MAGNITUDE OF IMPACTS

- 4.6.1. The magnitude of impacts are assessed against a defined hierarchy of scale specific to each environmental topic but in general, are described as major, moderate, minor or negligible (Table 4-3).

Table 4-3 - Magnitude of potential impact and typical descriptors

Magnitude	Criteria
Major	Loss of resource and/or quality and integrity; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	Significant impact on the resource, but not adversely affecting the integrity; Partial loss of/damage to key characteristics, features of elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	Some measureable change in attributes quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristic features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

- 4.6.2. Impacts may also be described as:

- Direct: caused by activities which are an integral part of the project;
- Indirect: due to activities which are not part of the project;
- Secondary: a consequence of a primary impact;
- Cumulative: comprising many impacts that singly are not significant, but when assessed together may be significant;
- Short, medium or long-term;

- Temporary or permanent: For example, dust generated during construction would be temporary; land taken by the proposed Scheme would be permanent; and
- Several of the impact descriptions are interdependent, such that it is possible to have a direct cumulative long-term permanent impact.

4.7 SIGNIFICANCE CRITERIA

4.7.1. Significance criteria are used to determine the effect, and they can be measured against (inter alia) the following:

- The magnitude of the impact;
- The spatial relationship of the impact to the receptor;
- The number of receptors affected/ the scale of the impact;
- If the impact is permanent or reversible through mitigation;
- The complexity of the impact;
- The probability of the impact;
- The value and importance of the receptor in terms of environmental and planning policy legislation; and
- The sensitivity and rarity of the receptor.

4.7.2. Significant effects may arise as a result of a slight impact on a resource of national value, or a severe impact on a resource of local value. Assignment of significance to an effect has been undertaken in a consistent and systematic manner through the establishment of a set of significant criteria following guidance set out in Section 2 of IAN133/10. The matrix used to determine the significance of effects to an environmental resource is demonstrated in Table 4-4. The significance of effects can either be considered adverse or beneficial.

Table 4-4 - Matrix used to determine the significance of effects to receptors

Magnitude of Potential Impact	Sensitivity				
	Very High	High	Medium	Low	Negligible
Major	Very large	Large or very large	Moderate or large	Slight or moderate	Slight
Moderate	Large or very large	Moderate or large	Moderate	Slight	Neutral or slight
Minor	Moderate or large	Slight or moderate	Slight	Neutral or slight	Neutral or slight
Negligible	Slight	Slight	Neutral or slight	Neutral or slight	Neutral
No change	Neutral	Neutral	Neutral	Neutral	Neutral

4.8 GENERAL ASSESSMENT, ASSUMPTIONS AND LIMITATIONS

4.8.1. The assessment of potential impacts is currently based on indicative scheme layout drawings (refer to Chapter 17), as some aspects of the proposed design and mitigation have not yet been confirmed. This is of particular importance when considering impacts associated the potential effects of the proposed Scheme. The potential impacts of the proposed Scheme are currently based on very high level details of the proposals.

4.8.2. Most of the baseline information across all the topic chapters has been gathered using desk based studies and may not have been informed by data collected physically on site. Some of the data collected relies on qualitative descriptions by the assessor which is subjective. There is also a degree of subjectivity in the assessment of views. Where subjective assessments are presented, attempts to reconcile against evidence will be made throughout.

4.8.3. The assessment will relies, in part, on data provided by third parties (e.g. local authorities, Environment Agency, Natural England) which are the most up-to-date, available at the time of the assessment. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment for Environmental Impact Assessment (EIA) purposes.

ELEMENTS

Whilst the routes have been technically developed as individual routes independent of each other, the recommended route could be a mixture of routes based on best solution within that element or sub- element, taking account of all relevant environmental and technical constraints, including the ability of the route sections to align with one another and the route as a whole to be able to meet the objectives of the scheme.

4.8.4. Therefore to assist with informing the route selection process each route option or combination of route options, where alignments are shared, has been assessed across three elements within the Hereford Bypass Core Strategy Area as illustrated in Figure 4-1 and described below:

- Element 1: A465 to Hill Road (Upper Breinton Road – U73022)
- Element 2: Hill Road (Upper Breinton Road – U73022) to Canon Pyon Road
- Element 3: Canon Pyon Road to A49

4.8.5. The term ‘element’ means a defined geographical section of the core strategy area, with a common set of constraints or issues and within which choices can be made largely independently of the other elements.

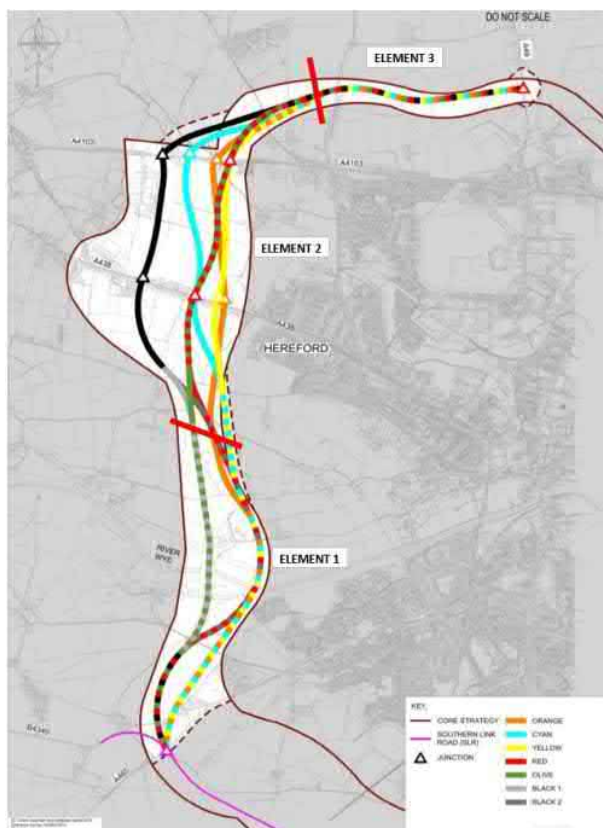


Figure 4-1 – Three Elements throughout the Core Strategy Area

4.8.6. The assessment undertaken in this report assesses the following combination of route options (where alignments are shared):

- Element 1 will assess four route options within the southern section: Orange, Cyan and Yellow, Red and Black 2, and Olive and Black 1;
- Element 2 will assess all seven route options individually within the central section; and
- Element 3 will assess a single option (route is the same for all 7 routes) within the northern section.

4.9 TRAFFIC DATA

4.9.1. For the purposes of this EAR assessment, the following traffic scenarios have been modelled:

- 2016 Baseline - no A4194 Southern Link Road (SLR);
- Do minimum - 2026 Opening Year 1 SLR (2026 Baseline);
- Do something - 2026 Opening year 2 SLR and Hereford Bypass;

- 2041 Design Year 1 SLR (2041 Baseline); and
- 2041 Design Year 2 SLR and Hereford Bypass.

- 4.9.2. It is therefore assumed that there is no scenario under which the Hereford Bypass would be constructed without the SLR first being in place.
- 4.9.3. These are described in more detail in Chapter 5 Air Quality and Chapter 7 Noise and Vibration. The developments contained within the Uncertainty Log for the traffic model are given in Chapter 17 Combined and Cumulative Effects.

5 AIR QUALITY

5.1 INTRODUCTION

- 5.1.1. This chapter provides the preliminary assessment of the potential air quality effects of the route options. Impacts during construction and operational phases have been considered in relation to sensitive human and ecological receptors.
- 5.1.2. The assessment has regard to relevant legislation and policy concerning air quality and transport infrastructure, and has been undertaken in accordance with Highways England Design Manual for Roads and Bridges (DMRB), Section 3 Part 1 guidance (HA207/07) and associated Interim Advice Notes.
- 5.1.3. The assessment reviews baseline air quality conditions, with particular reference to 2016 as the assessment base year, and future conditions without and with the scheme in the opening year of 2026.

5.2 LEGISLATION AND POLICY FRAMEWORK

RELEVANT LEGISLATION

- 5.2.1. The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland. The Air Quality Strategy⁵ provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation.
- 5.2.2. The Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002 set air quality objectives for local authorities. The current Air Quality Strategy was first established by the Government in 1997 in accordance with the requirements of Part IV of the Environment Act 1995. The Environment Act 1995 also introduced the system of local air quality management in pursuit of achieving the air quality objectives (commonly referred to as 'Air Quality Strategy objectives'). Local authorities are responsible for local air quality management and are required regularly to review and assess local air quality and report to the Department for Environment, Food and Rural Affairs. Where a local authority identifies non-compliance with one or more Air Quality Strategy objective it is required to declare an Air Quality Management Area (AQMA) and produce an Air Quality Action Plan to work towards achieving the relevant Air Quality Strategy objective(s).
- 5.2.3. The Air Quality Standards Regulations 2010 transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as PM₁₀⁶ and nitrogen dioxide (NO₂). The limit values are numerically the same as the Air Quality Strategy objectives. The relevant air quality criteria⁷ are given in Table 5-1 (further details are given in Appendix 5-2).

Table 5-1: Air Quality Criteria for Highways schemes

Pollutant	Concentration (micrograms per cubic metre, µg/m ³)	Measured as:	Number of exceedances allowed in a calendar year
Nitrogen Dioxide (NO ₂)	40	Annual mean	None
	200	1-hour mean	No more than 18
Nitrogen Oxides (NO _x)*	30	Annual mean	None
PM ₁₀	40	Annual mean	None
	50	24-hour mean	No more than 35

⁵ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2), Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations, 2007.

⁶ PM₁₀ – Particulate matter with a diameter of 10 micrometres or less.

⁷ The terms 'criteria' and 'criterion' are used in this chapter when referring to both Air Quality Strategy objectives and limit values.

* For the protection of ecological habitats

RELEVANT POLICY

National Planning Policy Framework

- 5.2.4. The Government's overall planning policies for England are described in the National Planning Policy Framework⁸ (NPPF). Of particular relevance is paragraph 124, which states:

- *"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."*

National Policy Statement for National Networks

- 5.2.5. The National Policy Statement for National Networks (NNNPS)⁹ addresses emissions of pollutants affecting air quality - specifically NO_x and PM₁₀. In paragraph 3.8, it considers that:

- *"The impact of road development on aggregate levels of emissions is likely to be very small. Impacts of road development need to be seen against significant projected reductions in carbon emissions and improvements in air quality as a result of current and future policies to meet the Government's legally binding carbon budgets and the European Union's air quality limit values."*

- 5.2.6. Paragraphs 5.3 to 5.15 of the NNNPS address air quality and set out the requirements of the Applicant's assessment, the Secretary of State's responsibilities in decision making, and mitigation to address any significant effect considered a compliance risk with regard to the Air Quality Directive (2008/50/EC).

- 5.2.7. Of particular importance to scheme progression is paragraph 5.13, which states that:

- *"The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will: result in a zone / agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision."*

- 5.2.8. The air quality assessment presented in this chapter must have regard to this policy by determining the compliance risk presented by the proposed Scheme and what, if any, mitigation would be required to facilitate compliance.

Hereford Local Policy

- 5.2.9. The Herefordshire Council Local Plan Core Strategy 2011-2031 defines the key strategic framework for the county. There are several mentions of air quality throughout the document, the following are some of the key policies concerning air quality:

- Policy HD3 Hereford movement - is the western relief road which aims to improve air quality through congestion relief in the centre of Hereford;
- Policy SS4 - Movement and Transportation looks to bring about improvements in air quality through intelligent design of new developments;
- Policy SS6 - Environmental quality and local distinctiveness, considers environmental components for new developments from the outset;
- Policy HD3 – Hereford movement looks to improve air quality through promoting sustainable transport modes.

⁸ National Planning Policy Framework, Department for Communities and Local Government, March 2012.

⁹ National Policy Statement for National Networks, Department for Transport, December 2014.

5.3 STUDY AREA

- 5.3.1. The study area includes the Hereford AQMA and the Affected Road Network (ARN). The ARN has been defined in accordance with HA207/07 scoping criteria. Affected roads are those that meet any of the following criteria:
- Road alignment will change by 5 metres or more; or
 - Daily traffic flows will change by 1,000 annual average daily traffic or more; or
 - Heavy duty vehicle flows will change by 200 annual average daily traffic or more; or
 - Daily average speed will change by 10 kilometres per hour or more; or
 - Peak hour speed will change by 20 kilometres per hour or more.
- 5.3.2. The study area is restricted to within 200 metres either side of the affected road network, as illustrated in Figure 5-1 in Appendix 5-1.

5.4 BASELINE CONDITIONS

- 5.4.1. Baseline air quality conditions have been reviewed within the study area. Conditions are described in terms of sensitive human receptors and ecological receptors.
- 5.4.2. The review was based on information from the following sources:
- Local air quality management reports and monitoring data, published by Herefordshire Council;
 - Scheme specific monitoring data, WSP;
 - Department for Environment, Food and Rural Affairs (Defra) Pollution Climate Mapping (PCM) model data;¹⁰
 - Defra UK-Air website;¹¹
 - Ordnance Survey (OS) data;
 - Natural England's MAGIC website¹² (information on designated sites); and
 - The Air Pollution Information System (APIS) website¹³ (information on designated sites).
- 5.4.3. Baseline conditions are illustrated in Figure 5-4, Figure 5-5 in Appendix 5-1, monitored concentrations are given in Appendix 5-3.
- 5.4.4. The ARN lies completely within the Herefordshire Council boundary. Herefordshire Council runs continuous analysers for both nitrogen dioxide and particulate matter on the A49 Victoria Street within Herefordshire. The annual mean concentrations for NO₂ and PM₁₀ in 2017 are 42µg/m³ and 25µg/m³ respectively. The latest diffusion tube data available from Herefordshire Council is for 2017, where the highest annual mean concentrations were 38.6µg/m³ at HCC89. Concentrations at all other Herefordshire Council monitoring sites are well below 40µg/m³.
- 5.4.5. The survey carried out for the proposed Scheme in 2017 included several roadside/kerbside sites Hereford 2, Hereford 3 and Hereford 10 (as shown on Figures 5-5). Annual mean NO₂ concentrations at these locations were around 25µg/m³, well below the annual mean limit of 40µg/m³. The average annual mean concentration at the continuous analyser was 44.8µg/m³.
- 5.4.6. Herefordshire Council has declared two AQMAs, both due to exceedance of the annual mean limit for NO₂. One of these, AQMA Hereford, is located within the study area along the A49 corridor through the centre of Hereford (refer to Figure 5-5). The highest monitored annual mean NO₂ concentration was 44.2µg/m³ in 2017.
- 5.4.7. There are PCM links within the study area. These links lie along the major A roads in and out of Hereford, including the A49, A465, A438, and the A4103. The highest roadside annual mean NO₂ concentration for 2015 is 38.6µg/m³ along the A49 between the Edgar St Roundabout and Barton Rd junction.

¹⁰ 2017 NO₂ Projections Data (2015 reference year), Department for Environment Food and Rural Affairs, 2017.

¹¹ Refer to <https://laqm.defra.gov.uk/>.

¹² Refer to <http://www.natureonthemap.naturalengland.org.uk/>.

¹³ Refer to <http://www.apis.ac.uk/>.

- 5.4.8. There is one designated ecological site within 200 metres of the ARN with features sensitive to air quality (River Wye SAC/SSSI). The details of both sites are given in Table 5-2, along with their relevant features.
- 5.4.9. NO_x concentrations at both sites are well below the critical level of 30µg/m³.

Table 5-2: Designated sites within the study area

Name	Distance to nearest road (metres)	Features	NO _x Concentration (µg/m ³)	Nitrogen Deposition (kg N/ha/yr)	Critical Load (kg N/ha/yr)
River Wye SAC	All options would cross the site	Water courses of plain to montane levels with the <i>Ranunculus fluitans</i> and <i>Callitriche-Batrachion</i> vegetation	11.8	18.6 (Max)	5*
River Wye SSSI	All options would cross the site	Bryophytes Vascular Plants	15.9	7.8 – 19.8 7.8 – 19.8	10-20
Wye Coppice Ancient Woodland	14m to Black 1 / Olive	Broadleaved deciduous woodland	9.72	31.22	10-20
Rough Coppice Ancient Woodland	7m to Black 2 / Orange / Red / Yellow, 68m to Black 1 / Olive	Broadleaved deciduous woodland	10.91	31.22	10-20
Hunderton Wood Ancient Woodland	48m to Orange, 53m to Black 1/Cyan/ Red/Yellow	Broadleaved deciduous woodland	11.8	31.22	10-20
Newton Coppice Ancient Woodland	7m to A465	Broadleaved deciduous woodland	11.1	31.22	10-20
Green Lane Wood Ancient Woodland	132m Black 1	Broadleaved deciduous woodland	9.77	29.68	10-20
Littlemarsh Common SSSI / Ancient Woodland	0m	Neutral grassland - Lowland	7.01	18.5	15-25
Cage Brook Valley SSSI	111m to Clehonger	Broadleaved, mixed and yew woodland - Lowland	7.5	31.12	10-20
Grafton Wood Ancient Woodland	7m to SLR	Broadleaved deciduous woodland	11.2	30.38	10-20
Hayleasow Wood Ancient Woodland	17m to A465	Broadleaved deciduous woodland	10.82	31.22	10-20

Data extracted from APIS (www.apis.ac.uk) 10/04/2018

5.5 ASSESSMENT METHODOLOGY

CONSTRUCTION PHASE IMPACTS

- 5.5.1. At this stage of the assessment there is insufficient information to undertake a sensible qualitative assessment of potential construction impacts from earthworks, construction, and trackout (as per the IAQM guidance¹⁴). A detailed assessment will be undertaken on the Preferred Route as part of the Environmental Statement (ES).
- 5.5.2. A simple level assessment of sensitive receptors within 200m of the route alignments of the has been undertaken. Beyond 200m any impact is unlikely to give rise to significant effects.

OPERATIONAL PHASE IMPACTS

Human Receptors

- 5.5.3. The assessment methodology follows HA 207/07 procedure for simple assessment and the following associated Interim Advice Notes (IAN) IAN170/12, IAN174/13 and IAN175/13. The air quality impacts presented in this report have been assessed using ADMS-Roads (4.1.1) Appendix 5-4 provides details of the ADMS-Roads model settings.
- 5.5.4. Receptors were chosen to be indicative of their respective settings, and represent the worst case effects of the proposed Scheme. The receptors are presented in four groups and shown in Figures 5-2 & 5-3:
- Offline receptors – those outside of 200m on the wider road network away from the proposed alignments; and
 - Online receptors – those within 200m of the proposed alignment receptors split into the three element groups across the different options (one to the north, one central and one to the south).
- 5.5.5. The receptors considered are places where members of the public are regularly present, including residential properties, schools, healthcare facilities and areas where people more sensitive to air quality such as the elderly (care homes) and young (schools). The selected receptors differ for each of the proposed options, to reflect the variation in alignment. In addition, the numbers of properties represented by each receptor may vary, and are therefore not an indication of total exposure as a result of the proposed options, i.e. there are more rural receptors (to cover the different alignments), than there are urban receptors (away from the proposed Scheme). Receptors were modelled at a height of 1.5m.
- 5.5.6. Traffic data for air quality assessment have been taken from the output of the transport assessment for the proposed Scheme. All calculations have been based upon total Annual Average Daily Traffic (AADT) flows, percentage heavy duty vehicles, and a diurnal profile to account for traffic variation during the morning, inter-peak, afternoon and off-peak periods.
- 5.5.7. Road source contributions to annual mean concentrations of pollutants have been estimated using the latest emission factor toolkit (EFT v8.0 (2 VC)). These data have been combined with the equivalent Defra background map data (produced in 2017, Appendix B-4) to generate total concentrations. NO₂ and PM₁₀ concentrations have been estimated at representative human receptors (shown in Figures 5-6). The assessment has accounted for the following scenarios:
- 2016 baseline (including monitoring sites to permit model verification, see Appendix 5-4 for details);
 - 2026 without scheme (Do-Minimum (DM)); and
 - 2026 with the Scheme (Do Something (DS)).
- 5.5.8. Total annual mean NO₂ concentrations have been derived from modelled road NO_x and background components using the Defra NO_x to NO₂ calculation tool (version 6.1). Non-compliance with the one hour mean NO₂ criterion has been assumed where the annual mean concentration exceeds 60µg/m³, in accordance with the Defra technical guidance LAQM.TG(16).

¹⁴ Institute of Air Quality Management (2016), Guidance on the assessment of dust from demolition and construction, available online <http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf>, accessed 17/05/2018.

- 5.5.9. The assessment has been undertaken in accordance with the IAN 170/12 (version 3) concerning future NO_x and NO₂ projections. This is to account for uncertainty in estimated future year concentrations. Defra's current emissions projections, are considered to be optimistic in forecasting emissions reductions. The IAN provides a gap analysis methodology based on a review of long-term trends in ambient monitoring data to address the uncertainty in the Defra's forecast. The gap analysis balances the assessment with a reasonably pessimistic (worst-case) forecast of concentrations, which reflects relatively modest improvements vehicle emissions over time, including the introduction of Euro 6/VI emissions classes.
- 5.5.10. The impacts have been described with reference to the significance criteria as set out in IAN 174/13. The definitions of the terms used are given in Table 5-3.

Table 5-3: Magnitude of Change Criteria

Magnitude of Change in Concentration (Positive or Negative)	Value of Change in Annual Average NO ₂ and PM ₁₀
Large (>4)	Greater than full measure of uncertainty value of 10% of the air quality objective (4µg/m ³).
Medium (>2 to 4)	Greater than half of the measure of uncertainty (2µg/m ³), but less than the full measure of uncertainty (4µg/m ³) of 10% of the air quality objective.
Small (>0.4 to 2)	More than 1% of objective (0.4µg/m ³) and less than half of the measure of uncertainty i.e. 5% (2µg/m ³). The full measure of uncertainty is 10% of the air quality objective (4µg/m ³).

- 5.5.11. The likely significance of effects has been considered with reference to IAN 174/13¹⁵. Significant effects may be adverse or beneficial in nature.

Compliance Risk

- 5.5.12. Annual mean NO₂ concentrations and impacts have been evaluated with regard to compliance with European Union Ambient Air Quality Directive (2008/50/EC), in accordance with IAN 175/13. The assessment uses PCM model baseline projections¹⁶ and the impacts predicted at representative receptors.

Designated Sites

- 5.5.13. Road source contributions to annual mean NO_x concentrations at transect receptors have been predicted. The transects, with receptor points at 10m intervals, extend into the designated sites up to 200m from the centreline of the nearest affected road network link. Beyond 200m any impacts would be imperceptible. The road source contributions have been combined with background NO_x data from the Defra¹⁷ to generate total concentrations.
- 5.5.14. Gap analysis has been undertaken for future predictions of NO_x concentrations in accordance with IAN 170/12 (version 3)¹⁸.

¹⁵ Interim Advice Note 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11 Section 3 Part 1 Air Quality (HA207/07), former Highways Agency, June 2013.

¹⁶ 2017 NO₂ Projections Data (2015 reference year), Department for Environment Food and Rural Affairs, 2017.

¹⁷ Refer to <https://laqm.defra.gov.uk/>.

¹⁸ Interim Advice Note 170/12 (v3) Updated air quality advice on the assessment of future NO_x and NO₂ projections for users of DMRB Volume 11 Section 3 Part 1 Air Quality, former Highways Agency, November 2013.

- 5.5.15. With reference to IAN 174/13¹⁵, if the critical level of 30µg/m³ is exceeded with a change of 0.4µg/m³ or more than a significant effect in terms of harm to sensitive vegetation cannot be ruled out. According to the guidance, a change of less than 0.4µg/m³ is imperceptible and a significant effect can be discounted.

Regional Air Quality

- 5.5.16. A regional impact assessment has been undertaken for each scenario, including the forecast year of 2041, to indicate the differences in emissions of NO_x, PM₁₀ and carbon dioxide (CO₂). Emissions have been calculated for the whole traffic model network for each scenario within the study area.

Options Offset

- 5.5.17. The introduction of the proposed Scheme would add additional road sources where there are none. Therefore there is little knowledge of how the potential impacts will change with distance from the road. Following consultation with Herefordshire Council a transect was modelled from the route option to 100m to understand the drop off of concentrations from the roadside. This will be used to inform developments (such as Three Elms) and the offset distance from the roadside.

Health

- 5.5.18. The assessment of likely significant effects on human health in relation to air quality is inherent in the health based objectives on which the assessment is based. These objectives have been established to protect individuals in a population, such that they define the standard below which health effects are unlikely to be experienced even by the most sensitive members of the population. Above these, worse health outcomes may be predicted.
- 5.5.19. The findings of the assessment of effects on human health will therefore be summarised qualitatively in the assessment section of the topic chapter. The air quality assessment will contain a cumulative assessment of changes in air quality arising from the Scheme and other committed developments within the traffic model.
- 5.5.20. Where human health effects are identified in this and any other topic, whether significant or not, these effects will be incorporated into the cumulative effects assessment in Chapter 15. It is noted that given the very low number of receptors affected, and the likelihood that appropriate mitigation measures for individual effects will be developed, the overall effects on human health are not considered to be significant.

Assessment Assumptions and Limitations

- 5.5.21. The assessment is intended to inform the Stage 2 assessment and preferred route sifting process, in-particular to present information on compliance risks so that the appropriate decisions can be made before advancing to the next stage. The assessment has been based on the best available information at the time. It is not intended to provide the level of detail required under Directive 2014/52/EU (also known as the Environmental Impact Assessment Directive), which is relevant at the next stage.
- 5.5.22. There was insufficient information for an assessment of construction impacts at this stage. It is envisaged that more detail would be available at the next stage and the assessment for the preferred route would be more refined. Nevertheless, it is considered that the assessment presented is robust.
- 5.5.23. In considering the impacts of operational traffic on regional emissions there is currently no established way of describing magnitude of impact or determining if the effect is significant or not. Also, emissions for the forecast scenario in 2041 are based on Defra emissions for 2030, which represents the maximum extent of Defra forecast for vehicle emission factors.

5.6 DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

CONSTRUCTION

- 5.6.1. To minimise the risk of adverse impacts during construction, industry best practice measures should be employed. Appropriate measures should be specified in the Construction Environmental Management Plan (CEMP). The measures used will depend on the circumstances but typically comprise:
- Damping down of dry surfaces, in-particular haul roads;
 - Avoiding / minimising stockpiling of friable materials on-site in open areas;
 - Locating stockpiles (if necessary) as far away from sensitive receptors as practicable;
 - Seeding of long-term inactive stockpiles such as topsoil;

- On-site speed restrictions to minimise dust entrainment;
- Sheeting / covering of lorries carrying potentially dusty materials;
- Wheel / chassis cleaning prior to exit onto the public highway;
- Requiring all on-site plant to comply with the latest EU emission standards for non-road mobile machinery; and
- Requiring all contractor vehicles to be compliant with a minimum Euro emissions standard, for example Euro VI (6).

OPERATION

- 5.6.2. Mitigation of operational phase impacts will only be required if significant adverse effects are likely. This is considered in the next section.

5.7 POTENTIAL EFFECTS

CONSTRUCTION

- 5.7.1. During the construction phase, adverse impacts from dust and exhaust emissions could potentially occur at sensitive receptors within 200m of worksites associated with the proposed Scheme. Impacts would be temporary in nature and with appropriate mitigation (see Section 5.6), the risk of such impacts could be minimised. The residual effect is unlikely to be significant.
- 5.7.2. The approximate number of receptors that could be affected during the construction of the proposed Scheme are shown in Table 5-4.

Table 5-4: Number of properties likely to be affected by the construction of the proposed Scheme

Option	Properties within 50m	Properties within 200m	Total number of properties within 200m
Cyan	16	111	127
Orange	18	91	109
Red	9	72	81
Yellow	13	133	146
Olive	9	139	148
Black 1	10	129	139
Black 2	10	96	106

OPERATIONAL PHASE IMPACTS

- 5.7.3. NO₂ and PM₁₀ concentrations have been assessed at 72 discrete human receptors (including residential properties) in the opening year of 2026 (shown in Appendix 5-5). Impacts are presented as the difference in concentrations with the scheme (Do-Something (DS)) and without the scheme (DO-minimum (DM)). The key findings for each proposed option are discussed below. The results are presented using the results of the gap analysis as a worst-case.
- 5.7.4. Overall, the proposed Scheme is predicted to redistribute traffic that currently goes through Hereford onto the bypass, leading to improvements in air quality in the centre of Hereford. Areas adjacent to each of the seven route options and adjoining roads would potentially experience an increase in pollutant concentrations, however with the existing low background pollutant concentrations the risk of exceedance of the relevant air quality standards is low.
- 5.7.5. Taking into account the guidance given by IAN 174/13 regarding evaluation of significant local air quality effects and using professional judgement, the local air quality impacts with the proposed Scheme would not give rise to a significant adverse effect.
- 5.7.6. Offline impacts (not on the route options alignments) are presented first, followed by route option specific impacts.

Offline Impacts

- 5.7.7. Within the centre of Hereford, the greatest change would be an improvement of $4.74\mu\text{g}/\text{m}^3$ at receptor R18 (see Appendix 5.5), which is located on Victoria Street between the Edgar Street roundabout and Barton Road junction. The magnitude of change is large. This is due to the overall rerouting of through traffic from the A49 through the centre of Hereford to the bypass. All modelled concentrations were well below the air quality threshold, with a maximum predicted concentration of $25\mu\text{g}/\text{m}^3$ at R19 on St Nicholas Street. There would be no increases in nitrogen dioxide within Hereford.
- 5.7.8. Outside of Hereford centre, the greatest decrease would be of $2.8\mu\text{g}/\text{m}^3$ at receptor R43 in Lulham, with further decreases seen at receptors R30, R40, and R44. This is due traffic crossing the River Wye rerouting onto the bypass rather than using the rural roads to the south-west of Hereford to cross the river. The greatest increase would be seen at receptor R28, on the A465 at Allensmore, with a small magnitude increase of $1.74\mu\text{g}/\text{m}^3$. This would be due to the increase in demand generated on the network by the bypass.
- 5.7.9. Annual and 24-hour mean concentrations of PM_{10} would be compliant with the relevant criteria (Table 5-1) at all receptors without and with all the proposed Scheme in place (see Appendix 5.5). Receptor R52 would experience the greatest impact with a small worsening in concentration of $0.63\mu\text{g}/\text{m}^3$. The highest annual mean PM_{10} concentration in all options ($17.3\mu\text{g}/\text{m}^3$) would be at R18, this would be well below the annual mean criteria. All other impacts would be of small to imperceptible magnitude, with concentrations everywhere staying well below the annual mean criteria of $40\mu\text{g}/\text{m}^3$. On the basis of the information provided and assumptions made in the modelling there is no risk of any significant impacts arising from the operation of the proposed Scheme for all options.

Route Option Specific Impacts

- 5.7.10. Table 5-5 below summarises the predicted impacts of the seven route options at the selected indicative receptors. This does not represent total exposure. The results are presented for City (receptors within the urban area of Hereford) and Rural (receptors outside of the urban area).

Orange

- 5.7.11. The greatest increase in annual mean NO_2 concentrations near the Orange route option would be $3.33\mu\text{g}/\text{m}^3$ at receptor R52 (Edgewood), which is on the B4349 Clehonger Lane approximately 35m from the southern end of the Orange option. The magnitude of change would be medium, due to the proximity of the introduced scheme. However, concentrations remain well below the annual mean criterion.
- 5.7.12. The worst affected receptor in Element 1 would be R52 discussed above. The worst affected receptor in Element 2 would be R85 (A438 Bramley Court), with a small magnitude change of $1.97\mu\text{g}/\text{m}^3$, which is on the A438 to the west of the route option alignment. This would be a result of increased traffic flows on the A438 Kings Acre Road accessing the bypass. The worst affected receptor in Element 3 would be R6 Towtree House, where a small magnitude change of $1.35\mu\text{g}/\text{m}^3$ is predicted. However, concentrations would remain well below the annual mean criteria.

Cyan

- 5.7.13. The greatest increase in annual mean NO_2 concentrations near the Cyan route option would be $3.33\mu\text{g}/\text{m}^3$ at receptor R52 (Edgewood), which is on the B4349 approximately 35m from the southern end of the proposed alignment. The magnitude of change is medium, due to the proximity of the introduced bypass. However, concentrations would remain well below the annual mean criteria.
- 5.7.14. The worst affected receptor in Element 1 would be R52, discussed above. The worst affected receptor in Element 2 would be R89 (Hunting Brook West), with a medium magnitude change of $2.93\mu\text{g}/\text{m}^3$, which is on the A438 Kings Acre Road to the east of the route option alignment. This is a result of increased traffic flows on the A438 Kings Acre Road accessing the route option. The worst affected receptor in Element 3 would be R6 Towtree House, where a small magnitude change of $1.35\mu\text{g}/\text{m}^3$ is predicted. However, concentrations would remain well below the annual mean criteria.

Table 5-5: Summary of predicted nitrogen dioxide impacts for all route options at selected indicative receptors

Receptor Setting	Selected receptors with improvement of >1%	Selected receptors with change between +/-1%	Selected receptors with a worsening >1%	Max predicted Do-something concentration	Max worsening	Max improvement
ORANGE						
Rural	11	0	29	22.5	3.33	-2.86
City	9	0	0	24.9	-0.01	-4.74
CYAN						
Rural	11	0	30	22.5	3.33	-2.86
City	9	0	0	24.9	-0.01	-4.74
YELLOW						
Rural	11	0	30	22.5	3.33	-2.86
City	9	0	0	24.90	-0.01	-4.74
RED						
Rural	11	0	34	22.5	3.36	-2.86
City	9	0	0	24.9	0.00	-4.74
OLIVE						
Rural	11	0	31	22.5	3.36	-2.86
City	9	0	0	24.9	-0.05	-4.74
BLACK 1						
Rural	11	0	33	22.5	3.36	-2.86
City	9	0	0	24.9	0.00	-4.74
BLACK 2						
Rural	11	0	31	22.5	3.36	-2.86
City	9	0	0	24.9	-0.05	-4.74

Yellow

- 5.7.15. The greatest increase in annual mean NO₂ concentrations near the Yellow route option would be 3.33µg/m³ at receptor R52 (Edgewood), which is on the B4349 approximately 35m from the southern end of the proposed alignment. The magnitude of change would be medium, due to the proximity of the introduced bypass. However, concentrations would remain well below the annual mean criterion.
- 5.7.16. The worse affected receptor in Element 1 would be R52 discussed above. The worse affected receptor in Element 2 would be R96 (Hunting Brook East), with a medium magnitude change of 2.03µg/m³, which is located 55m east of the junction with the A4103. This is a result of increased traffic flows on the A4103 accessing the bypass. The worst affected receptor in the third element is R6 Towtree House, where a small magnitude change of 1.35µg/m³ is predicted. However, concentrations would remain well below (<15µg/m³) the annual mean criteria.

Red

- 5.7.17. The greatest increase in annual mean NO₂ concentrations near the red route option would be 3.36µg/m³ at receptor R78 (Forest View), which is off the B4349 approximately 35m from the southern end of the Red option. The magnitude of change would be medium. The change is due to the proximity of the introduced bypass. However, concentrations would remain well below the annual mean criterion.
- 5.7.18. The worse affected receptor in Element 1 would be R78 discussed above. The worse affected receptor in Element 2 would be R85 (A438 Bramley Court), with a medium magnitude change of 2.24µg/m³, which is on

the A438 Kings Acre Road to the west of the option alignment. This would be a result of increased traffic flows on the A438 Kings Acre Road accessing the bypass. The worst affected receptor in Element 3 would be R6 Towtree House, where a small magnitude change of $1.35\mu\text{g}/\text{m}^3$ is predicted. However, concentrations would remain well below ($<15\mu\text{g}/\text{m}^3$) the annual mean criteria.

Olive

- 5.7.19. The greatest increase in annual mean NO_2 concentrations near the alignment would be $3.36\mu\text{g}/\text{m}^3$ at receptor R78 (Forest View), which is off the B4349 approximately 35m from the southern end of the proposed alignment. The magnitude of change would be medium, due to the proximity of the introduced bypass. However, concentrations would remain well below the annual mean criterion.
- 5.7.20. The worst affected receptor in Element 1 would be R78, discussed above. The worst affected receptor in Element 2 would be R85 (A438 Bramley Ct), with a medium magnitude change of $2.23\mu\text{g}/\text{m}^3$, which is on the A438 Kings Acre Road to the west of the option alignment. This is a result of increased traffic flows on the A438 Kings Acre Road accessing the bypass. The worst affected receptor in Element 3 would be R6 Towtree House, where a small magnitude change of $1.35\mu\text{g}/\text{m}^3$ is predicted. However, concentrations would remain well below ($<15\mu\text{g}/\text{m}^3$) the annual mean criterion.

Black 1

- 5.7.21. The greatest increase in annual mean NO_2 concentrations near the Black 1 route option would be $3.36\mu\text{g}/\text{m}^3$ at receptor R78 (Forest View), which is off the B4349 approximately 35m from the southern end of the proposed alignment. The magnitude of change would be medium, due to the proximity of the introduced bypass. However, concentrations would remain well below the annual mean criteria.
- 5.7.22. The worst affected receptor in Element 1 would be R78 discussed above. The worst affected receptor in Element 2 would be R14 (A438 Kings Acre Road), with a medium magnitude change of $2.04\mu\text{g}/\text{m}^3$, which is on the A438 Kings Acre Road to the west of the option alignment. This is a result of increased traffic flows on the A438 Kings Acre Road accessing the bypass. The worst affected receptor in Element 2 would be R91 on the A4110 Canon Pyon Road, where a small magnitude change of $0.47\mu\text{g}/\text{m}^3$ is predicted. However, concentrations would remain well below ($<15\mu\text{g}/\text{m}^3$) the annual mean criteria.

Black 2

- 5.7.23. The greatest increase in annual mean NO_2 concentrations near the Black 2 route option would be $3.36\mu\text{g}/\text{m}^3$ at receptor R78 (Forest View), which is off the B4349 approximately 35m from the southern end of the proposed alignment. The magnitude of change would be medium, due to the proximity of the introduced bypass. However, concentrations would remain well below the annual mean criterion.
- 5.7.24. The worst affected receptor in Element 1 would be R78 discussed above. The worst affected receptor in Element 2 would be R14 (A438 Kings Acre Road), with a medium magnitude change of $2.02\mu\text{g}/\text{m}^3$, which is on the A438 Kings Acre Road to the west of the option alignment. This is a result of increased traffic flows on the A438 Kings Acre Road accessing the bypass. The worst affected receptor in Element 3 would be R91 on the A4110 Canon Pyon Road, where a small magnitude change of $0.47\mu\text{g}/\text{m}^3$ is predicted. However, all concentrations would remain well below ($<15\mu\text{g}/\text{m}^3$) the annual mean criterion.

Designated Sites

- 5.7.25. Full results for designated sites are provided in Appendix 5-6. The key findings are discussed below, with offline ecological receptors further than 200m from the proposed alignment (offline) first and ecological receptors within 200m of the proposed alignment (online) second. Results are presented as a percentage change of the standard.
- 5.7.26. There are no predicted exceedances of the annual mean critical level for NO_x of $30\mu\text{g}/\text{m}^3$ with any of the proposed route options.
- 5.7.27. The predicted impacts of the route options on annual mean concentrations of NO_x within 200m of the ARN (away from the scheme alignment) are:
- Newton Coppice sees a small increase (1.2%);
 - Hayleasow Wood sees a medium increase (8.8%) in concentration due to increased use of the SLR to access the bypass;
 - Grafton Wood also sees a medium increase (6.4%) as a result of increased use of the SLR to access the bypass; and

- Little Marsh Common sees a small reduction (-3.8%) in concentration due to redirection of traffic, after 30m the change reduces to <-0.4%.

5.7.28. The predicted impacts of the route options on nitrogen deposition within 200m of the ARN (away from the scheme alignment) are detailed below. Deposition exceeds the minimum critical load for all sites in all years. By 2026 deposition levels have decreased but continue to exceed the critical load for all sites.

- Newton Coppice sees an imperceptible change (<0.1%);
- Hayleasow Wood sees a medium increase (5.8%) in deposition due to increased use of the SLR to access the bypass;
- Grafton Wood also sees a small increase (4.8%) as a result of increased use of the SLR to access the bypass; and
- Little Marsh Common sees a small reduction (-1.3%) in deposition due to redirection of traffic.

5.7.29. The maximum impacts on annual mean NO_x concentrations of the route options, at all designated sites within 200m along the proposed alignments are described below. These are as a result of the introduction of a road where previously none existed.

- River Wye SAC/SSSI sees a large increase of (20%) with all route options;
- Wye Coppice sees large increases (13.9%) on the Olive and Black 2 route options;
- Rough Coppice sees a large increase (18.7%) increase with the Orange, Cyan, Yellow, Red and Black 1 route options which pass within 10m of the ancient woodland; and
- Hunderton Wood sees a medium increase (7.6%) with the Orange, Cyan, Yellow, Red and Black 1 route options.

5.7.30. The maximum impacts on nitrogen deposition of the options, at all designated sites within 200m along the proposed alignments are described below. These are as a result of the introduction of a road where previously none existed.

- River Wye SAC/SSSI sees a large increase of (14%) with all route options;
- Wye Coppice sees medium increases (6.88%) with the Olive and Black 2 route options;
- Rough Coppice sees a large increase (13%) increase with the Orange, Cyan, Yellow, Red and Black 1 route options which pass within 10m of the ancient woodland; and
- Hunderton Wood sees a medium increase (6.7%) with the Orange, Cyan, Yellow, Red and Black 1 route options.

Compliance Risk Assessment

5.7.31. None of the PCM model links within the study area would have roadside exceedances of the EU limit value for annual mean NO₂ in 2016 (Table 5-1). By 2026, concentrations would be lower, reflecting the Defra emissions projections¹⁹ which is driven by improvements in vehicle technology. Further reductions are predicted by Defra up to 2030, which is the limit of the current set of forecasts. By 2028 the Defra predicts that all 43 UK reporting zones for EU limit value compliance will be compliant and this will be the position in 2030 and beyond.

5.7.32. Considering the whole study area, the highest roadside (PCM) annual mean NO₂ concentration in 2026 would be 23.55µg/m³ for PCM model links on the A49 on Victoria Street. The nearest sensitive locations to the A49 and these PCM model links are receptor R18 and R19 where the greatest change in the annual mean concentration predicted would be a decrease by 4.74µg/m³. The combined concentration of 18.81µg/m³ would be well below the limit value of 40µg/m³.

5.7.33. There are no predicted increases in concentrations at any of the receptors along PCM model links, which would give rise to a compliance risk with the Scheme. The risk of non-compliance is therefore considered to be low.

¹⁹ 2017 NO₂ projections data (2015 reference year): <https://uk-air.defra.gov.uk/library/no2ten/2017-no2-projections-from-2015-data>

Regional Assessment

- 5.7.34. Full results for the regional emissions of NO_x, PM₁₀ and CO₂ for the scenarios in 2016 and 2026 are summarised in Table 5-6 as changes in emission with (DS) and without the scheme (DM).
- 5.7.35. In 2026, the differences in all pollutant emissions with the scheme compared to the without scheme vary between an increase of 1.9 % (Olive) to 2.7% (Black 1). All the route options scenarios relieve congestion over the network as seen with the reduction in vehicle kilometres travelled. However, the reduction in congestion across the network means that traffic is moving faster, hence the modest increase in regional emissions. The difference across the route options is a result of the varying scheme lengths.

Options Offset with Three Elms Development

- 5.7.36. The increase of concentrations as a result of the proposed Scheme was modelled with a transect extending 100m from the roadside. Concentrations would rapidly drop off with distance with large increases (>4 µg/m³) up to 15m from the roadside, and small (<2µg/m³) increases seen at 50m-100m from the roadside. However, concentrations adjacent to the proposed route options would be very low <15 µg/m³ with currently little risk of exceedance of the annual mean criteria.
- 5.7.37. Accounting for further development of the area around the proposed Scheme, and therefore vehicular traffic, an offset distance of 40m for areas where people would be expected to spend a considerable portion of their time (e.g. residential properties) from the roadside would be recommended to reduce impact on any potential future receptors.

Table 5-6: Regional emissions

Scenario	NOx			PM ₁₀			CO ₂			Vehicle km per year
	Tonnes/annum	Change DM - DS	%	Tonnes/annum	Change DM - DS	%	Tonnes/annum	Change DM - DS	%	
2016 Baseline	238.8			16.8			88.4			77,042
Do-Minimum	123.2			16.5			91.7			91,100
Cyan	125.7	2.5	2.0%	16.9	0.4	2.4%	94.6	2.9	3.1%	88,177
Orange	125.8	2.6	2.1%	16.9	0.4	2.4%	94.7	3.0	3.1%	88,137
Red	125.8	2.5	2.0%	16.9	0.4	2.4%	94.6	2.9	3.1%	88,298
Yellow	126.0	2.8	2.2%	16.9	0.4	2.6%	94.9	3.2	3.3%	88,123
Olive	125.6	2.4	1.9%	16.8	0.4	2.2%	94.5	2.8	3.0%	88,037
Black1	126.6	3.4	2.7%	17.0	0.5	3.0%	95.4	3.6	3.8%	88,650
Black2	126.1	2.9	2.3%	16.9	0.5	2.7%	94.9	3.2	3.4%	88,361

5.8 SUMMARY

5.8.1. The summary of operational and construction effects is outlined in Table 5-7 below:

Table 5-7: Summary of air quality operational and construction effects

Phase	Route Options	Mitigation
Construction	The proposed scheme would result in a risk of impacts from construction. With the rigorous application of best practice mitigation measures, including visual monitoring of dust emissions and soiling, no significant effects are likely.	No site specific mitigation (beyond standard best practice) would be required.
Operation	The proposed scheme would result in both adverse and beneficial air impacts, this is a result of the redistribution of traffic from roads within urban areas (where beneficial impacts are predicted) to the bypass (where adverse impacts would occur). The maximum impacts of the proposed scheme are small in magnitude and the number of properties affected would be low.	The significance of impacts and the requirement of site specific mitigation cannot be assessed at this stage and will be fully assessed in the Environmental Statement on the preferred route.

6 NOISE AND VIBRATION

6.1 INTRODUCTION

- 6.1.1. This chapter presents the assessment of the likely significant effects on noise and vibration arising from the proposed Scheme which has the potential to affect nearby Noise Sensitive Receptors (NSRs) during both the construction and operational phases.
- 6.1.2. The chapter describes the legislative and policy framework relevant to noise and vibration, the study area and the baseline conditions on the site. It continues with a description of the assessment methodology and the design, mitigation and enhancement measures followed by the likely potential impacts as a result of the proposed Scheme. Finally, a summary of the noise and vibration assessment is presented.
- 6.1.3. A glossary of acoustic terminology used in this chapter is presented in Appendix 6-1.

6.2 LEGISLATION AND POLICY FRAMEWORK THE ENVIRONMENTAL NOISE DIRECTIVE 2002/49/EC

- 6.2.1. Directive 2002/49/EC of the European Parliament and of the Council relates to the assessment and management of environmental noise, and it is normally referred as the Environmental Noise Directive (END).
- 6.2.2. END promotes the implementation of three steps:
 - Undertake strategic noise mapping to determine exposure to environmental noise;
 - Ensure information on environmental noise is made available to the public;
 - Establish Action Plans based on the strategic noise mapping results, aiming to prevent and reduce the environmental noise where necessary, and to preserve environmental noise quality where it is considered good.
- 6.2.3. END has been transposed as the Environmental Noise (England) Regulations 2006 (as amended) into English Law. As part of this process, noise mapping has been undertaken and Noise Important Areas (NIAs) have been identified as locations where the 1% of the population that are affected to the highest noise levels is located. The main objective of this process is to identify the areas which require potential action.

NATIONAL PLANNING POLICY FRAMEWORK

- 6.2.4. The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England. It provides a framework within which local people and councils can produce their own Local and Neighbourhood Plans. The NPPF states that planning policies and decisions should aim to:
 - Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
 - Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of planning conditions;
 - Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
 - Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
- 6.2.5. The NPPF refers to the Noise Policy Statement for England (NPSE) to expand on the definition of adverse impacts.

NOISE POLICY STATEMENT FOR ENGLAND

- 6.2.6. The vision of the Noise Policy Statement for England (NPSE) 2010 is to promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development. The noise policy aims to:
 - Avoid significant adverse impacts on health and quality of life;
 - Mitigate and minimise adverse impacts on health and quality of life; and
 - Where possible, contribute to the improvement of health and quality of life.

- 6.2.7. The 'Explanatory Note' within the NPSE provides further guidance on defining 'significant adverse effects' and 'adverse effects', using the following concepts:
- No Observed Effect Level (NOEL): the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
 - Lowest Observed Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected; and
 - Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur.

PLANNING PRACTICE GUIDANCE

- 6.2.8. In March 2014, the Department for Communities and Local Government (DCLG) released its web-based Planning Practice Guidance (PPG) resource to support the NPPF. The guidance advises that local planning authorities should consider:
- Whether or not a significant adverse effect is occurring or likely to occur;
 - Whether or not an adverse effect is occurring or likely to occur; and
 - Whether or not a good standard of amenity can be achieved.
- 6.2.9. This guidance introduced the additional concepts of No Observed Adverse Effect Level (NOAEL) and Unacceptable Adverse Effect Level (UAEL).
- 6.2.10. Factors to be considered in determining if noise is a concern are identified, including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts.

NOISE INSULATION REGULATIONS

- 6.2.11. The Noise Insulation Regulations (NIR) 1975, amended 1988, provides the framework to determine the entitlement to noise insulation treatment at eligible buildings (i.e. dwellings and other building used for residential purposes within 300m from the nearest point on the new or altered highway).
- 6.2.12. The noise should be assessed at a reception point located 1m in front of the most exposed façade part of an external window or door of an eligible room. Traffic flows used in the calculations should be the highest expected in a period of 15 years after opening to traffic. The predictions will be normally undertaken using the Annual Average Weekly Traffic (AAWT).

BRITISH STANDARD BS 5228:2009+A1 (2004) 'CODE OF PRACTICE FOR NOISE CONTROL ON CONSTRUCTION AND OPEN SITES'

- 6.2.13. BS 5228 'Code of practice for noise and vibration control on construction and open sites' (2014), gives recommendations on noise and vibration control relating to construction activities. The standard provides advice on prediction methods, noise measurements and assessment for the associated impact.

DESIGN MANUAL FOR ROADS AND BRIDGES (DMRB) VOLUME 11, SECTION 3, PART 7, NOISE AND VIBRATION (HD 213/11)

- 6.2.14. DMRB Volume 11, Section 3, Part 7, Noise and Vibration (HD 213/11) advises on the appropriate level of noise and vibration assessment for road schemes.
- 6.2.15. The procedure to assess impact uses three levels: a) scoping, b) simple and c) detailed. Selecting the appropriate level of assessment depends on the following threshold criteria:
- Permanent change in magnitude of 1dB in the short-term (i.e. on opening);
 - Permanent change in magnitude of 3dB in the long-term (i.e. between opening and future assessment years);
 - The predicted noise level during night-time $L_{night, outside}$ is greater than 55dB in any scenario.
- 6.2.16. A change in road traffic of 1dB in the short-term, when the scheme is opened, is the smallest considered perceptible. In the long-term, a 3dB change is considered perceptible.
- 6.2.17. A simple assessment would be appropriate where threshold values are unlikely to be exceeded at any sensitive receptor. Conversely, a detailed assessment is appropriate in situations where threshold values are

likely to be exceeded. This assessment presents the results of a modified simple assessment sufficient to support the optioneering stage. A detailed assessment will be carried out for the Environmental Statement (ES) to be produced for the preferred route.

- 6.2.18. According to DMRB, impacts are derived in the short term by comparing the 'do-something' scenario (with the Scheme) in the opening year with the 'do-minimum' scenario (without the Scheme) in the same year. The classification of magnitude for the short-term noise impact is reproduced in Table 6-1. In addition, to the short-term impact for all receptors within the study area, this classification will be also used to determine the magnitude of impacts at receptors experiencing noise levels above the SOAEL, during both short and long-term.
- 6.2.19. In the long term, impacts are derived by comparing the 'do-something scenario' in the design year with the 'do-minimum' scenario in the design year. The classification of magnitude of noise impact in the long term is also reproduced in Table 6-1.

Table 6-1 – Magnitude of Traffic Noise Impacts

Short Term Change		Long Term Change	
Noise Level Change, dB L _{A10, 18h}	Magnitude of Impact	Noise Level Change, dB L _{A10, 18h}	Magnitude of Impact
0	No Change	0	No Change
0.1 - 0.9	Negligible	0.1 - 2.9	Negligible
1 - 2.9	Minor	3 - 4.9	Minor
3 - 4.9	Moderate	5 - 9.9	Moderate
5+	Major	10+	Major

DEPARTMENT OF ENVIRONMENT (NOW DEPARTMENT OF ENVIRONMENTAL, FARMING AND RURAL AFFAIRS) AND WELSH OFFICE (1988) CALCULATION OF ROAD TRAFFIC NOISE

- 6.2.20. The Calculation of Road Traffic Noise (CRTN) memorandum describes the procedures for calculating noise from road traffic. It is divided into three sections:
- Section I: A general method of calculation is set out, step by step, for predicting noise levels at a distance from a highway, taking into account different traffic parameters, intervening ground cover, road configuration and site layout.
 - Section II: Provides additional procedures that may need to be considered when applying the method given in Section I to specific situations. The aim has been to permit prediction in as many cases as possible.
 - Section III: The procedure and requirements to be met during such measurements are detailed, together with details of a simplified measurement procedure which is acceptable in certain circumstances.

6.3 STUDY AREA

- 6.3.1. At this stage and for the purposes of facilitating the optioneering process, the study area has been derived using a buffer of 1km from the routes to the west of the Orange, Cyan, Yellow, Red, Olive, Black 1 and Black 2 options. To the east of these options, the study area has been extended to include Hereford City with a view to incorporating the Noise Important Areas (NIAs) as well as areas likely to be affected by the Active Traffic Measures (ATMs). It is noted however that ATMs are outside the scope of this assessment. The study area is presented in Figure 6-1 of Appendix 6-2.
- 6.3.2. Once a preferred route is selected, the study area will be defined following guidance in DMRB HD 213/11.
- 6.3.3. The Noise Action Plan Important Areas Round 2 England database has been reviewed to identify the NIAs within the study area. The NIAs are listed in Table 6-2 and shown in Figure 6-1. The table presents the owner of the NIA asset, the relevant road and an approximate number of dwellings within the area.

Table 6-2: Noise Important Areas

NIA Asset ID	Asset Owner	Road	No. of Properties
11809	Herefordshire	A4103	1
11810	Highways England	A49	5
11811	Herefordshire	A465	5
11813	Herefordshire	A438	6
11814	Herefordshire	A438	65
11815	HE & Herefordshire	A49	88
11816	Herefordshire	A438	148
11817	HE & Herefordshire	A465	196
11818	Highways England	A49	2
7721	Highways England	A49	152
7725	Herefordshire	A465	3
7726	Herefordshire	A465	5

6.4 BASELINE CONDITIONS NOISE SURVEY

- 6.4.1. A baseline noise survey was carried out between Tuesday 7th March and Friday 10th March 2017 in accordance with CRTN and BS7445. The purpose of the noise survey was to establish the current noise climate at the surroundings of the proposed Scheme and to validate the results of the noise model prepared for the noise assessment undertaken in this report.
- 6.4.2. The noise survey methodology was discussed and agreed with the Environmental Health Officer (EHO) at Herefordshire Council prior to undertaking the baseline study.
- 6.4.3. Details of the noise survey are presented in Appendix 6-3. Figure 1 of the baseline survey report shows the location of the noise measurements.
- 6.4.4. Long-term unattended measurements were made at four positions (LT1-LT4) continuously over the entire survey period. Weather data comprising wind speed, wind direction and rainfall was measured over the survey period at LT3 using an anemometer and a rain gauge.
- 6.4.5. Short-term attended measurements were also made at five positions (ST1-ST5). Measurements were made at ST1, ST2 and ST3 on Wednesday 8th March and at ST4 and ST5 on Thursday 9th March.
- 6.4.6. Tables 6-3 and 6-4 present a summary of the noise survey results for the long term and short term measurement locations, respectively. Appendix 6-3 incorporates a comprehensive set of data including time histories of the continuous noise measurements and weather data.

Table 6-3: Long-term measurement results

Position	Date	<i>L_{A10}, 18h, dB</i> (0600-2400)	<i>L_{Aeq}, 16h, dB</i> (0700 – 2300)	<i>L_{Aeq}, 8h, dB</i> (2300 – 0700)
LT1 (60m to A438)	08/03/2017	47.4	46.8	44.1
	09/03/2017	49.1	48.6	43.9
	Average	48.2	47.8	44.0
LT2 (8m to A465)	08/03/2017	68.2	65.7	59.8
	09/03/2017	68.1	65.6	59.7
	Average	68.1	65.7	59.8
LT3 (9m to A4110)	08/03/2017	65.7	62.2	55.5
	09/03/2017	65.3	61.6	55.4
	Average	65.5	61.9	55.5
LT4 (10m to A49)	08/03/2017	73.9	71.1	63.9
	09/03/2017	73.7	70.7	64.0
	Average	73.8	70.9	64.0

Table 6-4: Short-term measurement results

Position	Date	Time Period	<i>L_{Aeq} range, dB</i>	<i>L_{A10} range, dB</i>	<i>L_{A90} range, dB</i>
ST2	08/03/2017	1403 - 1600	43 - 48	45 - 52	40 - 41
ST3	08/03/2017	1433 – 1627	49 - 53	52 - 55	35 - 37
ST4	09/03/2017	1015 - 1401	41 - 50	43 - 50	32 - 37
ST5	09/03/2017	1105 - 1450	59 - 60	61 - 63	40 - 42

- 6.4.7. Results presented in Tables 6-3 and 6-4 are considered to be typical of a semi-rural area where the noise climate is mainly dominated by road traffic noise. Locations LT2 to LT4 are were positioned within short distance to the main road (i.e. 8m to 10m), and this is reflected in the noise survey results being higher than those for LT1.

6.5 ASSESSMENT METHODOLOGY

CONSULTATION WITH HCC

- 6.5.1. In addition to the discussion with Herefordshire Council prior to the baseline study, a meeting was held with the Environmental Health team on 15th March 2018 to discuss and agree the methodology for the Noise and Vibration assessment for the Stage 2 EAR. The following bullet points summarise the discussion:

- The study will be based on a simple DMRB assessment;
- The noise model will not include mitigation at this stage;
- The model will include traffic data for the A4194 Southern Link Road (SLR) and the study area will cover the city;
- The noise assessment will include potential impact on the proposed development Land at Three Elms;
- Stage 2 study will not include the influence from the Active Traffic Measures; and
- The assessment will include Noise Important Areas and the definition of the Observed Effect Levels in accordance with the NPSE and PPG.

NOISE MODEL

- 6.5.2. A noise model has been developed using ArcGIS 10.4.1 and CadnaA 2017 to predict the baseline and operational noise levels associated with the 7 route options described in Chapter 2. The software has been configured to incorporate CRTN calculations and requirements from DMRB. The output from the model was validated using results of the noise survey.
- 6.5.3. For the purposes of this assessment, the following scenarios have been modelled:
- Baseline year (2016) – no SLR;
 - Do-minimum opening year (2026) – with SLR;
 - Do-something (with scheme) opening year (2026) for all options – with SLR; and
 - Do-something (with scheme) design year (2041) for all options – with SLR.
- 6.5.4. It should be noted that the traffic data for all scenarios modelled, except for baseline 2016, included the traffic flows for the operation of the SLR.
- 6.5.5. The following assumptions have been included in the model:
- Topographic data at 1m height intervals;
 - OS Addresspoint data;
 - Healthcare, educational and place of worship facilities have been included as other sensitive receptors, in accordance with guidance in DMRB;
 - The study area includes 28,501 residential properties and 188 other sensitive receptors;
 - Building height of 6m;
 - Receptor façade noise levels calculated at 4 m (first floor);
 - Ground absorption value of 0.5;
 - 18 hr AAWT traffic flows (0600 – 2400hrs) with average speed (kph) and percentage of heavy vehicles defined as vehicles with a weight greater than 3.5 tonnes;
 - Night-time noise model has not been prepared. The night-time noise assessment in the DMRB tables has been informed using the methodology published by Transport Research Laboratory (TRL)²⁰ method 3;
 - Scheme horizontal alignment for the routes were included. Vertical alignments are not yet available;
 - Bridges over river Wye have been defined in the model; and
 - A low noise surface correction of -3.5 dB(A) has been applied to the SLR carriageways.
- 6.5.6. A baseline noise model was prepared to correlate the long-term noise monitoring results. Table 6-5 presents the results of the comparison, it is considered that 1dB is good correlation between the model and the survey results.

Table 6-5: Model Validation Results

Location	CadnaA L _{A10} (dB)	Survey L _{A10} (dB)	Comparison
LT1	49.5	48.2	-1.3
LT2	69.4	68.1	-1.3
LT3	65.3	65.5	0.2
LT4	73.8	73.8	0

ASSESSMENT

Construction

- 6.5.7. The assessment has been focused on the effects likely to arise from the operational phase of the proposed Scheme. A noise and vibration construction assessment has not been conducted at this stage as the required

²⁰ Method for converting the UK road traffic noise index L_{A10,18h} to the EU noise indices for road noise mapping, TRL and Casella Stanger, Defra, 2006

technical information to prepare the assessment is not yet available. In addition, the selection of the preferred option is unlikely to be determined by the construction assessment. The construction noise and vibration effects will be assessed in the ES to be produced on the preferred route, in accordance with guidance in BS5228.

Operation

- 6.5.8. The results of the model were used to inform an assessment of the operational effects of noise following guidance in DMRB HD 213/11. The number of properties likely to experience short and long term impacts associated with the operational phase of the proposed Scheme have been quantified using the magnitude of impact classification defined in Table 6-1.
- 6.5.9. The SOAEL has been identified as 68dB LA10,18h (façade) in line with the specified noise level in the NIR 1975. The number of receptors likely to experience an impact above this threshold have been quantified separately using the magnitude of impact criteria for the short term criteria for both the short term and long term due to their high sensitivity.
- 6.5.10. NIAs have been identified in the study area. An assessment has been made to determine the likely effects experienced by receptors within these areas and to identify the potential need for noise mitigation.
- 6.5.11. Section 4.8 of this report describes the division of each of the routes into three Elements to assist with the selection of the final route. In order to facilitate this study, an analysis has been made of the number of properties within 300m with potential to qualify under the NIR 1975 as a metric of comparison. The quantification of properties has been made per Element.
- 6.5.12. Noise predictions have been made at receptors with the urban extension Land at Tree Elms to provide an indication of the constraints emerging from the operation of the proposed Scheme.

SIGNIFICANCE CRITERIA

- 6.5.13. The significance criteria used in this assessment follows the principles described in Chapter 4. The significance level attributed to each effect has been assessed on the magnitude of impact due to the proposed Scheme and the sensitivity of the receptor. Table 4-3 presents the matrix used to determine the significance of effects to receptors. The magnitude of potential impact presented in the table have been correlated with those defined in Table 6-1 for traffic noise, according to DMRB HD 213/11.
- 6.5.14. Most receptors in the study area corresponds to residential properties, classified as being of high sensitivity. For the purpose of the assessment at this stage, the effect is considered to be significant when the magnitude of impact is either moderate or major for residential receptors not experiencing a noise level above the SOAEL. On the other hand, for those with noise levels above the SOAEL, including dwellings within the NIAs, the effect is considered to be significant when the magnitude of impact is either minor, moderate or major.

6.6 DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

CONSTRUCTION

- 6.6.1. A noise and vibration impact mitigation strategy will be defined once the preferred route option is selected. The assessment undertaken for the ES, will provide an indication of key areas where mitigation is likely to be required. Thereafter, mitigation will be defined in the Construction Environmental Management Plan. In addition, contractors will have the possibility to seek consent from the Local Authorities through Section 61 of the Control of Pollution Act 1974 for the proposed construction activities. Details of the mitigation measures would be then stipulated as part of this consent.
- 6.6.2. During the construction phase, the contractor will be encouraged to apply Best Practicable Means to reduce residual noise. General methods of construction phase noise control may include:
 - The appropriate selection of plant, construction methods and programming: Only plant conforming with or better than relevant national or international standards, directives or recommendations on noise or vibration emissions would be used. Construction plant would be maintained in good condition with regards to reducing noise output;
 - Construction plant would be operated and maintained appropriately, having regard to the manufacturer's written recommendations or using other appropriate operation and maintenance programmes which reduce noise and vibration emissions. All vehicles and plant would be switched off when not in use;

- Design and use of site hoardings and screens, where necessary, to provide acoustic screening at the earliest opportunity. Where practicable, gates would not be located opposite buildings containing noise sensitive receptors;
- Choice of haulage routes and programming for the transport of construction materials, spoil and personnel to reduce the risk of increased noise and vibration impacts due to the construction of the junction;
- The positioning of construction plant and activities to reduce noise at sensitive locations;
- Equipment that breaks concrete by munching or similar, rather than by percussion, would be used as far as is practicable; and
- The use of mufflers on pneumatic tools.

OPERATION

- 6.6.3. A likely mitigation strategy has not been defined at this stage and the results included in this assessment correspond to unmitigated impacts. Mitigation measures often used in road schemes are listed below and they will be considered within the ES to be produced on the preferred route in Stage 3:
- Low noise surfacing in order to reduce tyre-surface interaction: An assessment of the effect of noise with and without this surface treatment should be undertaken in order to ascertain the potential cost-benefit of this measure. The noise level reduction at source for this measure will range between 1 to 3.5dB, depending on the traffic speed;
 - Noise barriers / earth bund / cutting: The benefits of installing noise barriers (earth bunding or acoustic fencing) at specific locations may be a suitable control measure in certain areas. This mitigation strategy is likely to provide a noise level reduction between 5 to 10dB, provided that the line-of-sight is obstructed; and
 - Alteration to the horizontal or vertical alignment in order to reduce potential impacts in key areas will be considered as a potential mitigation measure.
- 6.6.4. Based on the modelling results presented later in this chapter, areas near the proposed bypass are likely to receive an adverse significant impact. At Stage 3, emphasis will be given to study the possibility of mitigation measures, such as noise barriers and low noise surfacing, on the following areas:
- Segments of the route near the intersection with the A438 Kings Acre Road;
 - Segments of the route near the intersection with the A4110 Canon Pyon Road; and
 - Segments of the route near Belmont, south of the River Wye.

6.7 POTENTIAL IMPACTS

- 6.7.1. This section presents the noise impacts likely to be experienced during the short and long term in accordance with DMRB, particularly the classification of magnitudes described in Table 6-1. Furthermore, number of properties potentially qualifying under the NIR 1975 are reported for each element.
- Likely impacts are described below for each of the route options studied at Stage 2.

ORANGE

- 6.7.2. Table 6-6 and Table 6-7 present the short-term and long-term noise impacts likely to arise as a results of the operation of the Orange option.
- 6.7.3. In the short-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 6% of those studied. A beneficial impact of either minor to moderate is likely to be experienced at 2,532 properties, corresponding to the 9% of properties.
- 6.7.4. Figure 6-2 in Appendix 6-2 presents the noise contours illustrating the noise impact in the short-term. It can be seen that properties in the city centre, specifically receptors near the A49 and part of the A438, would experience a minor beneficial impact. The figure also shows that, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Orange route with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Other isolated cluster of properties along the bypass, with a limited number of receptors, would also experience a significant adverse impact.

Table 6-6: Short term noise Impact Orange (pre-mitigation) - Daytime

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	5319	28
	1.0 - 2.9 (Minor)	3729	7
	3.0 - 4.9 (Moderate)	746	4
	5 + (Major)	990	4
No change	0	2157	32
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	13028	87
	1.0 - 2.9 (Minor)	2531	26
	3.0 - 4.9 (Moderate)	1	0
	5 + (Major)	0	0

- 6.7.5. In the long-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied. A minor beneficial impact is likely to be experienced at only one property. It is likely that this is to do with the traffic growth in the area rather than a direct consequence from the operation of the bypass. At Stage 3, an analysis of this will be made by comparing the do-minimum scenarios for the design and opening years. In addition, the magnitude criteria for the short term and long term are different. For the long term, changes of noise levels up to 3dB are considered negligible, according to DMRB. Whereas in the short term, changes between 1 to 3dB are classified as a minor impact.
- 6.7.6. Figure 6-3 presents the noise contours illustrating the noise impact in the long-term. It can be seen that properties in the city centre, specifically receptors near the A49, would experience a noise level decrease of 1 to 3dB, which is classified as negligible according to DMRB, however, this could also be classified as a significant effect in terms of Government policy, if receptors are above the SOAEL.
- 6.7.7. As for the short term, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Orange route with the A438 King Acre Road and in Belmont, south of the river Wye. Other isolated cluster of properties along the bypass, with a limited number of receptors, would also experience a significant adverse impact. It should be noted that the number of receptors subject to a major adverse impact in the long term is lower than those for the short-term. This is due to the differences in the DMRB magnitude criteria for short and long term.

Table 6-7: Long term Noise Impact Orange

		Daytime		Night-time
Change in noise level		Dwellings	Other sensitives	Dwellings
Increase in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	19690	122	2031
	3.0 - 4.9 (Minor)	1187	2	16
	5.0 - 9.9 (Moderate)	954	5	10
	10 + (Major)	370	3	18
No change	0	937	4	63
Decrease in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	5362	52	1798
	3.0 - 4.9 (Minor)	1	0	0
	5.0 - 9.9 (Moderate)	0	0	0

	10 + (Major)	0	0	0
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- 6.7.8. Table 6-8 presents the assessment only for the sensitive receptors above the SOAEL. The table shows that there are more receptors subject to a beneficial impact (i.e. 509) compare to those experiencing an adverse impact (i.e. 488). Receptors subject to a minor beneficial impact are in the city, several of them are within NIAs 7721, 11815 and 11817. Receptors subject to an adverse impact are mainly concentrated near the intersection of the Orange route with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye.

Table 6-8: Long term noise Impact Orange (pre-mitigation) – receptors above SOAEL

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1742	23
	1.0 - 2.9 (Minor)	433	4
	3.0 - 4.9 (Moderate)	17	0
	5 + (Major)	34	0
No change	0	62	0
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1247	12
	1.0 - 2.9 (Minor)	492	17
Decrease in noise level, LA10, 18h	3.0 - 4.9 (Moderate)	0	0
	5 + (Major)	0	0

- 6.7.9. Table 6-9 presents the number of potential qualifying under the Noise Insulation Regulations divided into the three elements described in Section 4.8. It can be seen from the table that properties are concentrated in Element 2.

Table 6-9: Number of Properties above 68dB LA10,18h within 300m – Orange (pre-mitigation)

Element	Number of Properties
1	24
2	143
3	25
TOTAL	192

CYAN

- 6.7.10. Table 6-10 and Table 6-11 present the short-term and long-term noise impact likely to arise as a results of the operation of the Cyan route option.
- 6.7.11. In the short-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 6% of those studied. A beneficial impact of either minor or moderate is likely to be experienced at 2,520 properties, corresponding to the 9% of properties.
- 6.7.12. Figure 6-4 presents the noise contours illustrating the noise impact in the short-term. It can be seen that properties in the city centre, specifically receptors near the A49 and part of the A438, would experience a minor beneficial impact.

- 6.7.13. Similar to Orange, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Cyan route with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Compared to Orange, results show that properties immediately north of the A438 would be less affected due to the difference in the horizontal alignment in this area.

Table 6-10: Short term noise Impact Cyan (pre-mitigation) - Daytime

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	5390	28
	1.0 - 2.9 (Minor)	3601	6
	3.0 - 4.9 (Moderate)	776	3
	5 + (Major)	909	5
No change	0	2142	33
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	13163	87
	1.0 - 2.9 (Minor)	2519	26
	3.0 - 4.9 (Moderate)	1	0
	5 + (Major)	0	0

- 6.7.14. In the long-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied. A minor beneficial impact is likely to be experienced at one property. The explanation given in the Orange option section is also applicable to this option.
- 6.7.15. Figure 6-5 presents the noise contours illustrating the noise impact in the long-term. It can be seen that properties in the city centre, specifically receptors near the A49, would experience a noise level decrease of 1 to 3dB.
- 6.7.16. Similar to Orange, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of Cyan with the A438 Kings Acre Road and in Belmont, south of the river Wye. As above, when compared to Orange, results show that properties immediately north of the A438 would be less affected.

Table 6-11: Long term Noise Impact Cyan (pre-mitigation)

		Daytime		Night-time
Change in noise level		Dwellings	Other sensitives	Dwellings
Increase in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	19700	118	2031
	3.0 - 4.9 (Minor)	1215	2	6
	5.0 - 9.9 (Moderate)	896	5	9
	10 + (Major)	383	3	23
No change	0	929	8	62
Decrease in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	5377	52	1805
	3.0 - 4.9 (Minor)	1	0	0
	5.0 - 9.9 (Moderate)	0	0	0
	10 + (Major)	0	0	0

- 6.7.17. Table 6-12 presents the assessment only for the sensitive receptors above the SOAEL. The table shows that, as seen for Orange, there are more receptors subject to a beneficial impact (i.e. 513) compare to those experiencing an adverse impact (i.e. 470). Receptors subject to a minor beneficial impact are in the city, several of them are within NIAs 7721, 11815 and 11817. Receptors subject to an adverse impact are mainly concentrated near the intersection of Cyan with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye.

Table 6-12: Long term noise Impact Cyan (pre-mitigation) – receptors above SOAEL

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1752	23
	1.0 - 2.9 (Minor)	423	4
	3.0 - 4.9 (Moderate)	5	0
	5 + (Major)	38	0
No change	0	61	0
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1250	12
	1.0 - 2.9 (Minor)	496	17
	3.0 - 4.9 (Moderate)	0	0
	5 + (Major)	0	0

- 6.7.18. Table 6-13 presents the number of potential qualifying under the Noise Insulation Regulations divided into the three elements described in Section 4.8. It can be seen from the table that properties are concentrated in Element 2. It shows lower number of properties compared to Orange.

Table 6-13: Number of Properties above 68dB LA10,18h within 300m – Cyan Option (pre-mitigation)

Element	Number of Properties
1	24
2	121
3	25
TOTAL	170

YELLOW

- 6.7.19. Table 6-14 and Table 6-15 present the short-term and long-term noise impact likely to arise as a results of the operation of the Yellow option.
- 6.7.20. In the short-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 6% of those studied. A beneficial impact of minor and moderate is likely to be experienced at 2,513 properties, corresponding to the 9% of properties.
- 6.7.21. Figure 6-6 presents the noise contours illustrating the noise impact in the short-term. It can be seen that, as for other options, properties in the city centre, specifically receptors near the A49 and part of the A438, would experience a minor beneficial impact.

- 6.7.22. Similar to other options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of Yellow with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye.

Table 6-14: Short term noise Impact Yellow (pre-mitigation) - Daytime

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA ₁₀ , 18h	0.1 - 0.9 (Negligible)	5311	28
	1.0 - 2.9 (Minor)	3752	7
	3.0 - 4.9 (Moderate)	765	4
	5 + (Major)	979	4
No change	0	2165	32
Decrease in noise level, LA ₁₀ , 18h	0.1 - 0.9 (Negligible)	13016	87
	1.0 - 2.9 (Minor)	2512	26
	3.0 - 4.9 (Moderate)	1	0
	5 + (Major)	0	0

- 6.7.23. In the long-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied. A minor beneficial impact is likely to be experienced at one property. The explanation given in the Orange option section is also applicable to this option.
- 6.7.24. Figure 6-7 presents the noise contours illustrating the noise impact in the long-term. It can be seen that properties in the city centre, specifically receptors near the A49, would experience a noise level decrease of 1 to 3dB.
- 6.7.25. Similar to other route options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Yellow route with the A438 Kings Acre Road and in Belmont, south of the river Wye.

Table 6-15: Long term Noise Impact Yellow (pre-mitigation)

		Daytime		Night-time
Change in noise level		Dwellings	Other sensitives	Dwellings
Increase in noise level, LA ₁₀ , 18h	0.1 - 2.9 (Negligible)	19727	118	2037
	3.0 - 4.9 (Minor)	1189	2	7
	5.0 - 9.9 (Moderate)	932	5	13
	10 + (Major)	403	3	22
No change	0	929	8	61
Decrease in noise level, LA ₁₀ , 18h	0.1 - 2.9 (Negligible)	5320	52	1799
	3.0 - 4.9 (Minor)	1	0	0
	5.0 - 9.9 (Moderate)	0	0	0
	10 + (Major)	0	0	0

- 6.7.26. Table 6-16 presents the assessment only for the sensitive receptors above the SOAEL. The table shows that, as seen in other route options, there are more receptors subject to a beneficial impact (i.e. 509) compare to

those experiencing an adverse impact (i.e. 471). Several of the receptors that would be subject to a minor beneficial impact would be within NIAs 7721, 11815 and 11817. Receptors subject to an adverse impact are mainly concentrated near the intersection of Yellow with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye.

Table 6-16: Long term noise Impact Yellow (pre-mitigation) – receptors above SOAEL

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1766	23
	1.0 - 2.9 (Minor)	417	4
	3.0 - 4.9 (Moderate)	6	0
	5 + (Major)	44	0
No change	0	60	0
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1249	12
	1.0 - 2.9 (Minor)	492	17
	3.0 - 4.9 (Moderate)	0	0
	5 + (Major)	0	0

- 6.7.27. Table 6-17 presents the number of potential qualifying under the Noise Insulation Regulations divided into the three Elements described in Section 4.8. It can be seen from the table that properties are concentrated in Element 2. It shows similar number of properties in this Element compared to Orange.

Table 6-17: Number of Properties above 68dB LA10,18h within 300m – Yellow (pre-mitigation)

Element	Number of Properties
1	24
2	140
3	24
TOTAL	188

RED

- 6.7.28. Table 6-18 and Table 6-19 present the short-term and long-term noise impact likely to arise as a result of the operation of the Red route option.
- 6.7.29. In the short-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 6% of those studied. A beneficial impact of either minor or moderate is likely to be experienced at 2,540 properties, corresponding to the 9% of properties.
- 6.7.30. Figure 6-8 presents the noise contours illustrating the noise impact in the short-term. It can be seen that, as for other options, properties in the city centre, specifically receptors near the A49 and part of the A438 Kings Acre Road, would experience a minor beneficial impact.
- 6.7.31. Similar to other route options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of Red with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Properties near the A438 Kings Acre Road are likely to receive a lower impact, compared to Orange.

Table 6-18: Short term noise Impact Red (pre-mitigation) - Daytime

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	5591	27
	1.0 - 2.9 (Minor)	3383	6
	3.0 - 4.9 (Moderate)	750	3
	5 + (Major)	892	6
No change	0	2153	33
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	13192	87
	1.0 - 2.9 (Minor)	2539	26
	3.0 - 4.9 (Moderate)	1	0
	5 + (Major)	0	0

- 6.7.32. In the long-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied. A minor beneficial impact is likely to be experienced at one property. The explanation given in the Orange option section is also applicable to this route option.
- 6.7.33. Figure 6-9 presents the noise contours illustrating the noise impact in the long-term. It can be seen that, as for other options, properties in the city centre, specifically receptors near the A49, would experience a noise level decrease of 1 to 3dB.
- 6.7.34. Similar to other route options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Red route with the A438 Kings Acre Road (i.e. mainly south of the road) and in Belmont, south of the river Wye. Properties near the A438 Kings Acre Road are likely to receive a lower impact, compared to Orange.

Table 6-19: Long term Noise Impact Red (pre-mitigation)

		Daytime		Night-time
Change in noise level		Dwellings	Other sensitives	Dwellings
Increase in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	19650	117	2026
	3.0 - 4.9 (Minor)	1203	2	10
	5.0 - 9.9 (Moderate)	972	5	7
	10 + (Major)	264	3	20
No change	0	942	9	61
Decrease in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	5469	52	1799
	3.0 - 4.9 (Minor)	1	0	0
	5.0 - 9.9 (Moderate)	0	0	0
	10 + (Major)	0	0	0

- 6.7.35. Table 6-20 presents the assessment only for the sensitive receptors above the SOAEL. The table shows that, as seen in other route options, there would be more receptors subject to a beneficial impact (i.e. 511) compare to those experiencing an adverse impact (i.e. 444). Receptors subject to a minor beneficial impact are in the city, several of them are within NIAs 7721, 11815 and 11817. Receptors subject to an adverse impact are

mainly concentrated near the intersection of Red with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye.

Table 6-20: Long term noise Impact Red (pre-mitigation) – receptors above SOAEL

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1769	23
	1.0 - 2.9 (Minor)	400	4
	3.0 - 4.9 (Moderate)	8	0
	5 + (Major)	32	0
No change	0	60	0
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1246	12
	1.0 - 2.9 (Minor)	494	17
	3.0 - 4.9 (Moderate)	0	0
	5 + (Major)	0	0

- 6.7.36. Table 6-21 presents the number of potential qualifying under the Noise Insulation Regulations divided into the three Elements described in Section 4.8. It can be seen from the table that properties are concentrated in Element 2. It shows lower number of properties in this element compared to Orange.

Table 6-21 - Number of Properties above 68dB LA10,18h within 300m – Red (pre-mitigation)

Element	Number of Properties
1	13
2	114
3	13
TOTAL	140

OLIVE

- 6.7.37. Table 6-22 and Table 6-23 present the short-term and long-term noise impact likely to arise as a result of the operation of the Olive route option.
- 6.7.38. In the short-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied. A beneficial impact of either minor or moderate is likely to be experienced at 3,000 properties, corresponding to the 11% of properties. The Olive route option is located further to the west for most of the route, hence there is a slightly higher number of properties with a beneficial impact, compared to Orange, Cyan, Yellow and Red.
- 6.7.39. Figure 6-10 presents the noise contours illustrating the noise impact in the short-term. It can be seen that properties in the city centre, specifically receptors near the A49 and part of the A438 Kings Acre Road, would experience a minor beneficial impact.
- 6.7.40. Similar to other route options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Olive route with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Properties near the A438 Kings Acre Road are likely to receive a lower impact, compared to the Orange Option.

Table 6-22: Short term noise Impact with Olive Option (pre-mitigation) - Daytime

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	5444	26
	1.0 - 2.9 (Minor)	2922	6
	3.0 - 4.9 (Moderate)	691	4
	5 + (Major)	808	5
No change	0	2110	32
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	13526	86
	1.0 - 2.9 (Minor)	2999	29
	3.0 - 4.9 (Moderate)	1	0
	5 + (Major)	0	0

- 6.7.41. In the long-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 4% of those studied, slightly lower than other options. A minor beneficial impact is likely to be experienced at one property. The explanation given in the Orange route option section is also applicable to this route option.
- 6.7.42. Figure 6-11 presents the noise contours illustrating the noise impact in the long-term. It can be seen that, as for other route options, properties in the city centre, specifically receptors near the A49, would experience a noise level decrease of 1 to 3dB. Due to the layout located slightly further west compared to other options, the Olive route include more properties with a decrease in noise levels along the river Wye.
- 6.7.43. Similar to other route options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of Olive with the A438 Kings Acre Road (i.e. mainly south of the road) and in Belmont, south of the river Wye. Properties near the A438 Kings Acre Road are likely to receive a lower impact, compared to Orange.

Table 6-23 - Long term Noise Impact Olive (pre-mitigation)

		Daytime		Night-time
Change in noise level		Dwellings	Other sensitives	Dwellings
Increase in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	19074	114	2026
	3.0 - 4.9 (Minor)	1067	2	10
	5.0 - 9.9 (Moderate)	928	5	7
	10 + (Major)	208	3	18
No change	0	1002	8	61
Decrease in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	6221	56	1799
	3.0 - 4.9 (Minor)	1	0	0
	5.0 - 9.9 (Moderate)	0	0	0
	10 + (Major)	0	0	0

- 6.7.44. Table 6-24 presents the assessment only for the sensitive receptors above the SOAEL. The table shows that, as seen in other route options, there are more receptors subject to a beneficial impact (i.e. 511) compare to those experiencing an adverse impact (i.e. 442). Receptors subject to a minor beneficial impact are in the city, several of them are within NIAs 7721, 11815 and 11817. Receptors subject to an adverse impact are mainly

concentrated near the intersection of Olive with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye.

Table 6-24: Long term noise Impact Olive (pre-mitigation) – receptors above SOAEL

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1768	23
	1.0 - 2.9 (Minor)	400	4
	3.0 - 4.9 (Moderate)	8	0
	5 + (Major)	30	0
No change	0	60	0
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1246	12
	1.0 - 2.9 (Minor)	494	17
	3.0 - 4.9 (Moderate)	0	0
	5 + (Major)	0	0

- 6.7.45. Table 6-25 presents the number of potential qualifying under the Noise Insulation Regulations divided into the three Elements described in Section 4.8. It can be seen from the table that properties are concentrated in Element 2. It shows lower number of properties in this element compared to Orange.

Table 6-25 - Number of Properties above 68dB LA10,18h within 300m – Olive Option (pre-mitigation)

Element	Number of Properties
1	12
2	116
3	14
TOTAL	142

BLACK 1

- 6.7.46. Table 6-26 and Table 6-27 present the short-term and long-term noise impact likely to arise as a result of the operation of the Black 1 route option.
- 6.7.47. In the short-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied. A beneficial impact of either minor or moderate is likely to be experienced at 3,015 properties, corresponding to the 11% of properties. The Black 1 option is located further to the west for most of the routes, hence there is a slightly higher number of properties with a beneficial impact, compared to Orange, Cyan, Yellow, Red and Olive.
- 6.7.48. Figure 6-12 presents the noise contours illustrating the noise impact in the short-term. It can be seen that properties in the city centre, specifically receptors near the A49 and part of the A438, would experience a minor beneficial impact.
- 6.7.49. Similar to other route options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Black 1 route with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. However, fewer properties would be subject to an adverse impact compared to Orange.

Table 6-26- Short term noise Impact with Black 1 Option (pre-mitigation) - Daytime

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 – 0.9 (Negligible)	5637	26
	1.0 – 2.9 (Minor)	2495	5
	3.0 – 4.9 (Moderate)	680	4
	5 + (Major)	685	5
No change	0	2114	32
Decrease in noise level, LA10, 18h	0.1 – 0.9 (Negligible)	13875	87
	1.0 – 2.9 (Minor)	3014	29
	3.0 – 4.9 (Moderate)	1	0
	5 + (Major)	0	0

- 6.7.50. In the long-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 4% of those studied, slightly lower than other options. A minor beneficial impact is likely to be experienced at one property. The explanation given in the Orange route option section is also applicable to this option.
- 6.7.51. Figure 6-13 presents the noise contours illustrating the noise impact in the long-term. It can be seen that, as for other route options, properties in the city centre, specifically receptors near the A49, would experience a noise level decrease of 1 to 3dB. Due to the layout located slightly further west compared to previous options, the Black 1 route includes more properties with a decrease in noise levels along the river Wye.
- 6.7.52. Similar to other route options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Black 1 route with the A438 Kings Acre Road (i.e. mainly south of the road) and in Belmont, south of the river Wye. However, fewer properties would be subject to an impact compared to Orange.

Table 6-27: Long term Noise Impact Black 1 (pre-mitigation)

		Daytime		Night-time
Change in noise level		Dwellings	Other sensitives	Dwellings
Increase in noise level, LA10, 18h	0.1 – 2.9 (Negligible)	18966	114	2025
	3.0 – 4.9 (Minor)	1069	3	8
	5.0 – 9.9 (Moderate)	857	3	12
	10 + (Major)	166	4	15
No change	0	1016	8	60
Decrease in noise level, LA10, 18h	0.1 – 2.9 (Negligible)	6426	56	1803
	3.0 – 4.9 (Minor)	1	0	0
	5.0 – 9.9 (Moderate)	0	0	0
	10 + (Major)	0	0	0

- 6.7.53. Table 6-28 presents the assessment only for the sensitive receptors above the SOAEL. The table shows that, as seen in other route options, there would be more receptors subject to a beneficial impact (i.e. 513) compare

to those experiencing an adverse impact (i.e. 437). Receptors subject to a minor beneficial impact are in the city, several of them are within NIAs 7721, 11815 and 11817. Receptors subject to an adverse impact are mainly concentrated near the intersection of Black 1 with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye.

Table 6-28- Long term noise Impact with Black 1 Option (pre-mitigation) – receptors above SOAEL

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 – 0.9 (Negligible)	1771	24
	1.0 – 2.9 (Minor)	384	3
	3.0 – 4.9 (Moderate)	19	0
	5 + (Major)	31	0
No change	0	59	0
Decrease in noise level, LA10, 18h	0.1 – 0.9 (Negligible)	1246	12
	1.0 – 2.9 (Minor)	496	17
	3.0 – 4.9 (Moderate)	0	0
	5 + (Major)	0	0

- 6.7.54. Table 6-29 presents the number of potential qualifying under the Noise Insulation Regulations divided into the three Elements described in Section 4.8. It can be seen from the table that properties are concentrated in Element 2. It shows fewer properties in this Element compared to Orange.

Table 6-29- Number of Properties above 68dB LA10,18h within 300m – Black 1 Option (pre-mitigation)

Element	Number of Properties
1	12
2	114
3	14
TOTAL	140

BLACK 2

- 6.7.55. Table 6-30 and Table 6-31 present the short-term and long-term noise impact likely to arise as a result of the operation of the Black 2 route option.
- 6.7.56. In the short-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied. A beneficial impact of either minor or moderate is likely to be experienced at 2,549 properties, corresponding to the 9% of properties.
- 6.7.57. Figure 6-14 presents the noise contours illustrating the noise impact in the short-term. It can be seen that properties in the city centre, specifically receptors near the A49 and part of the A438, would experience a minor beneficial impact.
- 6.7.58. Similar to other route options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Black 2 route with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. A lower number of properties would experience an impact, when compared to Orange.

Table 6-30: Short term noise Impact Black 2 (pre-mitigation) - Daytime

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	5809	27
	1.0 - 2.9 (Minor)	2896	5
	3.0 - 4.9 (Moderate)	757	3
	5 + (Major)	776	6
No change	0	2160	33
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	13554	88
	1.0 - 2.9 (Minor)	2548	26
	3.0 - 4.9 (Moderate)	1	0
	5 + (Major)	0	0

- 6.7.59. In the long-term, the majority of receptors would experience a magnitude impact of either negligible or minor. Residential receptors subject to an adverse impact of either moderate or major correspond to 4% of those studied, slightly lower than other route options. A minor beneficial impact is likely to be experienced at one property. The explanation given in the Orange route option section is also applicable to this route option.
- 6.7.60. Figure 6-15 presents the noise contours illustrating the noise impact in the long-term. It can be seen that, as for other options, properties in the city centre, specifically receptors near the A49, would experience a noise level decrease of 1 to 3dB. Due to the layout located slightly further west compared to the other route options the Black 2 route includes more properties with a decrease in noise levels along the river Wye.
- 6.7.61. Similar to other route options, receptors potentially subject to either a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Black 2 route with the A438 Kings Acre Road (i.e. mainly south of the road) and in Belmont, south of the river Wye. A lower number of properties would experience an impact, when compared to Orange.

Table 6-31: Long term Noise Impact with Black 2 Option (pre-mitigation)

		Daytime		Night-time
Change in noise level		Dwellings	Other sensitives	Dwellings
Increase in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	19577	117	2025
	3.0 - 4.9 (Minor)	1212	3	8
	5.0 - 9.9 (Moderate)	895	3	12
	10 + (Major)	223	4	17
No change	0	1004	8	60
Decrease in noise level, LA10, 18h	0.1 - 2.9 (Negligible)	5589	53	1803
	3.0 - 4.9 (Minor)	1	0	0
	5.0 - 9.9 (Moderate)	0	0	0
	10 + (Major)	0	0	0

- 6.7.62. Table 6-32 presents the assessment only for the sensitive receptors above the SOAEL. The table shows that, as seen in other route options, there are more receptors subject to a beneficial impact (i.e. 513) compare to those experiencing an adverse impact (i.e. 439). Receptors subject to a minor beneficial impact are in the city, several of them are within NIAs 7721, 11815 and 11817. Receptors subject to an adverse impact are mainly

concentrated near the intersection of Black 2 with the A438 Kings Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye.

Table 6-32- Long term noise Impact with Black 2 Option (pre-mitigation) – receptors above SOAEL

Change in noise level		Dwellings	Other sensitive receptors
Increase in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1772	24
	1.0 - 2.9 (Minor)	384	3
	3.0 - 4.9 (Moderate)	19	0
	5 + (Major)	33	0
No change	0	59	0
Decrease in noise level, LA10, 18h	0.1 - 0.9 (Negligible)	1246	12
	1.0 - 2.9 (Minor)	496	17
	3.0 - 4.9 (Moderate)	0	0
	5 + (Major)	0	0

- 6.7.63. Table 6-33 presents the number of potential qualifying under the Noise Insulation Regulations divided into the three elements described in Section 4.8. It can be seen from the table that properties are concentrated in Element 2. It shows lower number of properties in this element compared to the Orange route option.

Table 6-33- Number of Properties above 68dB LA10,18h within 300m – Black 2 (pre-mitigation)

Element	Number of Properties
1	13
2	116
3	14
TOTAL	143

6.8 DISCUSSION

- 6.8.1. The majority of receptors in the study area are likely to experience a negligible impact which according to Table 4-4 of Chapter 4 and the sensitivity of the receptors is classified as a slight effect. Urban areas extending from Hereford are likely to receive either a minor, moderate or major adverse impact, classified as slight to large adverse effect. Receptors experience an adverse effect are mainly concentrated along the A438 Kings Acre Road and also near the A4110 Canon Pyon Road and in Belmont, south of the river Wye.
- 6.8.2. A minor beneficial impact, slight effect, is expected at receptors in the city centre. Some of them would be above the SOAEL therefore, this impact would be classified as significant in terms of Government policy.
- 6.8.3. The noise impact would be similar at all route options, variations in the route layout would only affect receptors near the proposed bypass. The impact at receptors towards the city centre would not be determined by the option selected. It is noted from the results that the Black 1 route option presents the least adverse impact, followed by Black 2 and Olive route options. For instance, the Black 1 route option exhibits the lowest number of receptors above the SOAEL subject to a major impact.
- 6.8.4. The analysis of elements of the route, summarised in Table 6-34, reiterates that Black 1 presents the lowest constraint with lower number of properties qualifying for NIR 1975. An indicative list of best performing route options with respect to NIR is shown below:

- Element 1: Either Option Black 1, Olive, Red or Black 2;
- Element 2: Either Option Black 1, Red, Black 2 or Olive; and
- Element 3: Either Option Black 1, Red, Olive, or Black 2

Table 6-34 - Number of Properties above 68dB L_{A10,18h} within 300m – Summary

Element	Orange	Cyan	Yellow	Red	Olive	Black 1	Black 2
1	24	24	24	13	12	12	13
2	143	121	140	114	116	114	116
3	25	25	24	13	14	14	14
TOTAL	192	170	188	140	142	140	143

6.9 NOISE IMPORTANT AREAS

- 6.9.1. A summary table has been prepared to illustrate the likely noise impact experienced by receptors within NIAs. The assessment in Table 6-35 is applicable for all route options. It can be seen from the table that NIAs are likely to experience either a minor beneficial or negligible impact.

Table 6-35- Worst case noise impact within noise important areas, all options (pre-mitigation)

NIA ID	All options – Short Term	All options – Long Term
11809	Negligible	Negligible
11810	Negligible	Negligible
11811	Negligible	Negligible
11813	Negligible	Negligible
11814	Negligible	Negligible
11815	Negligible	Negligible
11816	Negligible	Negligible
11817	Negligible	Negligible
11818	Minor Beneficial	Minor Beneficial
7721	Negligible	Negligible
7725	Negligible	Negligible
7726	Negligible	Negligible

6.10 ASSESSMENT OF PROPOSED LAND AT THREE ELMS DEVELOPMENT

- 6.10.1. An urban extension of up to 1,200 homes is proposed north west of Hereford, between the A4103 and A438, the Three Elms development. During consultation with Herefordshire Council it was agreed that the potential impact on this development would be indicatively assessed at this stage.
- 6.10.2. Noise predictions have been made in the model to indicate the likely absolute noise levels at the Three Elms development arising from the operation of the proposed Scheme. Representative sensitive receptor locations have been used to replicate the position of the most exposed dwellings respect to the bypass. Some of the proposed Scheme route options would go through the development site; the Red, Olive, Yellow and Orange route options would go through the Three Elms residential element, and the Cyan route option would go through 3 Elms commercial area. Only the Black 1 and Black 2 route options would avoid the Three Elms development completely.

- 6.10.3. Table 6-36 shows the noise modelling results, in terms of dB LA_{10,18h}. For the Cyan, Red, Olive, Black 1 and Black 2 route options, noise levels were predicted at three receptors located along the the western side of the Three Elms development, in positions assumed to be representative of the first row of houses. These are referred to as North, Central and South, corresponding to their location along the western boundary. For the Orange and Yellow route options, which would be located within the residential area of the development, noise levels were calculated at distances of 20m, 40m and 60m from the edge of the carriageway, to help inform offset distances that would be required within the Three Elms Development Masterplan redesign, should either the Orange or Yellow route options be selected as the preferred route.
- 6.10.4. The results show that Red and Olive route options would result in noise levels higher than 68dB LA_{10,18h}. Black 1 and Black 2 route options would result in noise levels of less than 60dB LA_{10,18h}, which is in turn is likely to result in a less onerous mitigation strategy.
- 6.10.5. Table 6-36 also shows that for the Ornage and Yellow route options going through the development, noise levels are likely to exceed 68dB LA_{10,18h} at distances of 20m, 40m and 60m from the carriageway. The Three Elms Masterplan would therefore need to be resigned with residential properties more than 60m from the Orange and Yellow options.

Table 6-36: Three Elms Development – Noise Levels dB LA_{10,10h}

Option	Noise Level at nearest façade (design year)			Noise Level from edge of carriageway, distance (m)		
	North	Centre	South	20m	40m	60m
Orange				73.2	69.1	66.9
Cyan	60.5	58.7	66.9			
Yellow				73.2	69.1	66.9
Red	67.4	66.5	69.7			
Olive	67.4	66.5	69.7			
Black 1	60.4	56.3	59.7			
Black 2	60.4	56.3	59.7			

6.11 SUMMARY

- 6.11.1. An assessment has been conducted to determine the likely noise impacts arising from the operation of the proposed Scheme. Seven route options have been analysed to assist the selection of the preferred route.
- 6.11.2. A baseline noise study has been undertaken to establish the noise climate at the surroundings of the site. NIAs were identified in Hereford and they have been included as part of the study.
- 6.11.3. A noise model using CadnaA and ArcGIS was prepared to predict the baseline and operational noise levels from the proposed Scheme and local road network. The methodology followed guidance in the CRTN. A noise assessment based on guidance in DMRB was prepared to determine the likely noise impacts during the short and long-term. Based on Government policy, and assessment was made to study the changes in noise levels at receptors experiencing noise levels above the SOAEL.
- 6.11.4. The assessment shows that the majority of receptors in the study area are likely to experience a negligible impact classified as a slight effect. Receptors concentrated near the A438 Kings Acre Road, A4110 Canon Pyon Road and in Belmont, south of the river Wye are likely to experience a slight to a large adverse effect. A minor beneficial impact, slight effect, is expected at receptors in the city centre. Some of them would be above the SOAEL therefore, this impact would be classified as significant in terms of Government policy.
- 6.11.5. The noise impact would be similar at all route options. Small variations in the results suggests that the Black 1 route option presents the least adverse impact, followed by Black 2.

- 6.11.6. The effect at NIAs in the city is likely to be slight to moderate beneficial. An indicative assessment has been provided for sensitive receptors at the proposed urban extension Land at Tree Elms and constraints are provided to suggest that Options Black 1 and Black 2 are likely to require a less onerous mitigation strategy.

7 LANDSCAPE

7.1 INTRODUCTION

- 7.1.1. This chapter describes and evaluates the existing landscape resource and visual receptors in the vicinity of the proposed Scheme. It identifies the likelihood of potential significant effects on high sensitivity landscape and visual receptors associated with the seven short-listed route options described in Chapter 2 of this report. At this stage the assessment is based on a 2D design. The findings of the assessment are intended to inform the decision-making process on the potential for route options to result in significant landscape and visual effects and whether appropriate design and mitigation can reduce these.

7.2 LEGISLATION AND POLICY FRAMEWORK LEGISLATION AND CONVENTIONS

- 7.2.1. Legislation and conventions of specific relevance to this chapter are outlined below:

Countryside and Rights of Way Act, 2000

- 7.2.2. The Countryside and Rights of Way Act 2000²¹ provides a statutory framework for protected landscapes and introduced an additional right of access requiring the identification of Open Access Land.

Hedgerow Regulations, 1997

- 7.2.3. Important hedgerows are protected through the Hedgerow Regulations. A hedgerow is likely to be deemed 'important' if it is at least 30 years old and fulfils at least one of a number of criteria, including but not limited to the following:

- Marks all or part of a parish boundary that existed before 1850;
- Incorporates a minimum number of woody species or features such as banks or ditches;
- Is adjacent to a bridleway or footpath, within the meaning of the Highways Act 1980 and includes at least four woody species and two features; and
- Is part of a field system or appears to be related to any building or other feature associated with the field system that existed before the Enclosure Acts (that is, before 1865).

The European Landscape Convention, 2000

- 7.2.4. The European Landscape Convention (ELC)²² was ratified in the UK on the 21 November 2006 and became binding on 1 March 2007. It provides a basis for closer co-operation on landscape issues across Europe. The Convention highlights the need to recognise landscape in law, to develop landscape policies dedicated to the protection, management and creation of landscapes, and to establish procedures for the participation of the general public and other stakeholders in the creation and implementation of landscape policies. It also encourages the integration of landscape into all relevant areas of policy, including cultural, economic and social policies. The ELC defines landscapes as:

- *"An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."*

- 7.2.5. The ELC applies to natural, rural, urban and peri-urban areas including land, inland water and marine areas. Its purpose is to promote landscape protection, management and planning in relation to all landscapes regardless of whether their quality and condition is considered outstanding, ordinary or degraded. The UK is recognised as already putting many of the principles of the ELC into practice. The importance of landscapes in contributing to local identity and in reflecting local cultural influences and ecological diversity is shown through the use of Landscape Character Assessments and Natural England's National Character Areas Project.

²¹ Department for Environment and Rural Affairs, 2000, Countryside and Rights of Way Act, HMSO

²² Council of Europe, 2000, The European Landscape Convention

NATIONAL POLICY

National Planning Policy Frameworks

- 7.2.6. The National Planning Policy Framework²³ (NPPF) was published in March 2012 and sets out the Government's planning policies for England and how these are expected to be applied.
- 7.2.7. The NPPF sets out a clear presumption in favour of sustainable development, which should be seen as a 'golden thread' running through plan-making and decision-taking. The NPPF outlines 13 aspects relating to the delivery of sustainable development and which are designed to guide and influence local authorities in developing their local plans, demonstrating the government's commitment to ensure the planning system does everything it can to support sustainable economic growth.
- 7.2.8. It recognises landscape as being an important part of sustainable development and in particular its environmental role as a contributing factor in understanding the natural, built and historic environment (paragraph 7). It attaches great importance to the design of the built environment and the need for good design which should contribute positively to making better places for people.
- 7.2.9. Within paragraph 17 of the NPPF the Government sets out a number of overriding core planning principles that are relevant to the landscape including:
- Always seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings;
 - Take account of the different roles and character of different areas; and
 - Contribute to conserving and enhancing the natural environment and reducing pollution.
- 7.2.10. Section 7, "Requiring Good Design" seeks to ensure that wider area development schemes are planned positively for the achievement of high quality and inclusive design (paragraph 57) and that local distinctiveness is promoted and reinforced.
- 7.2.11. Section 11; "Conserving and enhancing the natural environment" (paragraph 109) notes that the planning system should contribute to and enhance the natural and local environment by, inter alia: *"Protecting and enhancing valued landscapes, geological conservation interests and soils"*
- 7.2.12. Paragraph 114 states that Local Planning Authorities (LPAs) should protect and enhance their distinctive landscape and paragraph 115 notes that: *"Great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to landscape and scenic beauty. The conservation of wildlife and cultural heritage are important considerations in all these areas, and should be given great weight in National Parks and the Broads."*
- 7.2.13. Paragraph 123 notes the importance of tranquillity and requires planning policies and decisions aim to *"identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason"*.

National Policy Statement for National Networks

- 7.2.14. The National Policy Statement for National Networks (NNNPS), sets out the need for, and Government's policies to deliver, Nationally Significant Infrastructure Projects (NSIPs) on the national road and rail networks in England. It provides planning guidance for promoters of NSIPs on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State.
- 7.2.15. Guidance relevant to the proposed Scheme in relation to landscape and visual issues include the following:
- Avoid and mitigate environmental and social impacts in line with the principles set out in the NPPF and planning guidance;
 - Consider reasonable opportunities to deliver environmental and social benefits;
 - Good design should be an integral consideration from the outset of the project;

²³ Department for Communities and Local Government, 2012, National Planning Policy Framework, The Stationary Office, London

- Visual appearance is a key factor in considering the design of new infrastructure and should be sensitive to place;
- Take aesthetics into account as far as possible (bearing in mind fitness for purpose and sustainability), including siting, design measures relating to existing landscape and historical character and function, landscape permeability, landform and vegetation;
- The visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include any noise and light pollution effects, including on local amenity, tranquillity and nature conservation;
- Great weight should be given to conserving landscape and scenic beauty in nationally designated areas including National Parks, The Broads and Areas of Outstanding Natural Beauty;
- Strong presumption against any significant road widening or new roads in a National Park;
- Where an Environmental Impact Assessment (EIA) is required a landscape and visual assessment should be included in the EIA. The Secretary of State will want to judge whether visual effects on a sensitive receptor outweighs the benefits of development;
- Mitigate adverse landscape and visual effects through appropriate siting, design and landscaping; and
- Public Rights of Way (PRoW) and National Trails are important recreation facilities for walkers, cyclists and horse riders. Take appropriate mitigation measures to address adverse effects on national trails, other rights of way and open access land.

LOCAL POLICY

Hereford Local Plan – Core Strategy

- 7.2.16. The Proposed Scheme lies within the planning authority of Herefordshire Council, a Unitary Authority. The Hereford Local Plan – Core Strategy adopted 16 October 2015 provides the strategic planning framework for the county's future development needs up to 2031. Policies Ss6, LD1, LD2, LD3, LD4 and SD1 within the Local Plan relate to landscape and visual amenity (and replace policies within the former Unitary Development Plan). These policies are outlined below:
- 7.2.17. **Policy SS6 Environmental Quality and Local Distinctiveness** states that development proposals should “conserve and enhance those environmental assets that contribute towards the county's distinctiveness, in particular its settlement pattern, landscape, biodiversity and heritage assets and especially those with specific environmental designations”. The effectiveness of ecosystems essential “to the health and wellbeing of the county's residents and its economy” should be maintained, and an “integrated approach should be taken to planning environmental components” including landscape, townscape and local distinctiveness, biodiversity and geodiversity, historic environment and assets, green infrastructure, local amenity, agricultural and food productivity and physical resources.
- 7.2.18. **Policy LD1 Landscape and townscape** seeks to ensure that “the character of the landscape and townscape has positively influenced the design, scale, nature and site selection, the protection and enhancement of the setting of settlements and designated areas”. It also seeks to “conserve and enhance the natural, historic and scenic beauty of important landscape and features”, ensure that “new landscape schemes and their management are integrated into their surroundings” and “maintain and extent tree cover where important to amenity”. The supporting text refers to the varied, rural nature of the county with a wide range of settlement patterns, different types of farmland and evidence of ancient landscape features which informs its local distinctiveness, a number of publications and reiterates the importance of tree cover to the county's landscape and townscape.
- 7.2.19. **Policy LD2 Biodiversity and geodiversity** states that nature conservation sites and habitats, and important species should be retained and protected. Consideration should be given to the restoration and enhancement of existing features and connectivity to wider ecological network as well as the creation of new biodiversity features and wildlife habitats.
- 7.2.20. **Policy LD3 Green infrastructure** seeks to ensure that development proposals protect, manage and plan for the preservation of existing and delivery of new infrastructure. The following set of objectives should be achieved:
- “Identification and retention of existing green infrastructure corridors and linkages; including the protection of valued landscapes, trees, hedgerows, woodland, water courses and adjoining floodplain;
 - Provision of on site green infrastructure, in particular proposals will be supported where this enhances the network; and
 - Integration with, and connection to, the surrounding green infrastructure network.”

- 7.2.21. **Policy LD4 Historic environment and heritage assets** states that heritage assets and their setting should be protected, conserved and where possible enhanced. Where opportunities exist, proposals should contribute to the character and local distinctiveness of the townscape or wider environment. Understanding of the significance of heritage assets should be recorded and improvements made where appropriate to the understanding of and public access to heritage assets.
- 7.2.22. **SD1 Sustainable design and energy efficiency** seeks to ensure that development proposals are “safe, sustainable, well integrated environments” which take into account the local context and site characteristics. Residential amenity should be safeguarded as well as distinctive features of existing buildings and their settings. Designs should be easily adapted and sustainable construction methods used.

Herefordshire Green Infrastructure Strategy

- 7.2.23. The Herefordshire Green Infrastructure Strategy²⁴ (2010) identifies Fringe Zones, District Corridors, Strategic Corridors and Local Enhancement Zones with a view to identifying the potential for protection and enhancement of the green infrastructure network around Herefordshire.
- 7.2.24. District Strategic Corridors (DSCs) form a strategic network of distinct, linear landscapes joining people and the environment, building on existing and potential assets whilst Local Strategic Corridors (LSCs) represent the strategic framework of connected linear components of green infrastructure within and around the towns. The existing historic and natural assets that make up the Local Strategic Corridors provide the opportunity to increase the sustainability of new and existing development. Fringe Zones form a further layer; the interface or transition between settlement and countryside. Such zones were included “both in recognition of the inevitable pressures of development on these areas, and also because of the diversity of activities, assets and services inherent in these areas.”
- 7.2.25. Options for potential urban expansion form the focus of the Local Enhancement Zones (LEZ) which are areas around the periphery of Hereford not subject to development pressure, but where benefit to the local community and environment would accrue.

Breinton Neighbourhood Development Plan

- 7.2.26. The Breinton Neighbourhood Development Plan²⁵ (BNDP) sets out detailed planning policy for Breinton parish. The key policies of note are as follows:
- **Policy B6** – Sustainable Design and Energy Efficiency. This policy states that all development within the parish will be expected to achieve an appropriate density that reflects the rural settlement pattern whilst making efficient use of land avoiding encroachment into open countryside. It goes on to state that local distinctiveness should be preserved and enhanced by responding sympathetically to the historic and natural characteristics of these areas.
 - **Policy B7** – Protecting the best and most versatile agricultural land, soils and promoting agricultural development that protects the environment and preserves the distinctive rural landscape. Development will only be permitted where poorer quality land is not available, the economic benefits of the Proposed Scheme outweighing the need to retain open land and the land under consideration has no other benefit.
 - **Policy B9** – Protecting Designated Local Green Space. Green spaces to be protected include Drovers Wood, Wyevale Wood, Breinton Wood, including Breinton Springs, and Greenbank Meadow. Development in these areas will only be permitted where consistent with National Green Belt policy. ‘Proposals affecting the setting, tranquillity and landscape value of these local green spaces should avoid, or include appropriate mitigation measures to offset, any adverse impact.
 - **Policy B10** – Moving around Breinton. This policy seeks to protect the quiet and rural character of existing routes. Development affecting such routes should consider the need of route users taking into account the design of the development, views into and out of the route and the retention, improvement or resiting of existing access routes. Specific reference is made to the Hereford Relief Road which should integrate sympathetically with the natural landscape character of this sensitive rural area, take into account of local topography and skylines and be designed and sited to avoid encouragement of “rat running”. The Policy goes on to state that:

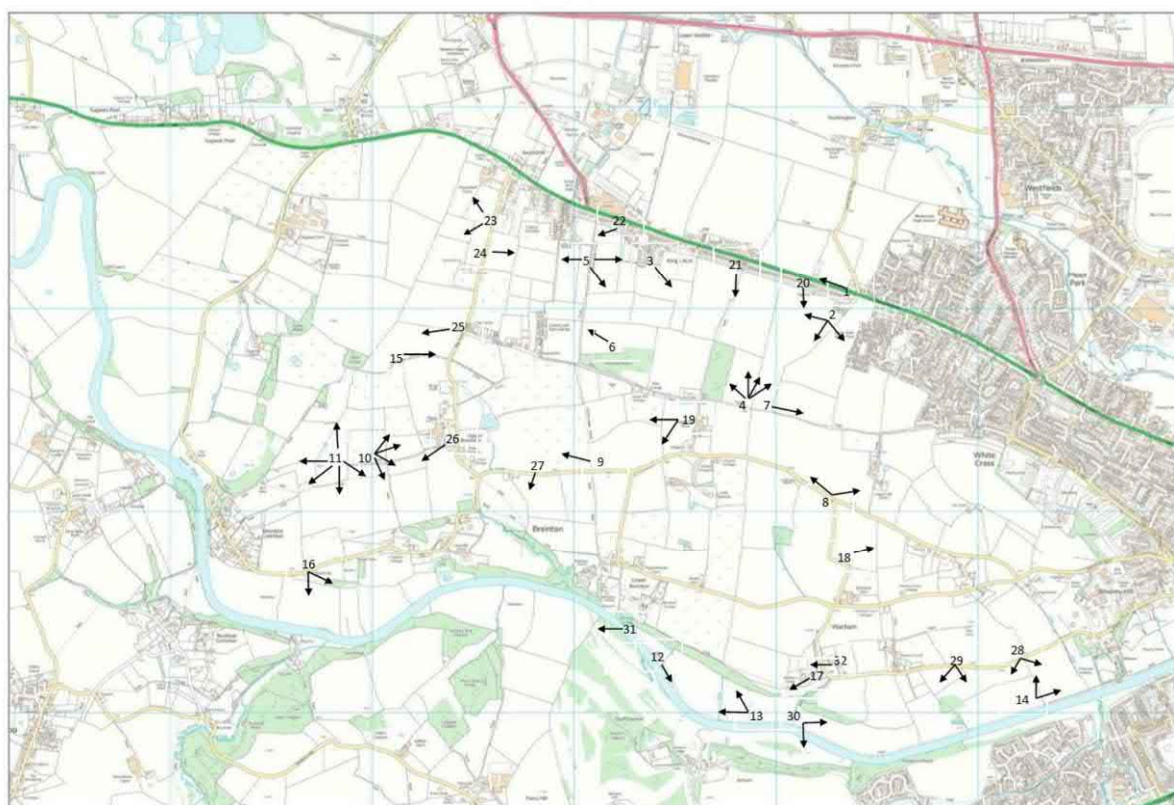
²⁴ Herefordshire Council, Green Infrastructure Strategy (and Study), February 2010

²⁵ Breinton Parish Council Breinton Neighbourhood Development Plan 2011-2031, September 2016

- *“Any artificial lighting should be minimised. Where provision of highway lighting is considered essential, lighting should be designed through use of appropriate luminosity and direction of light to have a low impact on the surrounding landscape and housing, and should not leak unnecessary light into the night sky;*
- *Any new roads should be part of a high quality landscaping scheme involving short term and long term planting using indigenous and locally appropriate tree and shrub species to provide screening and sound and visual barriers;*
- *Suitable road surface materials should be used to reduce noise impacts, and artificial earth bunding will be encouraged to reduce noise and improve visual amenity;*
- *Wildlife corridors should be provided where the green infrastructure network identified in figure 6 is truncated or severed, through the provision of underpasses, bridges etc;*
- *Roads should include provision of appropriate water management and storage to minimise runoff and water borne pollution into neighbouring fields and properties, and in particular the River Wye SAC where water quality must not be adversely impacted;*
- *Roads should retain crossing points for PROWs via footbridges or other means which are of a high quality design, sited appropriately, maximise user safety and encourage increased use of the PROW;*
- *Continued usage for landowners and farmers is a priority, particularly where land holdings are affected by severance. Areas of land that any new road makes uneconomic to be returned to their previous use should be re-used for public open space, community orchards, allotments, play grounds or sports fields in partial compensation for the road;*
- *Existing local lanes and other PROWs should not be severed if at all possible. These are important tourist's routes such as the Wye Valley Way and the Hereford Leisure Cycle Route 2004. Every effort should be made to maintain the existing links between the scattered farmsteads and hamlets and the residents within them and the few existing community facilities such as the parish church and village hall;*
- *Proposals for introducing quiet lanes, traffic calming and maximum speed limits of 20mph will be supported in principle on all routes through the parish to discourage increases in traffic, particularly heavy traffic, as a result of the completion of any road;*
- *Opportunities for improving provision for walking, running, cycling and horse riding and public transport services will be encouraged wherever possible so that any road is accessible by, and facilitates a genuine choice of modes of travel;*
- *Proposals should minimise the loss of the best and most versatile land uses for any proposed road or construction activity associated with it. Land used during construction but not needed once any road is completed should be returned to its original state; and*
- *Any road should be designed and developed to minimise adverse impacts or physical damage to habitats, water quality in the River Wye SAC, residential amenity, business interests, the significance and setting of heritage assets and the historic character of the wider landscape as a result of noise pollution and vibration, light pollution, air pollution or flood risk, where harmful effects cannot be entirely avoided proposals should include measures to mitigate the harm within the parish.”*
- **Policy B11 – Green Infrastructure.** This policy seeks to enhance or maintain the existing green infrastructure network. Development proposals that disrupt the network will not be permitted except where replacement of a small area of the network is unavoidable. In such cases, mitigation or compensation should be provided.
- **Policy B14 – Protecting the Landscape.** This policy seeks to ensure that developments take account of local topography, scale and massing and be appropriate for the local landscape.
- **Policy B15 – Local Distinctiveness.** This policy requires developments to have consideration of a number of landscape design principles in order to help retain the special character of the local landscape. Mitigation should be used to reduce adverse effects where necessary. The following principles should be adhered to:
 - Protection of veteran, mature and established trees and planting of new trees and hedgerows using native species. Wyevale wood and ancient woodland along River cliff to be left undisturbed
 - Retention of all traditional orchards. Where lost, they should be replaced with suitable fruit varieties over an equivalent or greater area
 - Incorporation of Sustainable Urban Drainage Systems (SUDS)

- **Policy B16** – Protecting important public views. The policy identifies 7 key views. Any development affecting the quality of these views will not be permitted, refer to Figure 7-1 below. The key views are as follows:
 - Southerly views from Kings Acre Road to Breinton Ridge;
 - Views from Breinton Ridge;
 - Views from / of Adams Hill;
 - Views from / to Breinton Manor (the Trig point);
 - Views of the River Wye SAC;
 - Views west towards Breinton Common; and
 - Views painted by Brian Hatton.

Figure 7.1: Important Public Views, Breinton Neighbourhood Development Plan, September 2016



7.3 STUDY AREA

- 7.3.1. The study area, was broadly defined through a desk top study of relevant maps and websites and the production of a combined Zone of Visual Influence (ZVI) of the seven proposed route options. The ZVIs extended 2km on either side of each proposed route option to ensure that any potential sensitive landscape and visual effects were considered.
- 7.3.2. For each proposed route option a study area was defined as 250m on either side of the centre line, focused on specific landscape features and visual receptors. The combined Route Study areas of all 7 route options is referred to as the Combined Route Study Area. This judgement is based on professional judgement and experience of the assessment of similar projects and the recommendation in IAN 135/10 Landscape and Visual Effects Assessment, that “no work should be carried out which does not directly assist the decision about whether further work is necessary....”
- 7.3.3. For the purposes of the baseline assessment, descriptions of landscape character and visual amenity are based on the study area as outlined above.

7.3.4. In addition, each of the seven routes has been subdivided into three elements, as described in Section 4.8.

7.4 BASELINE CONDITIONS

7.4.1. This section describes the baseline environment for landscape character and visual amenity within the study area.

LANDSCAPE CHARACTER

7.4.2. Landscape character is what makes an area unique. It is defined by both natural and culturally influenced characteristics, which in combination contribute to the look, function and feel of a place and affect its sensitivity to change.

7.4.3. The essential components of landscape character include:

- Landscape elements: the dominant features, which characterise, contribute to, or detract from the overall landscape impression (such as the built form, the landform, land use, vegetation, water, field patterns, walls etc.). They are quantifiable and can be described; and
- Landscape types: identifiable at a broader scale and constitute areas with a homogeneous character based on geology, topography, geomorphology, vegetation and/or land use (e.g. moorland, rolling upland, historic parkland, urban). These elements or groups of elements can be assessed as a landscape type of a particular quality and value. Sensory qualities (e.g. tranquillity and wildness) are also considered as part of the overall character type.

7.4.4. The following sections describe the landscape character elements and types within the study area.

National Landscape Character

7.4.5. The Combine Route Study Area lies within Natural England's National Character Area (NCA) 100 Herefordshire Lowlands. Key characteristics identified for NCA 100 include the following:

- Gently undulating landscape with localised steep-sided hills in the centre and wide agricultural flood plains.
- Much of the area is underlain by Old Red Sandstone, with localised deposits of alluvium and glacial drift. There is also a small area of Silurian limestone and siltstone at Shucknall Hill. Fertile soils support intensive mixed agriculture, especially on the better drained glacial river terraces.
- Wide, meandering river valleys drain the area, including the Wye, a major ecological and recreational asset, and the Lugg, and the valleys of the rivers Frome and Arrow also offer rich habitats.
- Pasture with occasional wet meadows and permanent grassland along the rivers. Low hedgerows with sparse tree cover. Arable cultivation on lower-lying land.
- Localised traditional and bush orchards and occasional hop fields planted with windbreaks.
- Several historic parklands include Humphry Repton's landscape improvements at Garnons and Hampton Court, Capability Brown's landscape at Berrington Hall, Uvedale Price's Foxley and numerous medieval parks, many with important ancient and veteran trees.
- Timber-framed (black-and-white) buildings are characteristic with stone and red brick also used frequently as building materials.
- Dispersed rural settlement pattern throughout with scattered villages, hamlets, farmsteads and clustered settlements around commons. Historic market towns of Hereford and Leominster are the principal settlements.
- Tranquil and relatively undisturbed by major infrastructure aside from a few crossing A-roads between Hereford, Hay-on-Wye and Leominster.

7.4.6. NCA 100 identifies the following cultural elements present:

- Sense of place /
- inspiration: Sense of place is provided by the distinctive, undulating, intensively farmed landscape with localised steep, often wooded, hills such as Dinmore and Wormsley rising above wide flood plains, with the meandering rivers of the Lugg, Frome and Wye, marked by occasional pollarded trees. The city of Hereford exerts a strong influence across most of the NCA. Hay-on-Wye to the west and Ledbury to the east act as 'gateways' into the area, from Wales and the Malvern Hills respectively.
- Tranquillity: particularly associated with the deeply rural and distinctive character of the traditionally farmed Herefordshire countryside crossed by wide, meandering river valleys and punctuated by steep, wooded hills with parkland and extensive orchards around many small settlements.

- Recreation: supported by the area's 1,319 km rights of way network and 458 ha of open access land, including Queenswood Country Park on Dinmore Hill as well as access within the river valleys. A National Cycle Route follows the Lugg Valley, there is access to the Offa's Dyke National Trail and a public right of navigation exists on the River Wye.
- Biodiversity: There is one internationally designated site within the NCA – the River Wye SAC, extending over 2,200 ha, of which 430 ha lie within this NCA. There are 24 SSSI in the NCA, totalling more than 1,000 ha.
- Geodiversity: As well as the SSSI at Monnington Scar there are 36 Local Geological Sites within the NCA. Many of the biological SSSI owe their character to the underlying geology. The Sturts contains the important habitat of kettle hole ponds in a glacial moraine.

7.4.7. NCA 100 also identifies approaches to management and environmental opportunities including the following:

- Conserve ancient and veteran trees within historic parkland, former wood pasture, in field boundaries, traditional orchards and in the wider landscape. Replant and replace fallen and decayed ancient and mature trees to maintain landscape character, sense of place and enhance biodiversity.
- Protect and manage the ancient semi-natural woodlands and associated habitats, including extending, buffering and connecting areas of woodland and unimproved grassland habitats. Use traditional coppice management, and plan for the increase in demand for wood fuel whilst preserving its intrinsic character.
- Manage, restore and enhance traditional orchards. Ensure a continuity of deadwood, maintain biodiversity value and increase the variability of age structure of orchard trees.
- Retain, restore, manage and plant new hedgerows, replacing hedgerow trees where necessary and managing field boundaries in traditional local styles.
- Protect, manage and enhance the river Wye, Lugg, Frome and Arrow. Plan for higher frequency of flood events and higher levels of winter rainfall through the restoration of traditional flood meadows and expansion of riparian habitats around the river corridors
- Protect the areas of strong rural character that lack intrusion and have high levels of tranquillity whilst supporting a working landscape that provides essential food, homes and recreational opportunities. Plan for reduced- carbon affordable housing that enhances landscape and biodiversity, using local materials built to high environmental standards.
- Manage the existing access network of rights of ways and cycle routes and plan new links, particularly between urban areas on the boundary of the NCA and the wider countryside linking to public transport.
- Protect the historical features in the landscape ranging from the buried archaeology of the prehistoric to Roman periods, the medieval settlements, structures and field systems and later examples of agrarian land use and industry
- Enhance green infrastructure links between the urban centres and wider countryside and develop and enhance green infrastructure within the urban areas.
- Maximise opportunities for recreation and enjoyment of nature, particularly along the river valley, linked by sustainable transport networks

7.4.8. The general scale of National Character Areas does not allow for a suitable assessment of individual road schemes, as their impacts on such a large area would not generally be significant. NCA 100 will therefore not be considered further as part of the assessment section but has been included here for completeness. In order to ascertain changes in local landscape character as a result of the proposed Scheme, published Local Landscape Character Area studies have been considered, as outlined below.

Local Landscape Character: Hereford Landscape Character Assessment

- 7.4.9. Herefordshire Council commissioned a Landscape Character Assessment SPG (2004 – Revised 2009) to provide the guidance necessary to comply with the now superseded landscape policies of the Herefordshire Unitary Development Plan (UDP). The document promotes the use of landscape character assessment to 'understand, safeguard and enrich' the quality of the landscape whilst accommodating appropriate development.
- 7.4.10. The Landscape Character Assessment SPG 2004 defines landscape as: *"The human perception of the land at a scale that is smaller than the global environment but larger than the individual site"*. Landscape character on the other hand has been described as *"An expression of pattern, resulting from particular combinations of natural and cultural factors that make one place different from another"*.
- 7.4.11. Historical patterns of settlement and woodland cover are a key determinant of landscape character with importance placed on the effects of land use change where possible should respect appropriate and not destroy the inherent character of the landscape.

- 7.4.12. Sensitivity determined through the establishment of quality, value and capacity to accommodate change is defined in Section 7.5 Assessment Methodology.
- 7.4.13. The relevant key Landscape Character Types (LCTs) identified in SPG 2004 are outlined below, along with their characteristics of relevance to the study area and their sensitivity (refer to Figure 7-3 Landscape Character in Appendix 7-1):
- 7.4.14. **LCT 7.10 Principal Timbered Farmlands** includes the following key characteristics and sensitivity:
- The parts of LCT 7.10 lying within the study area are to the north of the River Wye between Stretton Sugwas and Hereford, forming a rough L-shape
 - Principal Timbered Farmlands are rolling lowland landscapes with occasional steep sided hills and low escarpments. They have a small scale, wooded, agricultural appearance characterised by filtered views through densely scattered hedgerow trees.
 - The key element of these landscapes is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses.
 - The small scale wooded agricultural appearance is characterised by filtered views through densely scattered hedgerow trees. The mosaic of small to medium sized fields, irregularly shaped woodlands and winding lanes provide complex, intimate places within the landscapes.
 - The woodlands are of ancient semi-natural character, comprising mixed native broadleaved species, with oak being dominant. Visually dominant lines of mature oak and hedgerows present in the landscape provide rich, complex habitats supporting a wide range of flora and fauna as well as the numerous hedgerow trees.
 - The scale and shape of the woodlands is also important, ranging in size from small field corner copses to those of a size exceeding that of the surrounding fields.
 - The organic character of the landscape is influenced by the irregular outline of many of the woodlands, pattern of hedgerows and winding lanes. A densely dispersed pattern of farmsteads and wayside cottages is typical with a notable number of buildings constructed out of brick and timber.
- 7.4.15. This LCT is likely to be of high sensitivity to highway development.
- 7.4.16. **LCT 7.14 Riverside Meadows** includes the following key characteristics and sensitivity:
- The parts of LCT 7.14 within the study area follow the course of the River Wye, forming a corridor between 300m and 700m wide, aligned with the floodplain.
 - These are linear, riverine landscapes associated with a flat, generally well defined, alluvial floodplain, in places framed by steeply rising ground. They are secluded pastoral landscapes, characterised by meandering tree-lined rivers, flanked by riverside meadows, which are defined by hedge and ditch boundaries. Settlement is typically absent.
 - Throughout these landscapes, the presence of extensive areas of seasonally grazed waterside meadows has in the past provided a strong sense of visual and ecological unity. These are landscapes that accommodate a degree of annual flooding, a factor which has been reflected in the traditional patterns of land use, the lack of settlement and development (except for the occasional water mill), and the representation of species and habitats tolerant of such waterlogged conditions.
 - The natural fertility of Riverside Meadows has often been maximised by employing devices such as sluices to control and direct the silt laden flood waters.
 - Tree cover is a notable element of Riverside Meadows, usually in a linear pattern along the hedge and ditch lines, and to the banks of watercourses. Typically, species are alder and willow, the latter often pollarded. This LCT is associated with large rivers including the Wye River within the designated route option.
 - Riverside meadows are linear landscapes where the sense of unity relies heavily on extensive views along the length of river corridors. Added features such as roads, bridges or embankments, which dissect the river corridor have resulted in numerous instances of visual fragmentation.
- 7.4.17. This LCT is likely to be of high sensitivity to highway development.
- 7.4.18. **LCT 7.15 Wet Pasture Meadows** includes the following key characteristics and sensitivity:
- There are three sections of LCT 7.15 within the study area, one to the north west of Stretton Sugwas in the west, one to the north east around Pipe and Lyde and one small area in the far south near Haywood.

- Wet Pasture Meadows are flat, low-lying and largely uninhabited landscapes. They are found where the land form has naturally created poorly drained, low-lying basins collecting water from the surrounding low hills or scarps.
- These are landscapes which, in the past, have been protected from change by the difficulty of cultivating soils with the poor drainage. They have consequently been avoided as sites for settlement and roads, and have often not been considered economically viable for agricultural improvement. This, together with the widespread pastoral land use, and associated traditional methods of management, has favoured the retention of wetland habitats of considerable wildlife interest and a certain wilderness quality.
- Wet Pasture Meadows are secluded, pastoral landscapes characterised by a regular pattern of hedged fields and ditches fringed by lines of willow and alder. Pollarded willows are often a distinctive feature.

7.4.19. This LCT is likely to be of high sensitivity to highway development.

7.4.20. **LCT 7.18 Wooded Estatelands** includes the following key characteristics and sensitivity:

- The majority of the area south of the River Wye, in the south of the study area is covered by LCT 7.18.
- These are wooded agricultural landscapes of isolated farmsteads, clusters of wayside dwellings and occasional small estate villages.
- Mixed farming is the dominant land use, with woodland comprising about 30-40% of the land cover. This Landscape Type relies heavily upon its woodland component as the critical element in defining its character.
- The size, shape and composition of the woodlands are all important, being generally large, discrete woods of ancient semi-natural character and irregular or semi-regular outline. They frame views and are often prominently situated on low crests.
- The prominent hedgerows are also important in defining the scale and providing the structure to the landscape. Groups of mature ornamental trees planted in parks or gardens are often significant visual landmarks.
- The eighteenth and nineteenth century enthusiasm for landscape design is often evident in this Landscape Type where tree planting has been designed specifically to enhance, frame or screen designed views.
- Medieval parkland and its associated ancient woodland is often a feature of Wooded Estatelands. Estate villages are also associated with these areas, and these invariably possess a strong character as a result of their style, layout and detailing.
- It is not an intimate landscape and, due to its fairly large scale, can sometimes appear rather functional. The whole LCT will reflect the influence of a limited number of landowners over an extensive area of land.

7.4.21. This LCT is likely to be of medium sensitivity to highway development. However, this LCT incorporates the areas of Belmont and Merryhill, containing unregistered Parks & Gardens, ancient woodland and significant trees. It will therefore be considered as having a High sensitivity within this Chapter.

7.4.22. **LCT 7.21 Principal Settled Farmland** includes the following key characteristics and sensitivity:

- This is an extensive character type, LCT 7.21 is found in the south west, south east and most of the northern section of the study area.
- The rolling, lowland area of Central Herefordshire is dominated by this LCT. These are settled agricultural landscapes of dispersed, scattered farms, relic commons and small villages and hamlets.
- The mixed farming land use reflects the good soils on which they are typically found. Networks of small winding lanes nestling within a matrix of hedged fields are characteristic. Tree cover is largely restricted to thinly scattered hedgerow trees, groups of trees around dwellings and trees along stream sides and other watercourses.
- The composition of the hedgerow tree cover differs from that of Timbered Farmlands in its lower density and lack of oak dominance. This is a landscape with a notably domestic character, defined chiefly by the scale of its field pattern, the nature and density of its settlement and its traditional land uses.
- Hop fields, orchards, grazed pastures and arable fields, together make up the rich patchwork which is typical of Principal Settled Farmlands.

7.4.23. This LCT is likely to be of medium sensitivity to highway development.

Urban Fringe Landscape Sensitivity Analysis

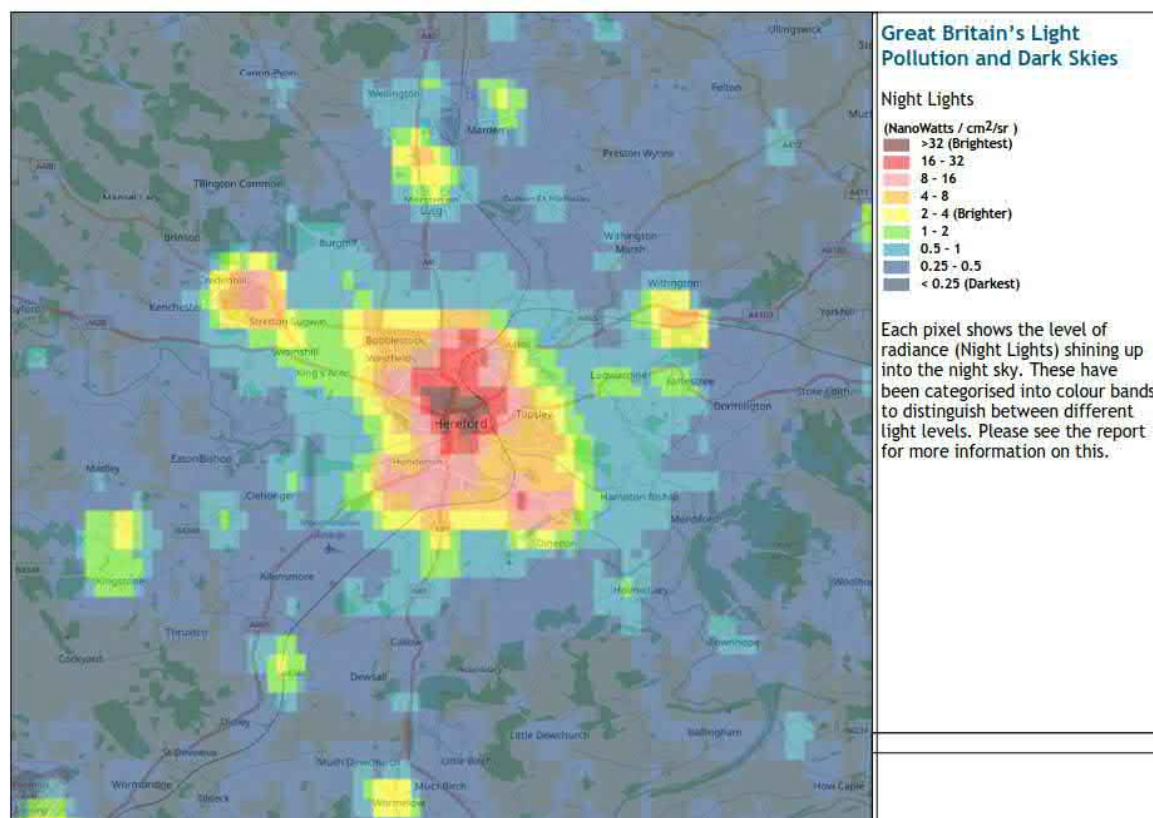
- 7.4.24. The Urban Fringe Landscape Sensitivity Analysis²⁶ is a technical paper which supports the Strategic Housing Land Availability Assessment. It aims to classify the level of sensitivity of the urban fringe landscape of Hereford and five other market towns. The analysis was used to inform the process of identifying potential housing sites and likely constraints to development. Consideration was given to an assessment of existing landscape (a landscape baseline study followed by an analysis of landscape sensitivity).
- 7.4.25. Criteria used to inform landscape sensitivity drew on visibility and prominence of the area, the degree of harmony between existing built development and other elements of the landscape, landscape character, historic landscape, presence of landmark features, scenic quality visual detractors, landscape condition, amenity value and tranquillity levels.
- 7.4.26. The Analysis concluded that much of the landscape on the fringes of Hereford was of high value and of High Sensitivity. The main reason for high sensitivity ratings are visual prominence resulting from elevated topography and integrity of historical character, which in turn contributes to the tranquillity and amenity value of the area. The Sensitivity Analysis identified Zones of Sensitivity, and those Landscape Sensitivity Zones likely to experience effects from the proposed Scheme are listed below:
- *3D/4G - Burghill- Pipe and Lyde:* St Mary's Hospital site redeveloped as housing. Loss of hedgerows and trees result in degraded landscape character. Area between A4110 and A49 relatively tranquil. Medium Sensitivity
 - *2C/5I - Stretton Sugwas-Huntington:* Mosaic small to medium sized fields, irregularly shaped woodlands, windbreak planting, winding lanes. Intensive arable use has degraded landscape character including loss of hedgerows. Medium/low sensitivity apart from High sensitivity of designed landscape and conservation area.
 - *3B/4E/4F - King's Acre:* South of Yazor Brook, very flat, under intensive arable use. Visually related to rural hinterland, not the city. Hedgerow oak trees. Degraded landscape character, loss of hedgerows. Medium sensitivity
 - *5H/4D - Breinton:* Views to Wye valley, pastoral south facing, wooded north facing valley sides. Low density of settlement, rural character. Complex landscape. Small to medium sized fields Hedgerows, scattered hedgerow trees, small woodlands. Windbreak planting. Informal recreation. Inter-visibility with Belmont. High sensitivity.
 - *5C - Wye Corridor:* Trees form strong linear feature. High amenity value. High sensitivity.
 - *5G - Belmont:* Parkland, views/setting of the city. Wooded, tranquil, agricultural landscape to west. Valuable for recreation. High sensitivity.
 - *5F - Ruckhall-Merryhill:* High sensitivity. Rural character visually isolated from Hereford.

Light Pollution

- 7.4.27. The Campaign to Protect Rural England (CPRE) has produced maps showing levels of light pollution in terms of nanowatts/cm²/sr. The area west of Hereford is recorded as having radiance levels (light shining up into the sky) between 0.25-2.0 nanowatts/cm²/sr. The area to the north has a range of 0.25-1 nanowatts/cm²/sr. This is in contrast to the centre of Hereford which has radiance levels of more than 32 nanowatts/cm²/sr. Hereford appears as an island of brightness in an area notable for its dark skies.
- 7.4.28. The route options would span across a number of light levels ranging 0.25-0.5 and 0.5 to 1 nanowatts/cm²/s southwest, west and north of Hereford to 1-2, 2-4 and 4-8 nanowatts/cm²/s north and north west of Hereford.

²⁶ Urban Fringe Sensitivity Analysis (2010): Hereford and the Market Towns, Local Development Framework, January 2010

Figure 7-2: Great Britain's Light Pollution and Dark Skies, CPRE



Hereford Rapid Townscape Assessment

7.4.29. The Hereford Rapid Townscape Assessment²⁷ divided the city into 17 townscape types which were then subdivided into 38 Hereford Townscape Character Areas. Whilst none of the character areas fall within the study area, there are a number within the 2km of the proposed route options. The following areas are considered likely to experience effects from the proposed route options in terms of intervisibility between them and the study area due to proximity:

- **HCA15 Kings Acre – Moor Park Character Area** is characterised by considerable 20th Century private sector residential development particularly during the 1920s-30s in the eastern part of the character area, continuing into the later 20th Century in the western part, with some limited areas of post 1950s public sector residential development. The proposed Scheme would intersect King's Acre Road (A438) which is lined with trees (many of which were pollarded in the past) and contains areas of grass verges and mature hedges over much of its length. The existing road retains aspects of its earlier semi-rural character (even though the area is now quite heavily developed) and serves as a gateway to the city. This area adjoins LCT 7.21.
- **HCA 17 Bobblestock – Yazor Road Character Area** is characterised by post 1960s planned-estate residential development with some earlier (19th-early 20th Century, 1920s-30s) development on the northern and north western edge. This area adjoins LCT 7.21.
- **HCA 19 Holmer Character Area** is characterised by dispersed residential and agricultural buildings on country lanes with grass verges, sandstone rubble walls and mature hedges. Post-1950s residential development, in the form of planned estates and individual houses and bungalows, has introduced a

²⁷ Herefordshire Council, Rapid Townscape Assessments for Hereford, Ledbury and Ross on Wye, March 2010

suburban character. The dispersed village of Holmer has a strong sense of place but recent suburban development has eroded its character. This area adjoins LCT 7.21.

- *HCA 28 Belmont Character Area* is characterised by intensive post 1950s private sector residential development, undertaken in the later 20th and early 21st Century, consisting primarily of two-storey family homes on small plots with open landscaped front gardens, including parking pads. This area adjoins LCT 7.14 and LCT 7.18.

- 7.4.30. The above townscape areas are considered within the visual assessment section of this chapter with identification of representative viewpoints.

LANDSCAPE AND CULTURAL DESIGNATIONS

- 7.4.31. The following landscape elements contribute to the landscape character areas identified above, as well as to the visual amenity of the study area.

Topography

- 7.4.32. The topography within the study area is illustrated in Figure 7-1 in Appendix 7-1.
- 7.4.33. The River Wye cuts through Hereford in a west-east direction at around 50m AOD. It forms a gorge in the Breinton Area, increasing the sense of isolation when visiting the flood meadows that extend either side of the river to the steep, tree covered slopes.
- 7.4.34. In areas south of the river the ground level rises gently, forming rolling hillsides, with highpoints at Perry Hill (115m AOD) and Clehonger Manor Farm (114m AOD). This undulating topography extends approximately 3km to the south, where the more significant ridge of Dinedor (182m AOD) and that at Whitfield (185m AOD), signal the start of the hills beyond.
- 7.4.35. To the north of the river, after the initial steep ridge to 70m AOD or thereabouts, marking the edge of the flood plain, the land rises more gently to a highpoint between 80 and 90m AOD, 500m south of King's Acre Road (A438). There is a notable hill 500m north of Breinton at 114m AOD, which hosts the Wye Valley Walk and features extensive views back towards Hereford.
- 7.4.36. North of King's Acre the land drains towards Yazor Brook (65m AOD) and is low lying and relatively flat. Together with the larger field boundaries, this forms a relatively large to medium scale landscape pattern. The landform begins to rise again at Stretton Sugwas to the west.
- 7.4.37. North of Yazor Brook and Roman Road, which cuts across it in an east-west alignment, the landform again becomes rolling and varied. Ridges rise to around 100-110m AOD and form enclosing features in views to the north from Hereford. The area between Arundel Farm and Pipe and Lyde features lines and groups of trees, which appear as landmarks on the horizon from a range of locations.

National Landscape Designations

- 7.4.38. There are no National Parks or Areas of Outstanding Natural Beauty (AONB) designated within the study area. The northern boundary of the Wye Valley AONB lies approximately 7.5km to the east / south east of the study area. Consideration should be given to the setting of the AONB (paragraph 4.5.1 in the AONB Management Plan and development Strategic Objective WV-D228). The Management Plan states that:
- *"The AONB is not an isolated landscape. It is connected to the surrounding landscapes, towns and countryside, ecologically, economically, socially and through the action of natural processes such as hydrology and pollination. Development and other activities within the setting of the AONB may have an impact on all these processes as well as affecting views into and out of the AONB".*
- 7.4.39. The document adds that high quality design, including the inclusion of Green Infrastructure which takes account of landscape character, scale and setting, can help enhance the area. AONBs are considered to be high sensitivity receptors.

²⁸ Wye Valley AONB Joint Advisory Committee, Wye Valley Area of Outstanding Natural Beauty Management Plan, 2015-2020

Locally Designated Parks and Gardens

- 7.4.40. To the south of the Wye corridor in the Belmont area (within LCT 7.18), is a locally designated (unregistered) historic park and garden associated with Belmont House (see Figures 17-1 to 17-7 in Appendix 17-1). Within the boundary of the park there are a number of Listed Buildings including:
- Belmont House, a neo-gothic mansion, most recently in use as a golf clubhouse (Grade II*);
 - Walled garden c.220 metres west-north-west of Belmont House
 - Stone and plaque about 200 yards west-north-west of Belmont House (Grade II);
 - Walled garden c.220 metres west-north-west of Belmont House (grade II); and
 - The Abbey Church of St Michael and All Angels, associated with the Belmont Priory complex (containing an additional 5 Grade II listed buildings) south of Ruckhall Lane (Grade II*).
- 7.4.41. The park itself features frequent mature parkland trees, including exotic species such as Cedar of Lebanon, Oriental Plane and Giant Sequoia. The extensive grassland is largely managed using grazing sheep, which is consistent with likely traditional management of this site. The historic landscape has been altered to support its use as a former golf course (Belmont Lodge and Golf Course), with sand bunkers, additional tree planting and closely mown grass, as well as built facilities such as a hotel and shelters.
- 7.4.42. Belmont House is partially screened by the local topography, which falls away sharply on the north side, and rises slightly to the south, supporting substantial mixed tree belts.
- 7.4.43. The Belmont Abbey Church is more visible particularly from the west, and its spire serves as a landmark where it is not screened by woodland (i.e. Newton Coppice to the south and a small plantation to the immediate north). The surrounding Belmont parkland provides an open pastoral setting. Views between Belmont House, Abbey and Belmont Unregistered Park and Garden are functionally, historically and aesthetically linked. Equally there are views across the Wye from such heritage assets to Warham House and Warham Unregistered Park and Garden refer to Chapter 8 Cultural Heritage paragraph 8.5.3 and 8.6.18 for further details.
- 7.4.44. The actual extent of the historic park is undetermined on the ground. The area to the north of Ruckhall Lane and east of Belmont House benefits from the remaining mature parkland trees and woodland, which indicate that this landscape is relatively undisturbed with the exception of the golf course interventions. The area alongside the river is notably tranquil – with no audible traffic noise and an open view of the slow moving river and farmland to the north, and dense hanging woodland to the south.
- 7.4.45. Most of this parkland is inaccessible to the public, but it forms a background, ‘borrowed’ landscape for many accessible viewpoints on the western side of Hereford, particularly the Wye Valley walking route.
- 7.4.46. There is a further locally designated (unregistered) historic park and garden surrounding Warham House (see Figures 17-1 to 17-7 in Appendix 17-1), which sits between two areas of Ancient Woodland (within LCT 7.10). The garden is surrounded by mature trees, which largely screen it from the surrounding landscape. The grounds of Warham House within Greenbank Meadow are important in being the location of views painted by artist Brian Hatton (1887-1916). A London Plane and Turkey Oak planted c. 1750, and featured in his painting “The Lawns, Warham” are still there, and also the large Horse Chestnut tree shown in the distance in the Hatton painting.
- 7.4.47. There is some intervisibility between Warham House and Belmont Park, which may have been developed at a similar period.
- 7.4.48. Huntington Court also includes a small, locally (unregistered) designated park and garden (see Figures 17-1 to 17-7 in Appendix 17-1), as does the landscape of Burghill Hospital (within LCT 7.21), recently redeveloped for residential use. Burghill Hospital lies approximately 600m north of the A4103 Roman road. The park has some loss of intrinsic character, and a setting already degraded by highways.
- 7.4.49. The effects of the proposed route options on Belmont House, Abbey, Priory Complex and unregistered Park and Gardens is considered further within Chapter 8: Cultural Heritage and included within consideration of LCT 7.18 within this Chapter.
- 7.4.50. Huntington Court is included within consideration of LCT 7.21 and Warham House as part of LCT 7.10.

Cultural and Heritage Assets

- 7.4.51. Historic and environmental designations are an indication of the quality of the landscape, and identify sites where potential visual receptors may be highly sensitive, such as visitors to designated sites experiencing

them in the context of their setting. There are numerous cultural assets within the study area, including Conservation Areas, Listed Buildings and Ancient Woodland (see Figures 17-1 to 17-7 in Appendix 17-1). The visual amenity of Ancient Woodland areas such as Wye Coppice and Rough Coppice will be influenced by development and consideration has been given to the landscape value of these areas.

- 7.4.52. Ancient semi-natural woodland contributes to the overall landscape pattern of the area. There are a number of trees within the study area covered by individual or group Tree Preservation Orders (TPOs) as well as ancient / veteran / notable trees and trees, which are Category A (see Arboricultural Report in Appendix 7-4). In addition there are areas of woodland owned by the Woodland Trust and land under the ownership of the National Trust. A number of ancient / traditional orchards as well as some defined as Hereford Listed Traditional Orchards and Pippin Trust Orchard are notable features within the study area as well as the avenue of trees along Kings Acre Road (see Figures 17-1 to 17-7 in Appendix 17-1). Most of the woodlands within the area are open to the public.
- 7.4.53. To the north of the River Wye the Breinton landscape (within LCT 7.10), features many historic landscape elements, among which are Wye Coppice and Rough Coppice, two slender stretches of Ancient Woodland covering the steep slopes rising out of the floodplain. These are bounded to the north by veteran oak pollards and standard trees.
- 7.4.54. To the west of this area lies the Grade II listed church of St Michael, which is surrounded by orchard trees and an adjacent moated site; which is also a Scheduled Monument. Together with the surrounding cider orchards and small scale agricultural fields, these elements form a coherent traditional landscape that appears largely undisturbed by modern development.
- 7.4.55. There is a further area of Ancient Woodland, Wyevale Woods (formerly Green Lane Wood), between King's Acre and Breinton (within LCT 7.21). This has been supplemented by a Woodland Trust Community Woodland designated as Open Access land - Drover's Wood, north of Upper Hill Farm (Grade II Listed). This area is part of a popular recreational route with PRoW connecting the western fringe of Hereford with Kings Orchard, along hedgerow bounded footpaths.
- 7.4.56. The Church of St Mary Magdalene at Swainshill (Within LCT 7.21), to the west of the Combined Route Study Area, is Grade II* listed. The village lies to the west of a low ridge and is surrounded by woodland and boundary vegetation.
- 7.4.57. In Holmer, previously a separate village, now absorbed into the north of Hereford, is the Grade I listed Church of St Bartholomew (within LCT 7.21). Within the church grounds can also be found a Grade II listed bell tower, tomb and a churchyard cross, which is also a Scheduled Monument. 100m to the north is the Grade II listed Holmer House, now a conference centre. Both of these sites currently back on to open fields and have a partially rural outlook, despite the detractor of the A49, immediately to the east.
- 7.4.58. There are two designated Conservation Areas located within 250m of the study area. The Broomy Hill Conservation Area (within LCT 7.10) extends north of the River Wye from the western edge of Hereford to the historic waterworks, now a museum. It includes numerous Listed Buildings including the Grade II* listed Broomy Hill Pumping Station and the Grade II listed Water Tower, which serves as a landmark across a wide area.
- 7.4.59. A second Conservation Area encompasses the hamlet of Huntington (within LCT 7.21) located approximately 300m from Bobblestock in the north western district of Hereford. It includes four Grade II Listed Buildings as well the small locally designated historic park and garden associated with Huntington Court. The significance of this area extends to include a large pond formed by damming the Yazor Brook and mature trees and hedgerow vegetation within the gardens and along the Brook corridor.
- 7.4.60. A further, more distant Conservation Area covers the village of Burghill, approximately 2km northwest of the urban edge of Hereford. This includes 14 listed properties including the Grade II* Church of St Mary. Views from the village are largely constrained by built form, vegetation, and the varied local topography, which sets the village on the western slope of a hillside at around 80m Above Ordnance Datum (AOD).
- 7.4.61. Chapter 8: Cultural Heritage addresses issues in relation to archaeology and heritage assets, including their setting and are therefore not considered separately within this Chapter. Chapter 9: Ecology describes and assesses potential effects on areas designated as protected habitats and having high nature conservation value, including traditional orchards. They are therefore not considered separately within this Chapter.

- 7.4.62. Whilst the above assets are not considered as individual receptors within this Chapter, they are all considered as part of the review and assessment of the respective Character Areas to which they contribute. They are also influential in the visual assessment section in terms of viewpoint selection and sensitivity.

Access and Public Rights of Way

- 7.4.63. There are no National Trails within the study area. However, there is an extensive network of PRoW, including green lanes and bridleways. A number of PRoW cut across the study area, including:

- Clehonger footpath 7 and 7A to the south of the River Wye;
- Breinton footpath 1 along the River Wye (also forming the Wye Valley Walk);
- Breinton footpath 2 and 8 to the north of the River Wye;
- Breinton Bridleway 4 and Hereford Bridleway 25 to the south of Kings Acre;
- Breinton Bridleway 3 and 9 to the south of Kings Acre;
- Hereford footpath 1, 35, 37 and 55 between Kings Acre and Roman Road;
- Burghill footpath 11 to the north of Roman Road; and
- Pipe and Lyde footpath 9 to the north of Roman Road

- 7.4.64. The Wye Valley Walk is a long distance recreational route following the course of the Wye River, between Chepstow and Plynlimon and incorporates Breinton footpath 1. The Three Rivers Ride is a regional riding route linking the Sabrina Way near the Severn with the Brecon Beacons and is located approximately 850m northwest of the study area. National Cycle Route 64 runs approximately 1.3km south/ south east of the study area, south of the A465 before crossing a railway line close to Grafton and running west of the city centre.

- 7.4.65. There are two small pockets of Open Access land and Access Land in Woodland Areas, which were designated under the Countryside and Rights of Way Act (CRoW) 2000, within the study area. The first is located around Ruckhall to the west and the second is located west/ south west of Breinton Common.

- 7.4.66. The local PRoW network and Open Access Land areas are generally considered to have a medium sensitivity to change, given their local designation but importance in accessing the countryside and for health. Green Lane (Bridleway BT4) provides a direct connection to central Hereford and the Breinton footpath network. It is important historically as a Drover's Way used since medieval times along ridgeline. Long distance and national trails are considered to have a high sensitivity due to their national and strategic importance.

- 7.4.67. Chapter 13: People and Communities describes and assesses potential effects on non-vehicular transport routes, including pedestrians and cyclists. They are therefore not considered separately within this Chapter except in relation to viewpoint selection and their overall contribution to visibility and accessibility within their respective Character Areas.

LANDSCAPE CHARACTER SUMMARY

- 7.4.68. The following landscape receptors are considered to be potentially impacted by the proposed Scheme and will be taken forward to the assessment section:

Table 7-1 - Landscape Receptor Summary

Landscape Character Area	Receptor Sensitivity	Key Features within the study area	Elements and Route Options Potentially Affected
LCT 7.10 Principal Timbered Farmlands	High sensitivity	■ Ancient woodlands including Rough Coppice; Wye Coppice; Hunderton Wood ■ Breinton footpath 2 and 8 to the north of the River Wye; and Breinton Bridleway 4 and Hereford Bridleway 25 (Green Lane); ■ Grade II listed buildings; ■ Important trees – Ancient / veteran/	Element 1 and 2 of all route options

Landscape Character Area	Receptor Sensitivity	Key Features within the study area	Elements and Route Options Potentially Affected
		- notable; Grade A; TPOs (individual plus groups); - Breinton Court & Warham House Unregistered Park and Gardens - Greenbank Meadow - Traditional Orchards	
LCT 7.14 Riverside Meadows	High sensitivity	- Breinton footpath 1 along the River Wye (also forming the Wye Valley Walk) and Breinton footpath 8 to the north of the River Wye; - Important trees; and - Belmont House Unregistered Park and Garden	Element 1 of all route options
LCT 7.15 Wet Pasture Meadows	High sensitivity	- Burghill footpath 11 to the north of Roman Road; and - Grade II Listed Buildings	Element 2 of all route options
LCT 7.18 Wooded Estatelands	High sensitivity	- Ancient woodlands including Newton Coppice & Hayleasow Wood; Old Hill Coppice; Hunderton Wood; - Clehonger footpath 7 and 7A to the south of the River Wye; - Grade II and II* Listed Buildings - Important trees; and - Belmont House Unregistered Park and Garden	Element 1 of all route options
LCT 7.21 Principal Settled Farmland	Medium sensitivity apart from High sensitivity of designed landscape and conservation area of Huntingdon.	- Ancient Woodlands including Wyevalle Wood (formally known as Green Lane Wood); - Breinton Bridleway 4 and Hereford Bridleway 25 (Green Lane) to the south of Kings Acre; Breinton Bridleway 3 and 9 to the south of Kings Acre; Hereford footpath 1, 35, 37 and 55 between Kings Acre	Element 2 and 3 of all route options

Landscape Character Area	Receptor Sensitivity	Key Features within the study area	Elements and Route Options Potentially Affected
		- and Roman Road; and Pipe and Lyde footpath 9 to the north of Roman Road - Grade II Listed Buildings - Important trees - Traditional and Heritage Orchards and Pippins Trust Orchards, plus Drovers Wood - Burghill Hospital & Huntington Court Unregistered Park and gardens - Huntington Conservation Area	
3D/4G - Burghill- Pipe and Lyde:	Medium sensitivity	Considered within the assessment of LCT 7.21	Considered within the assessment of LCT 7.21
2C/5I - Stretton Sugwas-Huntington	Medium/ low sensitivity apart from High sensitivity of designed landscape and conservation area.	Considered within the assessment of LCT 7.21	Considered within the assessment of LCT 7.21
3B/4E/4F - King's Acre		Considered within the assessment of LCT 7.21	Considered within the assessment of LCT 7.21
5H/4D - Breinton	High sensitivity	Considered within the assessment of LCT 7.10	Considered within the assessment of LCT 7.10
5C - Wye Corridor	High sensitivity	Considered within the assessment of LCT 7.14	Considered within the assessment of LCT 7.14
5G – Belmont	High sensitivity	Considered within the assessment of LCT 7.18	Considered within the assessment of LCT 7.18
5F - Ruckhall-Merryhill	High sensitivity	Considered within the assessment of LCT 7.18	Considered within the assessment of LCT 7.18
Wye Valley AONB	High sensitivity	- The Special Qualities of the Wye Valley AONB include: - Diversity of woodlands - Species-rich grasslands	None

Landscape Character Area	Receptor Sensitivity	Key Features within the study area	Elements and Route Options Potentially Affected
		- Boundary habitat diversity and connectivity, - Picturesque, extensive & dramatic views, particularly overlooking the Wye - Significant numbers of ancient pollards and mature trees in hedges, woods and parkland - Historic Parks and Gardens - Old tracks: often in sunken ways and/or bounded by drystone walls - National and Regional walking routes; and - Traditional orchards mostly cider apples and perry pear also commercial standard apple and bush orchards	

VISUAL AMENITY

- 7.4.69. Visual receptors are the people who live in or visit the landscape and who would experience views of the proposed Scheme, whereas visual amenity is defined as the pleasantness of the view or outlook of an identified receptor or group of receptors. Visual receptors, such as users of buildings, recreational spaces, footpaths and transport routes, have differing sensitivities to their visual environment. Generally, this is dependent upon their interest in the visual environment, their viewing opportunity and duration, and the context of the views. These factors may be expressed in terms of:
- 7.4.70. The value of the view / viewpoint reflects the intrinsic character and scenic qualities of its location and context. Where recognised through the designation of an area, such as a National Park, value is increased, while the presence of detracting features in a view will generally reduce value. Higher value views / viewpoints are likely to be more sensitive to change.
- 7.4.71. The importance of the viewpoint – as indicated by some form of recognition, e.g. as noted in a guidebook, marked on a map, whether it is a tourist attraction or has literary or artistic references, or where it is indicated on the ground by a sign or other visible feature. The provision of facilities e.g. seating, parking, footpath may also indicate a location of higher importance. Views gained from locations where people gather outdoors may also be of higher importance.
- 7.4.72. The visibility towards the location of the route options is restricted to varying degrees by screening elements that obscure or block the views, including intervening hedgerows, woodland belts and copses, local hills and topography, and built form.
- 7.4.73. The following groups of people are considered to be key visual receptors in relation to the proposed Scheme:
- Local communities (e.g. villages and settlements) and isolated residential properties. The sensitivity of residential receptors is generally high, depending on location and existing views. They can be very susceptible to changes in view and visual amenity relating to changes to the highway so are generally

considered to have a sensitivity of high. Receptors are typically identified as single or grouped visual receptors.

- People in their places of work. Views from places of work are typically of low to moderate sensitivity as enjoyment of the landscape is not generally the focus. Views can therefore accommodate changes more easily and are less susceptible to change in the landscape. Sensitivity is therefore considered to be low or medium.
- People using regionally and nationally promoted footpaths, cycle routes, bridleways, users of the local rights of way network and areas of open access or common land. There are a number of PRoWs and walking trails within the study area including long distance paths such as the Wye Valley Long Distance Path. The sensitivity of path users is generally considered to be medium or high, as enjoyment of the landscape is usually a key element of using the paths;
- Visitors at publicly accessible sites such as Unregistered/ Registered Parks and Gardens, historic sites, and other visitor attractions are generally considered to have a sensitivity of medium or high as enjoyment of the landscape is a key factor in visiting the site; and
- Road users. The sensitivity of road users is generally considered to be low as enjoyment of the countryside is not typically the focus of travel and views are transient in nature.

The criteria used to assess visual sensitivity is based on the typical descriptors and examples set out in IAN 135/10 Annex 2 Table 1. Any departures from the criteria are stipulated.

ZONES OF VISUAL INFLUENCE

- 7.4.74. The Zone of Visual Influence (ZVI) represents the extent of the area within which there would be potential for views of the proposed Scheme. A preliminary plotting of the ZVI was undertaken by reviewing current Ordnance Survey mapping for the area to establish where landform, large scale established planting and areas of built development would be likely to define the availability of views. A viewer height of 1.8m was assumed along with a development height (z-value) of 4m (to represent potential height of lorries). A total of 53 viewpoint locations were originally reviewed to assess the ZVI in the field. Following field survey work, the number of viewpoints was reduced to a total of 25 representative viewpoints which have been included as part of the visual assessment section of this chapter.
- 7.4.75. The ZVI of each route option for this assessment is discussed below and has been broadly defined with the available detail at this stage. Refer to Figures 7-4 to 7-10 in Appendix 7-1 for the initial ZVI for each route option and the locations of the 25 representative viewpoints.
- **Orange** - Initial review of the ZVI for Orange shows a large area of potential visibility within the 2km study area, covering much of the area except for the south and north-east areas which have limited visibility.
 - **Cyan** - Initial review of the ZVI for Cyan shows a similarly large area of potential visibility as Orange, but with an area of lower visibility identified around Sugwas Court to the west.
 - **Yellow** - Initial review of the ZVI for Yellow shows an almost identical area of potential visibility as Cyan.
 - **Red** - Initial review of the ZVI for Red shows a slightly reduced area of potential visibility compared to Orange. There is considerably reduced visibility along the River Wye corridor and around Lower Breinton as a result of the alignment of the cutting on the approach to the river crossing and across Warham Farm.
 - **Olive** - Initial review of the ZVI for Olive shows a similarly large area of potential visibility as Orange, but with a slightly reduced area of visibility identified around Upper Breinton to the west.
 - **Black 1** - Initial review of the ZVI for Black 1 shows a similarly large area of potential visibility as Orange, but with a slightly increased area of visibility identified around Upper Breinton to the west and Burghill to the northwest.
 - **Black 2** - Initial review of the ZVI for Black 2 shows a very similar zone of visual influence as Black 1 but with significantly reduced area of visibility along the River Wye corridor and Breinton/ Upper Breinton to the west.

VIEWPOINTS

- 7.4.1. Views within and around the study area are typically quite wide ranging and open, although long distance views can be limited by the rolling topography, hedgerows, vegetation and woodland across farmland, meadows and remaining countryside.
- 7.4.2. The following viewpoints represent the range of potential views of the proposed route options across the study area. They represent sensitive views from residential receptors, designated landscapes and townscapes and

users of recreational footpaths and local roads. In drawing up the proposed list of representative viewpoints, consideration has been given to Policy B16 - Protecting important public views as set out in the Breinton Neighbourhood Development Plan (2016).

7.4.3. The viewpoints selected for this assessment are briefly described below. More detailed descriptions of these viewpoints are provided in Appendix 7-3. Figures 7-4 to 7-10 provide the locations of the viewpoints and Figure 7-11 (Viewpoints 1 to 25) provides photographs of the views available from each viewpoint.

7.4.1. It should be noted that the local PRoW network, Open Access Land areas and unregistered parks and gardens are generally considered to have a medium sensitivity to change, given their local designation but importance in accessing the countryside, for health, and for their historic connections. Long distance and national trails as well as Registered Parks and Gardens are considered to have a high sensitivity due to their national and strategic importance. Therefore, for the purposes of this assessment it is considered that the sensitivity of users of PRoW which are not of national or regional importance, and views from Open Access Land and Unregistered Parks and Gardens is moderate rather than high. This judgement was also informed by the location, context and importance of the view.

Viewpoint 1: Wye Valley Walk view West

7.4.2. This view looks west along the Wye Valley Walk (long distance footpath). Views are framed by linear belts of trees in the middle distance and occasional parkland trees, the rising topography to the north up to Adam's Hill and trees and scrub which edge the River Wye to the south. The edge of a road connecting Hereford with Warham is visible to the right of the photo.

7.4.3. The view is representative of those experienced by users of the local PRoW network and Wye Valley Walk. It is partially enclosed and free of built elements or other indicators of modern development

7.4.4. This viewpoint is considered to have a sensitivity of High.

Viewpoint 2: View north east from PRoW bottom of garden of property near Dunan

7.4.5. A wide, expansive view from a slightly elevated PRoW, looking across agricultural fields towards low rolling distant hills. The A465 can be seen snaking away to the right of the view, with blocks of woodland beyond (Newton Coppice and Hayleasow Wood). A group of white-washed cottages are clearly visible in the centre of the view (in the near to middle distance) complementing the largely rural scene with neat, scattered dwellings. This view is representative of users of the local PRoW network and residential receptors at Dunan.

7.4.6. This viewpoint is considered to have a sensitivity of High.

Viewpoint 3: View south east from entrance to Belmont Hotel

7.4.7. A peaceful, rural view of managed parkland containing mature specimen trees edged by mown grass and a country lane with hedgerow. Glimpses of gently rolling hills and woodland blocks add to the rural character and tranquillity of the view, whilst reducing the intimate feel. The tower of Belmont Abbey provides a focal point and landmark feature in the centre of the view. This view is representative of users of the local road network and visitors to Belmont Hotel as well as being located on the edge of the Unregistered Park and Garden of Belmont.

7.4.8. This viewpoint is considered to have a sensitivity of High.

Viewpoint 4: View north east from St Michaels Belmont Abbey churchyard

7.4.9. An historic, peaceful and rural view across a graveyard and entrance porch towards agricultural fields and scattered views. Long distance views are largely restricted by intervening woodland blocks in the middle distance, creating a slightly more intimate view. This view is representative of visitors and users of the historic Belmont Abbey and Unregistered Park and Garden.

7.4.10. This viewpoint is considered to have a sensitivity of High.

Viewpoint 5: View west from edge of Belmont Housing

7.4.11. Representative of residential receptors in Belmont housing estates, this wide, open but rural view looks across managed parkland with mature scattered trees. The tower of St Michaels Abbey is clearly visible as a landmark above a copse of trees in the centre of the view. A glimpse of distant rolling hills in the centre of the view adds to the open expansive feel.

7.4.12. This viewpoint is considered to have a sensitivity of High.

Viewpoint 6a: View east from Wye Valley South West of Warham House

- 7.4.13. A wide view of meadow land, and the River Wye, the relatively flat landscape being contained by blocks of trees (Wye Coppice/ Rough Coppice and Greenbank Meadow) and the slight rise of the wooded valley side edging the Unregistered Park and Garden of Belmont and Belmont golf course. The wide river, edged to the banks with trees, shrubs and grassland vegetation, creates a tranquil, rural character, only partially disrupted by a post and barbed wire fence. The woodland helps create a more intimate, enclosed landscape associated with the former historic parkland around Warham House and Belmont Park. The view is representative of views experienced by users of the Wye Valley Walk (long distance footpath), river and parkland.
- 7.4.14. This viewpoint is considered to have a sensitivity of High.

Viewpoint 6b: View east from PRoW junction Wye Valley walk

- 7.4.15. A view representative of users of the Wye Valley Walk (long distance footpath), surrounding parkland and golf course. The bend in the river opens up a linear view along the valley, with a wide flat river valley and meadows edged by slightly rising ground. The view is contained by thick belts of woodland either side creating some sense of enclosure, but the flat, wide valley floor and linear visibility creates a more open character, but one that is predominately rural, tranquil and natural.
- 7.4.16. This viewpoint is considered to have a sensitivity of High.

Viewpoint 6c: View west towards footpath junction Wye Valley walk

- 7.4.17. A relatively contained view with thick vegetation and woodland (Wye Coppice/ Rough Coppice) and the slight rise of the wooded valley sides edging the Unregistered Park and Garden of Belmont / Belmont golf course and Warham House. The river is thickly edged with vegetation, partially obscuring it from the view, and creating an increased sense of enclosure at this point. This is partially offset by the wide grassland and views of more distant trees allowing linear views along the river corridor. The view is representative of views experienced by users of the Wye Valley Walk (long distance footpath), river and parkland.
- 7.4.18. This viewpoint is considered to have a sensitivity of High.

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.4.19. A wide, extensive, elevated view representative of users of the PRoW network. The view extends across a large, open field bounded by a low hedgerow, metal access gates and occasional hedgerow trees and looks across the valley towards opposite low rolling hills. The predominant sense of character is of a rural landscape of agricultural fields, small settlements and hamlets, scattered trees and large blocks of woodland, creating a typical pastoral English landscape in the middle/ far distance, albeit modernised in the foreground by metal field gates, amalgamated fields and improved grassland. The tower of Belmont Abbey is visible in the distance against a backdrop of fields and woodland.
- 7.4.20. This viewpoint represents BNDP viewpoint 11 and is considered to have a sensitivity of High.

Viewpoint 8: View north east from Green Lane Park Home Estate

- 7.4.21. An enclosed view representative of users of the Green Lane Park Home Estate and Green Lane. The view looks across a large agricultural field edged with hedgerows and scattered hedgerow trees. Woodland within Green Lane Wood and trees adjacent to Breinton bridleway 2A further contribute to the containment of views although a gap in the hedgerow allows glimpsed longer distance views of adjacent fields. The view has a largely rural and tranquil feel but becoming suburbanised by the presence of park home caravans, fences and telephone poles and wires.
- 7.4.22. This viewpoint is considered to have a sensitivity of High.

Viewpoint 9: View south east from PRoW junction Green Lane Wood

- 7.4.23. Another enclosed view representative of users of the PRoW network and Green Lane (Bridleway BT4). The view looks across a wide agricultural field containing telephone poles and wires and edged with tall hedgerows, scrub and scattered trees. Woodland within Green Lane Wood restricts wider views. Orchard trees are clearly visible in the middle distance beyond the mast adding local distinctive and historic character to the view. The view has a largely rural and fairly tranquil character.
- 7.4.24. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 10a: View south west from PRoW opp. Bay Horse Pub

- 7.4.25. A long view across an arable field edged with trees, hedgerows and shrubs. The view is shortened by tall trees and hedgerows across a flat landscape. The character is predominantly rural. It is representative of residential receptors along the A438, visitors to the Bay Horse Pub and users of the PRoW network.
- 7.4.26. This viewpoint represents BNDP viewpoint 21 and is considered to have a sensitivity of High.

Viewpoint 10b: View south east into field south of Bay Horse Pub

- 7.4.27. A long view across an arable field edged with trees, hedgerows and shrubs. The topography allows for slightly longer views across further agricultural fields with scattered trees and hedgerows. The rear of properties along Kings Acre Road are also visible. The view is relatively wide and quite expansive, but predominantly rural in character. Suburbanising features include telephone poles/ exchanges and wires as well as garden boundary hedges/fences and sheds. The view is representative of residential properties along Kings Acre Road and users of the PRoW network.
- 7.4.28. This viewpoint represents BNDP viewpoint 21 and is considered to have a sensitivity of High.

Viewpoint 11: View south west from PRoW behind Kings Court Housing

- 7.4.29. A wide, expansive view across a large arable field edged with trees, hedgerows and shrubs as well as houses overlooking from Kings Court and Kings Acre Road. Hedgerows and scattered trees contribute to the rural character of the view. Urban edge features including rear garden boundaries and houses introduce a suburbanising effect into the view. The view is representative of residential properties along Kings Acre Road and users of the PRoW network (Breinton Bridleway 3).
- 7.4.30. This viewpoint represents BNP viewpoint 2 and is considered to have a sensitivity of High.

Viewpoint 12: View west from PRoW at edge of housing in White Cross

- 7.4.31. The view is representative of views from residential properties in White Cross and users of the PRoW network (Green Lane – Bridleway BT4). A wide, expansive long distance view looking across a large arable field towards distant rolling hills. Orchards are visible in the middle distance, along with housing estates, hedgerows and scattered trees. The view is largely a rural one with limited detracting features.
- 7.4.32. This viewpoint is considered to have a sensitivity of High.

Viewpoint 13: View south from northern edge of Racecourse sports field

- 7.4.33. A wide, open view across the race track towards distant low-rising hills. The foreground is occupied with the turf track and railings, with buildings and urbanising features including lighting, in the middle distance. The back drop of the view is of agricultural hills on gentle low-rise hills, edged with trees and hedgerows. Buildings are also distinctive features on the skyline, along with lighting columns. This view is representative of visitors and users of the racecourse.
- 7.4.34. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 14: View northwest from junction of PRoW Yazor Brook south of Bovingdon housing

- 7.4.35. This view is representative of users of the PRoW network. It shows a large, open arable field, gently sloping, edged with tall hedgerows and scattered trees. Single-storey housing within the Bovingdon residential mobile home park are clearly visible on the skyline in the centre of the view, restricting longer-distance views beyond and adding a suburbanising element into an otherwise rural and tranquil view. Glimpses of distant hills are visible between the Mobile Home Park and Yazor brook hedgeline. The A4103 (Roman Road) is not readily visible in the view.
- 7.4.36. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 15: View east from PRoW near Priory Hotel

- 7.4.37. A view taken between hedgerows across a large grass field, edged with mature trees and hedgerows. Long distance views across the landscape are visible beyond the hedgerows and trees in the middle of the view. The view is predominantly a rural, tranquil view with few detracting features. Glimpses of buildings and lighting columns are visible in the distance. The view is representative of users of the PRoW network and visitors and workers at the Priory Hotel.
- 7.4.38. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 16: View east from PRoW entrance to Livestock Market

- 7.4.39. This view is representative of users of the A4103 Roman Road, local PRoW network and users of the livestock market. The view looks down the characteristically straight A4103 Roman Road, with pavements and cycle lane, lighting columns and crossing points creating urbanising elements in the view. A managed landscape to the right of the view towards the livestock markets incorporates maturing trees and hedgerows and grassed fields, with low-rise buildings and bunds in the middle distance largely blocking views beyond. To the left of the view, scrub land, arable fields and woodland contributes to the largely rural character of the view, with occasional housing visible in the distance adjacent to the road.
- 7.4.40. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 17: View south west from gateway PRoW Tillington Road

- 7.4.41. A wide view across large arable fields edged with hedgerows and scattered trees. Glimpsed views of long-distance rolling hills visible beyond the foreground topography. Telegraph poles and wires and metal 5-bar gates slightly detract from the otherwise rural and peaceful views. The view is typical of users of the PRoW network and Tillington Road.
- 7.4.42. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 18: View south from shared open space Burghill Hospital development

- 7.4.43. A view across the Unregistered Park and Garden grounds of the former Burghill Hospital and representative of residential receptors and users of the shared open space within the former Burghill hospital complex. The wide but partially contained rural view looks across a managed lawn area with mature specimen parkland trees, newly planted standard trees and grazing land beyond, edged with further trees and hedgerows. The middle distance is occupied with a rolling rural landscape broken up by telegraph poles and wires, agricultural buildings and scattered housing.
- 7.4.44. This viewpoint is considered to have a sensitivity of High.

Viewpoint 19: View south from gateway in front of Burlton Court

- 7.4.45. A wide ranging view across a largely flat arable field edged with hedgerow, hedgerow trees and scrub. Long distance views towards distant wooded hills are glimpsed across a gently rolling agricultural landscape. The view is rural, fairly open and largely un-blighted by detracting features. Roof tops of dwellings within the former Burghill hospital redevelopment as well as those within Burlton Court Farm are visible below the skyline in the valley. Canon Pyon Road is not readily visible in the view. The view is representative of users of the PRoW network and Burlton Court.
- 7.4.46. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 20: South west from inside gate to Burton Court Farm (Canon Pyon Road, Elton's Marsh)

- 7.4.47. A wide expansive view across a large, arable field edged with hedgerow, hedgerow trees and scrub. Long distance views towards distant hills are visible across a gently rolling agricultural landscape. The view is rural, open and largely un-blighted by detracting features. Roof tops of dwellings within the former Burghill hospital are visible below the skyline and largely screened by vegetation and trees. Canon Pyon Road is not readily visible in the view. The view is representative of users of the PRoW network and Canon Pyon Road.
- 7.4.48. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 21: View south from Arundel Farm (Lyde Arundel) Junction

- 7.4.49. A wide, expansive view across un-bounded arable field, tarmacked farm access and a wider agricultural landscape. The foreground and middle distance are largely flat, with views beyond towards distant low-rise hills. Hedgerows and scattered trees foreshorten parts of the view. The character of the view is one of tranquil, open countryside. Minor detracting features include telephone wires and traffic along Canon Pyon Road. The view is typical of users of Canon Pyon Road, residents and visitors to Lyde Arundel (wedding venue at Arundel Farm) and adjacent properties along Canon Pyon Road (including Stone House).
- 7.4.50. This viewpoint is considered to have a sensitivity of High.

Viewpoint 22: View south east from PRoW Arundel Farm

- 7.4.51. This view is representative of users of the PRoW network, and users/visitors/ residents of Arundel Farm (Lyde Arundel Wedding Venue). The view is partially enclosed by tall hedgerows and mature blocks of trees, largely blocking wider longer distance views. In the middle portion of the view, long distance views towards gently

rolling hills are visible above intervening low-level hedgerows and scattered trees. The gardens and buildings of Arundel Farm are largely screened in the view by mature trees and vegetation. The overall view is one that is tranquil and rural in nature although partially contained.

- 7.4.52. This viewpoint is considered to have a sensitivity of High.

Viewpoint 23: View north from Gateway north of Hospital Farm

- 7.4.53. The view looks between trees and hedgerows across a relatively wide, rural agricultural landscape of fields bounded by low hedgerows and scattered trees. Low rolling hills of fields, hedgerows, trees and woodland foreshorten the view in the middle to longer distance. Minor detracting features include telephone wires and traffic along Canon Pyon Road. The view is typical of users of visitors to the traditional Orchard and Canon Pyon Road.

- 7.4.54. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 24: View north from PRow north of Ayers Brook

- 7.4.55. A wide, open view across a rising arable field, foreshortened by telegraph poles and wires, hedgerows and scattered trees in the middle distance. Glimpses of distant hills are visible to the left of the view across a fall in the topography. The view is open, rural and tranquil and typical of the view experienced by users of the local PRow network.

- 7.4.56. This viewpoint is considered to have a sensitivity of Moderate.

Viewpoint 25: View northwest from Holmer Churchyard

- 7.4.57. The view from the churchyard looks across an agricultural landscape and gently rolling topography. The topography allows some long-distant views toward gently rolling hills. Fields are largely bounded by hedgerows and scattered trees although some are demarcated by post and wire fencing (edging Ayles Brook). Further detracting features include numerous telephone wire and pikes. The buildings of Holmer House and farm are visible to the right of the view. The view is typical of users of the PRow network and visitors to Holmer Parish Church (St. Bartholomew's), Churchyard and adjacent residential properties.

- 7.4.58. This viewpoint is considered to have a sensitivity of High.

7.5 ASSESSMENT METHODOLOGY

- 7.5.1. The scope of the assessment has included a review of available and relevant documents (see Section 7.4 above) relating to the study area following a site based review of baseline information, to identify constraints associated with landscape character and visual receptors.

- 7.5.2. The landscape and visual assessment has followed guidance on stages of the assessment contained in the Highways England Interim Advice Note (IAN) 135/10 – Landscape and Visual Effects Assessment, this replaces the Design Manual for Roads and Bridges, Volume 11, Section 5, Part 3 (1993), where there is a divergence away from this guidance, the reason for the variation is described.

- 7.5.3. Reference has also been made to the following published guidance and assessment criteria:

- Guidelines for Landscape and Visual Impact Assessment (Third Edition), published by the Landscape Institute and the Institute of Environmental Management and Assessment (2013); and
- An Approach to Landscape Character Assessment, Natural England (2014).

- 7.5.4. At this stage the assessment into landscape character and visual amenity has centred on:

- Identifying and describing the landscape and visual context through field surveys and desk based studies determining the quality, value and capacity to accommodate change to establish a sensitivity to change of the type of development being proposed;
- Informing the development of route alignments;
- Identifying potentially significant effects taking into account appropriate mitigation strategies; and
- Undertaking a comparison of the proposed alignments to identify the key differences.

- 7.5.5. The preliminary desk studies and site analysis of the physical landscape (e.g. landform, vegetation) and spatial components (e.g. scale, key views) was undertaken to identify key landscape characteristics and features, key visual receptors, site constraints and opportunities to be considered in the development of the proposed route options.

7.5.6. Preliminary baseline information was based on a combination of field surveys and desk studies, which was obtained from:

- Published landscape character assessments and relevant documents at regional and local scale including:
 - National Character Areas 100 Herefordshire Lowlands, Natural England;
 - Hereford Landscape Character Assessment, Herefordshire Council (Updated 2009);
 - Urban Fringe Landscape Sensitivity Study, 2010;
 - Hereford Rapid Townscape Assessment, 2010;
- 1:25,000 Ordnance Survey Explorer maps to identify public rights of ways and access land as well as landform, drainage, field settlement and transport patterns;
- Government and local authority planning documents;
- Google Earth Pro; and
- National, county and local landscape designations.

SPATIAL AND TEMPORAL SCOPE

7.5.7. The study area for landscape effects covers the proposed Scheme and the wider landscape context within which the proposed Scheme may influence landscape character. In this case, the study area for effects on landscape character is the same as for visual effects, however takes into consideration the potential effects on the perception of landscape character as a whole within the defined landscape character area.

7.5.8. The temporal scope of the assessment is based on the following timescales:

- 2017 is the baseline year;
- 2020 – 2023 is the identified construction period;
- 2023 will be the Year of Opening (Year 0) when the proposed Scheme is in operation, and will consider the likely effects in the absence of the maturation of mitigation planting, representing the worst case scenario; and

7.5.9. 2038 will be the Design Year (Year 15) and will consider the likely effects following the establishment of any proposed mitigation planting strategy, assuming a typical framework of roadside planting.

LANDSCAPE CHARACTER ASSESSMENT

7.5.10. The landscape character effects have been assessed as follows:

- Baseline conditions for landscape have been described and evaluated in respect of character areas, their quality, features and elements, and value;
- The sensitivity of landscape with reference to its capacity to accommodate change arising from the project has been evaluated;
- An assessment of the magnitude of impacts on landscape features and character has been made, including the scale and nature of change;
- An assessment of the magnitude of impacts on the landscape form and character, including the scale and nature of change;
- Outline environmental measures have been proposed to reduce potential adverse effects;
- The significance of landscape effects has been evaluated; and
- Potential residual landscape effects have been identified.

Landscape Sensitivity

7.5.11. The landscape character within the study area has been developed based on the preliminary baseline information and professional judgement, which have been used to describe and evaluate the quality, value and capacity to accommodate change of the type proposed. These are used to determine the sensitivity of the identified Landscape Character Types within the study area to the type of development being proposed, which in this case is a highway. The criteria used to assess landscape sensitivity is based on the typical descriptors and examples set out in IAN 135/10 Annex 1 Table 2. These descriptions have formed the basis upon which the magnitude of impacts and significance of effects have been judged.

Landscape Quality

- 7.5.12. Landscape quality relates to the intrinsic aesthetic appeal demonstrated by a character area, feature or composition within the landscape, including the relative condition of the landscape and features therein. A five point scale has been adopted to describe quality:
- **Highest Quality.** Areas comprising a clear composition of valued landscape components in robust form and health, free of disruptive visual detractors and with a strong sense of place. Areas containing a strong, balanced structure with distinct features worthy of conservation. Such areas would generally be internationally or nationally recognised, e.g. World Heritage Sites and National Parks.
 - **Very Attractive.** Areas primarily of valued landscape components combined in an aesthetically pleasing composition and lacking prominent disruptive visual detractors. Areas containing a strong structure with noteworthy features or elements, exhibiting a sense of place. Such areas would generally be nationally or regionally recognised locations, e.g. Areas of Outstanding National Beauty (AONB), parts within a National Park and the majority of Areas of Great Landscape Value (AGLV) and historic townscapes.
 - **Good.** Areas primarily of valued landscape components combined in an aesthetically pleasing composition with low levels of disruptive visual detractors, exhibiting a recognisable landscape structure. Such areas would generally be regionally and locally recognised areas, e.g. localised areas within AONB and AGLV designations, the majority of Areas of Local Landscape Importance and Conservation Areas.
 - **Ordinary.** Areas containing some features of landscape value but lacking a coherent and aesthetically pleasing composition with frequent detracting visual elements, exhibiting a distinguishable structure often concealed by mixed land uses or development. Such areas would be commonplace at the local level and would generally be undesignated, offering scope for improvement.
 - **Poor.** Areas lacking valued landscape components or comprising degraded, disturbed or derelict features, lacking any aesthetically pleasing composition with a dominance of visually detracting elements, exhibiting mixed land uses which conceal the baseline structure. Such areas would generally be restricted to the local level and identified as requiring recovery.

Landscape Value

- 7.5.13. Landscape value relates to areas of particular scenic quality or those displaying important historic and cultural associations. Landscape value is frequently addressed by reference to international, national, regional and local designations. An absence of a formal designation does not, however, determine that a landscape is necessarily of low value; factors such as accessibility and local scarcity can render areas of unremarkable quality highly valuable as a local resource.

Capacity to Accommodate Change

- 7.5.14. Capacity to accommodate change is broadly derived from a combination and correlation of the quality and sensitivity of a given area.
- 7.5.15. Although there is common ground between the aspects of sensitivity and capacity, the relationship between the degree of sensitivity and capacity are not always directly related. A highly sensitive area should not, by definition, infer that it has little or no capacity to accommodate future change. Similarly, an area expressing low sensitivity to change does not automatically have a higher capacity to accommodate development.

Magnitude of Impacts

- 7.5.16. Potential impacts on the perception of landscape character have been identified along with the predicted magnitude of impact. In considering the magnitude of impact on the surrounding landscape, the proposed route options have been assessed in terms of scale, spatial extent and massing. The magnitude of impact, which could be either adverse or beneficial, has been assessed using indicative criteria taken from IAN 135/10 Annex 1 Table 1.

Landscape Character Significance of Effect Ratings

- 7.5.17. The evaluation and significance of the landscape character effects of the proposed Scheme is derived by assessing the sensitivity of the landscape character against the magnitude of impact (allowing for mitigation) as shown in Table 7-2. Typical descriptors for the significance of effect are described in IAN 135/10 Annex 1 Table 4 (Landscape Character) and Annex 2 Table 4 (Visual Effects).

Table 7-2 - Significance of Effect Categories

Magnitude of Impact	Major	Slight / Moderate	Moderate / Large	Large / Very Large
	Moderate	Slight	Moderate	Moderate / Large
	Minor	Neutral / Slight	Slight	Slight / Moderate
	Negligible	Neutral / Slight	Neutral / Slight	Slight
	No change	Neutral	Neutral	Neutral
		Low	Moderate	High
Sensitivity of Receptor				

**It should be noted that the above sensitivity levels are indicative. For the purposes of this assessment it is considered that the sensitivity of the local PRoW network, open access land and unregistered parks and gardens is moderate rather than high given their local designation but importance in accessing the countryside, for health and for their historic connections.*

- 7.5.18. This is only a framework to aid consistency of reporting and provide an initial indication of the likely effect either beneficial or adverse arising from the assessment of magnitude of impact and sensitivity of the resource. Given that the criteria low / moderate / high, and major / moderate / minor / negligible/ no change represent levels on a continuum or continuous gradation, application of the framework also requires professional judgement and awareness of the relative balance between sensitivity and magnitude.
- 7.5.19. The findings of the assessment are represented using a descriptive, descending scale ranging from large - moderate - slight and adverse through neutral. There is a further effect rating, very large adverse, used to indicate adverse effects on a very high quality landscape or on important and rare combinations of landscape features and their elements. Such a rating would indicate that the effect is considered highly prejudicial in relation to the specific topic of landscape character. Explanation of the significance of effect ratings is provided below in Table 7-3.

Table 7-3- Landscape Significance of Effect Ratings and Criteria

Rating	Criteria
Neutral Effect	The proposals are well designed to: - Complement the scale, landform and pattern of the landscape. - Incorporate measures for mitigation to ensure that the scheme will blend in well with surrounding features and elements. - Avoid having an adverse effect on the current level of tranquillity in which the development would sit. - Maintain existing landscape quality and character.
Slight Adverse Effect	The proposals: - Do not quite fit the landform and scale of the landscape. - Although not very visually intrusive, will impact on certain views into and across the area. - Cannot be completely mitigated for because of the nature of the proposal itself or the character of the landscape in which the development would sit. - May affect an area of recognised landscape quality.
Moderate Adverse Effect	The proposals: - Are out of scale with, or at odds with, the local landscape pattern. - Are not possible to fully mitigate for, that is, mitigation will not prevent the scheme from scarring or detrimentally affecting the landscape in the longer term as some features of interest will be partly destroyed or their setting reduced or removed. - Will have an adverse effect on a landscape or townscape of recognised quality or on vulnerable This is only a framework to aid consistency of reporting and provide an initial indication of the likely effect either beneficial or adverse arising from the assessment of magnitude of impact and sensitivity of the resource. Given that the criteria low/ moderate/ high, and major/ moderate/ minor/ negligible/ no change represent levels on a continuum or continuous gradation, application of the

Rating	Criteria
	framework also requires professional judgement and awareness of the relative balance between sensitivity and magnitude.
Large Adverse Effects	The proposals are very damaging to the landscape in that they: - Are at considerable variance with the landform, scale and pattern. - Are visually intrusive and would disrupt fine and valued views of the area. - Are likely to degrade, diminish or even destroy the integrity of a range of characteristic features and elements of their setting. - Will be substantially damaging to a high quality or highly vulnerable landscape, resulting in fundamental change and be considerably diminished in quality. - Cannot be adequately mitigated for.
Very Large Adverse Effect	The proposals would result in exceptionally severe adverse effects on the landscape because they: - Are at complete variance with the landform, scale and pattern. - Are highly visually and extremely intrusive, destroying fine and valued views both into and across the study area. - Would irrevocably damage or degrade, badly diminish or even destroy the integrity of characteristic features and elements and their setting. - Would cause a very high quality or highly vulnerable landscape to be irrevocably changed and its quality very considerably diminished. - Cannot be mitigated for, that is, there are no measures that would protect or replace the loss of a nationally important landscape.

VISUAL AMENITY ASSESSMENT

7.5.20. The visual effects have been assessed as follows:

- The baseline studies include establishing the ZVIs, identification of visual receptors and their sensitivity to change;
- The assessment has considered the magnitude of visual impacts with reference to the scale and nature of change;
- Outline environmental measures have been proposed to reduce potential adverse effects;
- The significance of visual effects has been evaluated; and
- Potential residual visual effects for the main receptor groups have been identified.

Visual Sensitivity

- 7.5.21. Visual amenity is defined as the pleasantness of the view or outlook of an identified receptor or group of receptors. Sensitivity of visual receptors and their views is dependent on the location and context of the view; the expectation, occupation or activity of the visual receptor; and the importance of the view, which may be determined by its designation, such as an AONB, its popularity, the number of people affected, and whether it is a tourist attraction or has literary or artistic references.
- 7.5.22. Representative viewpoints were identified and the extent and nature of their views have been broadly described. The sensitivity of the visual amenity receptors and their views has been ascertained. The criteria used to assess visual sensitivity is based on the typical descriptors and examples set out in IAN 135/10 Annex 2 Table 1 and detailed below in Table 7-4.

Table 7-4: Visual Sensitivity

Sensitivity	Typical Criteria
High	- Residential properties. - Users of Public Rights of Way or other recreational trails (e.g. National Trails, footpaths, bridleways etc.)[*]. - Users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (e.g. Country Parks, National Trust or other access land).
Moderate	- Outdoor workers. - Users of scenic roads, railways or waterways or users of designated tourist routers. - Schools and other institutional buildings, and their outdoor areas.
Low	- Indoor workers. - Users of main roads (e.g. trunk roads) or passengers in public transport on main arterial routes. - Users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities).

**It should be noted that the above sensitivity levels are indicative. For the purposes of this assessment it is considered that the sensitivity of users of PRow which are not of national or regional importance is moderate rather than high. This judgement was also informed by the location, context and importance of the view.*

Magnitude of Impact

- 7.5.23. Potential impacts on the perception of visual amenity have been identified along with the predicted magnitude of impact. In considering the magnitude of impact on views, the proposed route options have been assessed in terms of scale, spatial extent and massing. The magnitude of impact, which could be either adverse or beneficial, has been assessed using indicative criteria taken from IAN 135/10 Annex 1 Table 1.

Significance of Visual Effect Ratings

- 7.5.24. The evaluation and significance of the visual effects of the proposed Scheme is derived by assessing the sensitivity of visual receptors against the magnitude of impact (allowing for mitigation) as shown in Table 7-5 below. Typical descriptors for the significance of effect are described in IAN 135/10 Annex 1 Table 4 (Landscape Character) and Annex 2 Table 4 (Visual Effects).

Table 7-5: Significance of Visual Effect Categories

Magnitude	Major	Slight / Moderate	Moderate / Large	Large / Very Large
	Moderate	Slight	Moderate	Moderate / Large
	Minor	Neutral / Slight	Slight	Slight / Moderate
	Negligible	Neutral / Slight	Neutral / Slight	Slight
	No change	Neutral	Neutral	Neutral
		Low	Moderate	High
		Sensitivity		

- 7.5.25. This is only a framework to aid consistency of reporting and provide an initial indication of the likely effect either beneficial or adverse arising from the assessment of magnitude and sensitivity. Given that the criteria low/ moderate / high, and major / moderate / minor / negligible / no change represent levels on a continuum or continuous gradation, application of the framework also requires judgement and awareness of the relative balance between sensitivity and magnitude.
- 7.5.26. The findings are represented using a descriptive scale ranging from large - moderate - slight and adverse through neutral. There is a further effect rating, very large adverse, which is used to indicate effects on a receptor of very high sensitivity, significantly affecting an existing view of very high value and quality. Such a rating would indicate that the effect is considered highly prejudicial in relation to visual effects. The various

levels of effect can be applied to individual properties, businesses, groups of housing, areas of open space and Rights of Way including highways. An explanation of the effect ratings is provided in Table 7-6.

Table 7-6: Visual Significance of Effect Ratings and Criteria

Rating	Criteria
Neutral Effect	This would typically occur where: Implementation of the proposals would not result in a discernible improvement or deterioration in existing receptor view or outlook.
Slight Adverse Effect	This would typically occur where: The receptor is at some distance from the proposals, or the proposal would not constitute a new point of principal focus. It would also occur where the proposal is closely located to the viewpoint but is seen at an acute angle and at the extremity of the overall available view, or viewed from rarely occupied upper storey rooms or less sensitive receptor types.
Moderate Adverse Effect	This would typically apply where: The proposals result in a noticeable deterioration to the current outlook, involving removal of existing, visually screening elements in the view, exposing the scheme. It would also occur where large new structures are introduced as part of the proposals which may appear at distance but be positioned as a focal point the field of view, or where the proposal can only be partially mitigated.
Large Adverse Effect	This would typically apply where: The proposal would cause a significant deterioration in the current receptor view or outlook, be positioned prominently within an existing view of local interest in a valued landscape, or where only selected elements of the proposal can be effectively mitigated.
Very Large Adverse Effect	This would typically apply where: The proposal would cause a highly prejudicial deterioration in the current view, be positioned prominently within an existing view of regional or national importance in a valued landscape, or where the proposal cannot be effectively mitigated.

7.5.27. The Guidelines for Landscape and Visual Impact Assessment notes *'There are no hard and fast rules about what makes a significant landscape effect, and there cannot be a standard approach since circumstances vary with the location and context and with the type of proposal.'* When making a judgement about the significance of landscape character effects it provides the following guidance:

- Major loss or irreversible negative effects, over an extensive area, on elements and/or aesthetic and perceptual aspects that are key to the character of nationally valued landscapes are likely to be of the greatest significance;
- Reversible negative effects of short duration, over a restricted area, on elements and/or aesthetic and perceptual aspects that contribute to but are not key characteristics of landscapes of community value are likely to be of the least significance and may, depending on the circumstances, be judged as not significant; and
- Where assessments of significance place landscape effects between these extremes, judgements must be made about whether or not they are significant, with full explanations of why these conclusions have been reached.

7.5.28. In making a judgement about the significance of visual effects it advises the following points should be considered:

- Effects on people who are particularly sensitive to changes in views and visual amenity are more likely to be significant; and
- Effects on people at recognised and important viewpoints or from recognised scenic routes are more likely to be significant; and large-scale changes which introduce new, non-characteristic or discordant or intrusive elements into the view are more likely to be significant than small changes or changes involving features already present in the view.

7.6 DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

LANDSCAPE DESIGN

- 7.6.1. Chapter 17 illustrates the proposed route options under consideration, including horizontal alignment. Design information for the proposed built structures, signage, and lighting, which could have an impact on views as well as the surrounding townscape and rural landscape, is not available at this stage.
- 7.6.2. The crossing of the River Wye could have significant landscape and visual impacts on the Wye Valley, a landscape of high sensitivity. Adverse visual impacts could not be mitigated with screen planting in this case due to the likely elevation of the bridge and the open character of part of the floodplain. It is essential that the crossing is designed and incorporates an appropriate architectural style that is sensitive to this setting.
- 7.6.3. Permanent landscape mitigation proposals and enhancement measures would follow the guidance in the DMRB, Volume 10: Environmental Design and Management (Section 0: Environmental Objectives). Where opportunities exist during an iterative process to refine route design (e.g. sinuously connect embankments and cutting into the surrounding landscape), associated landscape proposals should also be designed to complement the existing landscape elements and environmental functions of the adjoining landscape and comprise locally occurring desirable native species of trees, shrubs, wildflowers and grasses as well as hedgerows and orchards.
- 7.6.4. Ancient, veteran and notable trees, as well as those defined as of Class A quality in the Arboricultural Report (Appendix 7-4), should be avoided through micro-siting of the route alignment. This involves avoiding the identified Root Protection Area (RPA) and protecting the trees during the construction period in accordance with BS5837:2012.
- 7.6.5. The first principle of the landscape design would be to retain and protect as much of the existing woodland, orchards and hedgerows as possible. The second principle would be to carry out new planting for landscape and visual mitigation and to replace any vegetation lost due to construction. Opportunities for landscape enhancement, such as improvement through the management of any retained areas of vegetation, should also be considered.

LANDSCAPE MITIGATION AND ENHANCEMENT

- 7.6.6. The landscape and visual effects associated with the construction phase of a highway scheme are similar in their area of influence to the operational phase, but cannot generally be mitigated as it is not possible to screen the construction works completely. Whilst it is likely the construction effects may generally be more adverse where views of the exposed earthworks and the extended works area (including signage, traffic management, contractor's compounds etc.) would be available, they would be temporary effects.
- 7.6.7. The following mitigation measures are anticipated to form a common approach to the detailed design of the preferred route and have been incorporated when developing likely impacts and effects:
 - Sensitive earthworks design to minimise the impact of the cuttings and embankments and enable integration of the proposed scheme into the surrounding landscape;
 - Where appropriate there is the potential for the grading out of earthworks at sensitive locations to avoid disjointed appearance of landform and aid integration of the option into landscape;
 - Retention of existing established trees and vegetation wherever possible and incorporation of new native woodland planting to integrate with existing (where appropriate);
 - Planting at junctions and adjacent to structures to help assimilate the junctions / structures into the landscape;
 - Use of native woodland mixes that comprise a mix of trees and scrub species that reflect the inherent local woodland composition and enhance biodiversity;
 - Replacement or enhancement of traditional orchards, including selection of suitable orchard fruit varieties;
 - Retention or replacement of hedgerows, using native species appropriate to the local area; and
 - Consideration as to the use of visual barriers (including green acoustic barriers), where planting depth may be insufficient to provide effective screening.
- 7.6.8. It should be noted that the nature of the proposed Scheme does not fit into the general scale or pattern of the surrounding landscape and it would therefore not be possible to fully integrate the proposed Scheme into the landscape. However, measures should be taken to reduce the impact through retaining and protecting where

possible, landscape elements of great significant value including watercourses such as the Wye River and Yazor Brook, protected trees and woodlands such as Wye and Rough Coppice, designated landscape parks, traditional orchards and settlement patterns. The potential impact of the development would be visually intrusive for existing views along the watercourses, disrupting the quality of the linear landscape, and alter some of the BNDP protected views.

- 7.6.9. The preferred route should be designed to follow the natural topography of the landscape as far as possible. However, where cuttings and embankments are required, slopes should be slackened to integrate with the existing rolling landform characteristic of Herefordshire and mitigation planting should be subtly specified and positioned to integrate with surrounding landscape features.

7.7 POTENTIAL IMPACTS

- 7.7.1. Potential impacts on landscape character and visual amenity during the construction phase, in the Year of Opening and at Year 15 of operation have been identified below. The assessment of landscape character and visual effects are described further in Appendix 7-2 Landscape Effects Schedule and Appendix 7-3 Viewpoint Visual Effects Schedule.
- 7.7.2. Full design proposals are as yet unknown and the magnitude of impact on landscape and visual receptors will be influenced by the design and extent of earthworks and structures. Works that have the potential to affect landscape and visual receptors include, but are not limited to, the excavation for the road option, additional land / mitigation requirements for ecological, noise and flood compensation, lighting columns and above-ground infrastructure, compound areas, landscape planting, retaining ponds, temporary access routes, topsoil stripping, traffic management and hoardings / fencing, stockpiles, artificial lighting, changes in noise and tranquillity levels, and presence of plant and traffic.
- 7.7.3. The construction of any of the proposed route options may potentially impact trees protected by Ancient Woodland / Veteran tree status, Tree Preservation Orders and BS5837 Category A status trees as well as locally designated Traditional Orchard sites and associated Priority Habitats. Vegetation currently provides screening for views in and out of the proposed Scheme as well as contributing to the overall character of the study area. Any loss of vegetation (such as of hedgerows or trees) may therefore adversely affect local visual amenity and local character.
- 7.7.4. In relation to the assessment commentary below, 'Notable trees' are high quality trees which are of importance due to their size and age. They have arboricultural value but may also have landscape / historic value and are considered as important trees in terms of local planning policy. 'Trees at risk' are those where there is development within the root protection area.

LANDSCAPE EFFECTS – ELEMENT 1

Orange: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.5. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. It has a sensitivity of High.
- 7.7.6. The route option at this point is on embankment, rising up on embankment to cross C1189 (Lower Breinton Road) via a bridge. This will increase visibility and awareness of the route option and detract from the rural nature of the character area. The size and scale of the option is also uncharacteristic of this character area. The route will bisect hedgerows along lanes near Warham House and Warham Farm, some of which contain important trees and passes in close proximity to ancient woodland (Rough coppice) and Habitat of Principal Importance (orchard) to the north east of Warham Farm.
- 7.7.7. Mitigation through planting of embankments would help soften the harsh engineered structures, and appropriate profiling of the earthworks would enable the embankments to more naturally sit in the landscape.
- 7.7.8. At Construction, the magnitude of this change is considered to be Major resulting in a significance of effect of Large and adverse.
- 7.7.9. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Large and adverse at Year 15.

Orange: Summary of Potentially Significant Landscape Character effects on LCT 7.14

- 7.7.10. This character area is a secluded pastoral landscape characterised by extensive views along the length of river corridors and meandering tree-lined rivers, flanked by riverside meadows defined by hedge and ditch boundaries and notable tree cover. It has a sensitivity of High.
- 7.7.11. The crossing of the river would cause visual fragmentation within the character area, disrupt local PRow (particularly the Wye Valley Walk and Breinton footpath 8) and result in loss of tree cover and vegetation. The route option is in cutting on the approach and exit of the bridge, so views within the character area would be more localised. This option results in less tree cover loss than some other routes and therefore the perception of the change in local character as a result of the structure on this character area will be reduced.
- 7.7.12. There is limited mitigation available at construction due to the nature of the bridge within an open river corridor. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate/large and adverse.
- 7.7.13. There is limited mitigation available at operation due to the nature of the bridge within an open river corridor but the design and structure of the bridge would define the quality of the built form within the character area and should be sympathetic and complimentary to its setting. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate/large and adverse at Year 0 and Moderate/large and adverse at Year 15.

Orange: Summary of Potentially Significant Landscape Character effects on LCT 7.18

- 7.7.14. Parkland trees, framed views and woodland are important features in this character area. It has a sensitivity of high.
- 7.7.15. The route option would result in a new at-grade junction with the A465 with associated lighting columns, and passing under the B4349 and Ruckhall Lane, requiring small bridges for these existing east-west crossings. The proposed route option may introduce views and / or awareness of lighting associated with the proposed junction from localised views. The route running alongside Belmont Abbey and through Belmont Park is not currently well lit and will therefore have the effect of partially urbanising a part of the northern section of this character area. Overall the proximity of the route to some existing built form is not likely to influence the perception of the landscape from wider views within this character area.
- 7.7.16. Although there would be no loss of parkland trees within Belmont House Unregistered Park and Garden as a result of this route option, there would be considerable impacts on the character of the park and garden due to disruption of views within the designed landscape, reduction of tranquillity within the park and considerable earthworks associated with the cutting slopes. The settings of Belmont abbey and associated listed buildings (Grade II* and II) and the character of the more functional agricultural landscape would all be affected. Clehonger footpath 7 would be directly affected where it cross the route alignment within the park.
- 7.7.17. The route option is largely in cutting through this character area, allowing some potential for mitigation planting of cutting slopes.
- 7.7.18. At construction, the magnitude of change is considered to be major resulting in a significance of effect of moderate/large and adverse.
- 7.7.19. At operation, the magnitude of change is considered to be major resulting in a significance of effect of moderate/large and adverse at year 0 reducing to moderate and adverse at year 15 with mitigation planting and appropriate noise barriers.

Cyan and Yellow: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.20. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. It has a sensitivity of High.
- 7.7.21. The route options at this point is on embankment, rising up on embankment to cross C1189 (Lower Breinton Road) via a bridge. This will increase visibility and awareness of the route options and detract from the rural nature of the character area. The size and scale of the route options is also uncharacteristic of this character area. The route will bisect hedgerows along lanes near Warham House and Warham Farm, some of which contain important trees and passes in close proximity to ancient woodland (Rough coppice) and Habitat of Principal Importance (orchard) to the north east of Warham Farm.
- 7.7.22. Mitigation through planting of embankments would help soften the harsh engineered structures, and appropriate profiling of the earthworks would enable the embankments to more naturally sit in the landscape.

- 7.7.23. At Construction, the magnitude of this change is considered to be Major resulting in a significance of effect of Large and adverse.
- 7.7.24. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Large and adverse at Year 15.

Cyan and Yellow: Summary of Potentially Significant Landscape Character effects on LCT 7.14

- 7.7.25. This character area is a secluded pastoral landscape characterised by extensive views along the length of river corridors and meandering tree-lined rivers, flanked by riverside meadows defined by hedge and ditch boundaries and notable tree cover. It has a sensitivity of High.
- 7.7.26. The crossing of the river would cause visual fragmentation within the character area, disrupt local PRoW (particularly the Wye Valley Walk and Breinton footpath 8) and result in loss of tree cover and vegetation. The route options are in cutting on the approach and exit of the bridge, so views within the character area would be more localised. These route options would result in less tree cover loss than some other routes and therefore the perception of the change in local character as a result of the structure on this character area will be reduced.
- 7.7.27. There is limited mitigation available at construction due to the nature of the bridge within an open river corridor. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate/large and adverse.
- 7.7.28. There is limited mitigation available at operation due to the nature of the bridge within an open river corridor but the design and structure of the bridge would define the quality of the built form within the character area and should be sympathetic and complimentary to its setting. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate/large and adverse at Year 0 and Moderate/large and adverse at Year 15.

Cyan and Yellow: Summary of Potentially Significant Landscape Character effects on LCT 7.18

- 7.7.29. Parkland trees, framed views and woodland are important features in this character area. It has a sensitivity of High.
- 7.7.30. The route options would result in a new at-grade junction with the A465 with associated lighting columns, and passing under the B4349 and Ruckhall Lane, requiring small bridges for these existing east-west crossings. The proposed route options may introduce views and / or awareness of lighting associated with the proposed junction from localised views. The route running alongside Belmont Abbey and through Belmont Park is not currently well lit and will therefore have the effect of partially urbanising a part of the northern section of this character area. Overall the proximity of the route to some existing built form is not likely to influence the perception of the landscape from wider views within this character area.
- 7.7.31. Although there would be no loss of parkland trees within Belmont House Unregistered Park and Garden as a result of these route options, there would be considerable impacts on the character of the park and garden due to disruption of views within the designed landscape, reduction of tranquillity within the park and considerable earthworks associated with the cutting slopes. The settings of Belmont Abbey and associated listed buildings (Grade II* and II) and the character of the more functional agricultural landscape would all be affected. Clehonger footpath 7 would be directly affected where it cross the route alignment within the park.
- 7.7.32. The route options are largely in cutting through this character area, allowing some potential for mitigation planting of cutting slopes.
- 7.7.33. At Construction, the magnitude of change is considered to be Major resulting in a significance of effect of Moderate/large and adverse.
- 7.7.34. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Moderate/large and adverse at Year 0 reducing to Moderate and adverse at Year 15 with mitigation planting and appropriate noise barriers.

Red and Black 2: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.35. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. It has a sensitivity of High.
- 7.7.36. The route options at this point is on embankment, rising up on embankment to cross C1189 (Lower Breinton Road) via a bridge. This will increase visibility and awareness of the route option and detract from the rural

nature of the character area. The size and scale of the route option is also uncharacteristic of this character area. The route will bisect hedgerows along lanes near Warham House and Warham Farm, some of which contain important trees and passes in close proximity to ancient woodland (Rough coppice) and Habitat of Principal Importance (orchard) to the north east of Warham Farm. The alignment of Red and Black 2 would result in the loss of outbuildings belonging to Warham Farm, further detracting from the typical character and pattern of the character area.

- 7.7.37. Mitigation through planting of embankments would help soften the harsh engineered structures, and appropriate profiling of the earthworks would enable the embankments to more naturally sit in the landscape.
- 7.7.38. At Construction, the magnitude of this change is considered to be Major resulting in a significance of effect of Large and adverse.
- 7.7.39. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Large and adverse at Year 15.

Red and Black 2: Summary of Potentially Significant Landscape Character effects on LCT 7.14

- 7.7.40. This character area is a secluded pastoral landscape characterised by extensive views along the length of river corridors and meandering tree-lined rivers, flanked by riverside meadows defined by hedge and ditch boundaries and notable tree cover. It has a sensitivity of High.
- 7.7.41. The crossing of the river would cause visual fragmentation within the character area, disrupt local PRow (particularly the Wye Valley Walk and Breinton footpath 8) and result in loss of tree cover and vegetation. The route option is in cutting on the approach and exit of the bridge, so views within the character area would be localised. These route options would result in more tree cover loss than some other routes due to the more extensive earthworks in the adjacent character area and therefore the perception of the change in local character as a result of the structure on this character area will be increased, particularly during construction.
- 7.7.42. There is limited mitigation available at construction due to the nature of the bridge within an open river corridor. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate/large and adverse.
- 7.7.43. There is limited mitigation available at operation due to the nature of the bridge within an open river corridor but the design and structure of the bridge would define the quality of the built form within the character area and should be sympathetic and complimentary to its setting. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate/large and adverse at Year 0 and Moderate/large and adverse at Year 15.

Red and Black 2: Summary of Potentially Significant Landscape Character effects on LCT 7.18

- 7.7.44. Parkland trees, framed views and woodland are important features in this character area. It has a sensitivity of High.
- 7.7.45. The route options would result in a new at-grade junction with the A465 with associated lighting columns, then pass under the B4349 and Ruckhall Lane in cutting, requiring small bridges for these existing east-west routes. The route then continues in cutting through Belmont Park as it approaches the River Wye.
- 7.7.46. The proposed route options may introduce views and/or awareness of lighting associated with the proposed junction from localised views. The route passing near Belmont Abbey and through Belmont Park is not currently well lit and will therefore have the effect of partially urbanising a part of the northern section of this character area. The cutting through Belmont House Unregistered Park and Garden is likely to be visible in the local landscape due to its length and loss of tree cover, causing severance of the parkland and disrupting the setting of its historic houses.
- 7.7.47. The route takes a curved route through the park, resulting in loss of scattered trees as well as considerable impacts on the character of the due to disruption of views within the designed landscape, reduction of tranquillity within the park and earthworks associated with the cutting slopes. The route options is more distant from the settings of Belmont Abbey and associated listed buildings (Grade II* and II) than the Orange, Cyan and Yellow route options, being located more within the functional agricultural landscape. Clehonger footpath 7 would be directly affected where it cross the route alignment within the park.
- 7.7.48. The route option is largely in cutting through this character area, allowing potential for mitigation planting of cutting slopes.

- 7.7.49. At Construction, the magnitude of change is considered to be Major resulting in a significance of effect of Moderate/large and adverse.
- 7.7.50. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Moderate/large and adverse at Year 0 reducing to Moderate and adverse at Year 15 with mitigation planting and potential noise bunding / barriers.

Olive and Black 1: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.51. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. It has a sensitivity of High.
- 7.7.52. These route options at this point remains in a small cutting, although one east-west lane requires embankments and an overbridge to cross the resultant cutting west of Warham Farm. The size and scale of the route options is also uncharacteristic of this character area. The route options would bisect hedgerows along lanes near Warham House and Warham Farm, and passes in close proximity to ancient woodland (Wye Coppice).
- 7.7.53. The Olive / Black 1 route options cuts through Greenbank meadows and Warham House Unregistered Park and Garden. It would result in a loss of the cultural association with the painter Brian Hatton through permanently altering some of the local views of Warham House and grounds (and potential loss of trees) depicted in his paintings, notably "The Lawns, Warham."
- 7.7.54. Mitigation through planting of embankments would help soften the harsh engineered structures, and appropriate profiling of the earthworks would enable the embankments to more naturally sit in the landscape. However, the loss of views associated with the cultural connections of the area would be lost.
- 7.7.55. At Construction, the magnitude of this change is considered to be Major resulting in a significance of effect of Large and adverse.
- 7.7.56. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Large and adverse at Year 15.

Olive and Black 1: Summary of Potentially Significant Landscape Character effects on LCT 7.14

- 7.7.57. This character area is a secluded pastoral landscape characterised by extensive views along the length of river corridors and meandering tree-lined rivers, flanked by riverside meadows defined by hedge and ditch boundaries and notable tree cover. It has a sensitivity of High.
- 7.7.58. The crossing of the river would cause visual fragmentation within the character area, disrupt local PROW (particularly the Wye Valley Walk) and result in loss of tree cover and vegetation. These route options are in deep cutting on the approach and exit of the bridge, so views within the character area would be localised at operation due to screening by vegetation. At construction however, the extent of the earthworks and vegetation loss in the adjacent character area is likely to extend views within the character area. These options would result in more tree cover loss than some other routes due to the more extensive earthworks and therefore the perception of the change in local character as a result of the structure on this character area will be increased, particularly during construction. The crossing at this location would be wider, requiring a longer bridge span. Natural curves in the river would help mitigate this larger structure through naturally limiting open views along the corridor.
- 7.7.59. There is limited mitigation available at construction due to the nature of the bridge within an open river corridor. At Construction, the magnitude of change is considered to be Major resulting in a significance of effect of large and adverse.
- 7.7.60. There is limited mitigation available at operation due to the nature of the bridge within an open river corridor but the design and structure of the bridge would define the quality of the built form within the character area and should be sympathetic and complimentary to its setting. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of large and adverse at Year 0 but reducing to Moderate/large and adverse at Year 15.

Olive and Black 1: Summary of Potentially Significant Landscape Character effects on LCT 7.18

- 7.7.61. Parkland trees, framed views and woodland are important features in this character area. It has a sensitivity of High.

- 7.7.62. These routes would cause the greatest loss of trees within Belmont Unregistered Park and Garden than any of the other route options due to the size of the cutting. It would result in a new at-grade junction with the A465 with associated lighting columns, then pass under the B4349 and Ruckhall Lane in cutting, requiring small bridges for these existing east-west routes. The route then continues within an increasingly deep cutting through the park as it approaches the River Wye.
- 7.7.63. The proposed route options may introduce views and / or awareness of lighting associated with the proposed junction from localised views. The routes passing near Belmont Abbey and through Belmont Park is not currently well lit and will therefore have the effect of partially urbanising a part of the northern section of this character area. The extent of cutting and associated earthworks through the park is likely to be visible in the local landscape due to its scale and loss of tree cover, causing severance of the parkland and disrupting the setting of its historic houses.
- 7.7.64. The route takes a curved route through the park, resulting in loss of scattered trees (including important trees) as well as considerable impacts on the character of park due to disruption of views within the designed landscape, reduction of tranquillity within the park and earthworks associated with the deep cutting slopes. Loss of woodland would occur to the south of the River Wye as the viaduct abutment would be located within the woodland.
- 7.7.65. The route options are more distant from the settings of Belmont Abbey and associated listed buildings (Grade II* and II) than some other options, being located more within the functional agricultural landscape. Clehonger footpath 7 would be directly affected where it cross the route alignment within the park.
- 7.7.66. The route options are largely in cutting through this character area, allowing potential for mitigation planting of cutting slopes.
- 7.7.67. At Construction, the magnitude of change is considered to be Major resulting in a significance of effect of Moderate/large and adverse.
- 7.7.68. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Moderate/large and adverse at Year 0 reducing to Moderate and adverse at Year 15 with mitigation planting and appropriate noise bunding / barriers.

LANDSCAPE EFFECTS – ELEMENT 2

Orange: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.69. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. The character area extends from north of Warham Farm to Green Lane (Bridleway BT4). It has a sensitivity of High.
- 7.7.70. The route option at this point is primarily in cutting, with Green Lane (Bridleway BT4) crossing above it largely at grade. Whilst the earthworks would not be extensive, the size and scale of the route option is uncharacteristic of this character area, cutting a linear track north-south through the local landscape. It would pass in close proximity to a woodland block protected by a TPO (group) to the north-west of Warham farm.
- 7.7.71. The Orange route bisects several hedgerows, some of which contain important trees. Mitigation through planting of cutting slopes would help soften the option over time. At Construction, the magnitude of this change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.72. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Orange: Summary of Potentially Significant Landscape Character effects on LCT 7.15

- 7.7.73. This character area is a secluded, pastoral landscape characterised by a regular pattern of hedged fields and ditches fringed by lines of willow and alder. It has a sensitivity of High.
- 7.7.74. The orange route option affects a very small section of this character area only, just impinging in to it at the junction with Roman Road. The route option would add more hard surfacing, artificial lighting and traffic into the very edge of the character area, affecting its immediate setting.
- 7.7.75. Overall this is a small contained character area of which the route option form a very small part. It would create the presence of a new highway on the edge of the character area but effects would be contained to a localised area and would not influence the perception of this wider landscape.

7.7.76. At Construction, the magnitude of change is considered to be Minor resulting in a significance of effect of Moderate/slight and adverse.

7.7.77. At Operation, the magnitude of change is considered to be Negligible resulting in a significance of effect of slight and adverse at Year 0 and slight and adverse at Year 15.

Orange: Summary of Potentially Significant Landscape Character effects on LCT 7.21

7.7.78. A domestic character containing a rich patchwork of land uses including traditional orchards and mixed farming of pasture and arable fields as well as variety of settlements. Tree cover is generally limited to thinly scattered hedgerows. This route option element extends from Green Lane (Bridleway BT4) to Burghill hospital. It has a sensitivity of Moderate.

7.7.79. The route option is on slight embankment towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade where a double roundabout is located, again with associated lighting columns. North of Roman Road the route drops into slight cutting beneath Tillington Road before rising up on embankment and then cutting beneath Canon Pyon Road. The varied topography of the landscape results in a variety of earthworks requirements.

7.7.80. The Orange route bisects several hedgerows some of which contain important trees although the route passes through mainly open agricultural fields. Breinton Bridleway 3 and Green Lane (Bridleway BT4) directly cross the proposed route alignment, as do Burghill footpath 11 and Hereford footpath 1. The route passes directly below the boundary of Burghill Hospital Unregistered Park and Garden, and just above Hospital Farm traditional orchard.

7.7.81. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is rather uncharacteristic of this part of the landscape resulting in some visual severance of its rural character.

7.7.82. The character and setting of Burghill Hospital Unregistered Park and Garden and traditional orchards north of Roman Road will be slightly eroded due to proximity of the route options, and visually detract from the quality of this area.

7.7.83. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway, but effects would be contained to a localised area of the character area and would not influence the perception of this wider landscape. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the proposed Scheme and provide some integration into the landscape.

7.7.84. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.

7.7.85. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 reducing to Slight and adverse at Year 15.

Cyan: Summary of Potentially Significant Landscape Character effects on LCT 7.10

7.7.86. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. It has a sensitivity of High.

7.7.87. The route option at this point is primarily in cutting, with Green Lane (Bridleway BT4) crossing above it largely at grade. Whilst the earthworks would not be extensive, the size and scale of the route option is uncharacteristic of this character area, cutting a linear track north-south through the local landscape.

7.7.88. Mitigation through planting of cutting slopes would help soften the proposed Scheme over time.

7.7.89. At Construction, the magnitude of this change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.

7.7.90. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and Slight and adverse at Year 15.

Cyan: Summary of Potentially Significant Landscape Character effects on LCT 7.15

7.7.91. This character area is a secluded, pastoral landscape characterised by a regular pattern of hedged fields and ditches fringed by lines of willow and alder. It has a sensitivity of High.

- 7.7.92. The cyan route option crosses through the character area towards its eastern extent, causing severance of the character area and wetland, rural character of the Yazor brook. The current design shows the Yazor Brook being culverted underneath the Cyan route, further disrupting its character. The route option would add more hard surfacing, artificial lighting and traffic across a section of the character area, greatly affecting its character and the fragmented character of the east of the proposed route alignment. It is therefore likely to alter the perception of this character area in localised views. Limited mitigation is possible within the flood plain, although planting on cutting slopes would provide some screening of vehicle movement over time.
- 7.7.93. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.94. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Moderate/slight and adverse at Year 0 and Moderate/slight and adverse at Year 15.

Cyan: Summary of Potentially Significant Landscape Character effects on LCT 7.21

- 7.7.95. A domestic character containing a rich patchwork of land uses including traditional orchards and mixed farming of pasture and arable fields as well as variety of settlements. Tree cover is generally limited to thinly scattered hedgerows. This route option element extends from Green Lane (Bridleway BT4) to Burghill hospital. It has a sensitivity of Moderate.
- 7.7.96. The route option is largely in cutting towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade or on slight embankment. A roundabout and associated lighting columns is located at grade just north of Roman Road before the route drops into slight cutting beneath Tillington Road. It then rises up on embankment and then cutting beneath Canon Pyon Road. The varied topography of the landscape results in a variety of earthworks requirements, including embankment and bridge crossing for Tillington Road above the route option.
- 7.7.97. The Cyan route bisects several hedgerows although the route passes through mainly open agricultural fields. Breinton Bridleway 3 and Green Lane (Bridleway BT4) directly cross the proposed route alignment, as does Burghill footpath 11. The route passes directly below the boundary of Burghill Hospital Unregistered Park and Garden, and just above Hospital Farm traditional orchard.
- 7.7.98. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is rather uncharacteristic of this part of the landscape resulting in some visual severance of its rural character.
- 7.7.99. The character and setting of Burghill Hospital Unregistered Park and Garden and traditional orchards north of Roman Road will be slightly eroded due to proximity of the route options, and visually detract from the quality of this area.
- 7.7.100. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway, but effects would be contained to a localised views and would not influence the perception of this wider landscape. Mitigation planting along the proposed Scheme would help soften harsh engineering structures over time, although tree planting should not be continuous so as not to reinforce the presence of the option.
- 7.7.101. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.102. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 reducing to Slight and adverse at Year 15.

Yellow: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.103. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. The character area extends from north of Warham Farm to Green Lane (Bridleway BT4) . It has a sensitivity of High.
- 7.7.104. The route option at this point is primarily in cutting, with Green Lane (Bridleway BT4) crossing above it largely at grade. Whilst the earthworks would not be extensive, the size and scale of the option is uncharacteristic of this character area, cutting a linear track north-south through the local landscape. It would pass in close proximity to a woodland block protected by a TPO (group) to the north-west of Warham farm.
- 7.7.105. Mitigation through planting of cutting slopes would help soften the option over time.

- 7.7.106. At Construction, the magnitude of this change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.107. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Yellow: Summary of Potentially Significant Landscape Character effects on LCT 7.21

- 7.7.108. A domestic character containing a rich patchwork of land uses including traditional orchards and mixed farming of pasture and arable fields as well as variety of settlements. Tree cover is generally limited to thinly scattered hedgerows. This route option element extends from Green Lane (Bridleway BT4) to Burghill hospital. It has a sensitivity of Moderate.
- 7.7.109. The route option is cutting and then on slight embankment towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade where a junction is located, again with associated lighting columns and signalisation. North of Roman Road the route drops into slight cutting beneath Tillington Road before rising up on embankment and then cutting beneath Canon Pyon Road. The varied topography of the landscape results in a variety of earthworks requirements.
- 7.7.110. The Yellow route bisects several hedgerows although the route passes through mainly open agricultural fields. Breinton Bridleway 3 and Green Lane (Bridleway BT4) directly cross the proposed route alignment, as does Hereford footpath 1. The route passes directly below the boundary of Burghill Hospital Unregistered Park and Garden, and just above Hospital Farm traditional orchard.
- 7.7.111. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is rather uncharacteristic of this part of the landscape resulting in some visual severance of its rural character.
- 7.7.112. The character and setting of Burghill Hospital Unregistered Park and Garden and traditional orchards north of Roman Road will be slightly eroded due to proximity of the route options, and visually detract from the quality of this area.
- 7.7.113. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway, but effects would be contained to a localised area of the character area and would not influence the perception of this wider landscape.
- 7.7.114. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the proposed Scheme and provide some integration into the landscape over time.
- 7.7.115. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.116. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Moderate/slight and adverse at Year 0 reducing to Slight and adverse at Year 15.

Red: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.117. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. The character area extends from north of Warham Farm to Green Lane (Bridleway BT4) . It has a sensitivity of High.
- 7.7.118. The route option at this point is in cutting, with Green Lane (Bridleway BT4) crossing above it via an overpass largely at grade. Whilst the earthworks would not be extensive, the size and scale of option is still uncharacteristic of this character area, cutting a linear track north-south through the local landscape. It would also result in the loss of a very small area of Traditional Orchard due to the re-grading of a lane to form an overbridge as well as loss of part of the recently planted heritage orchards (created by the Pippin Trust) at Upper Hill Farm.
- 7.7.119. The character of the landscape would therefore be eroded through loss of trees, orchards and disruption of the rural character. Mitigation through planting of cutting slopes would help soften the option over time.
- 7.7.120. At Construction, the magnitude of this change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.121. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Red: Summary of Potentially Significant Landscape Character effects on LCT 7.21

- 7.7.122. A domestic character containing a rich patchwork of land uses including traditional orchards and mixed farming of pasture and arable fields as well as variety of settlements. Tree cover is generally limited to thinly scattered hedgerows. This route option element extends from Green Lane (Bridleway BT4) to Burghill hospital. It has a sensitivity of Moderate.
- 7.7.123. The route option is in cutting and then on slight embankment towards Kings Acre Road, where a new junction at grade is located with associated lighting columns and signalisation. The route then travels north / north east to Roman Road, largely at grade where a junction is located, again with associated lighting columns and signalisation. North of Roman Road the route rises up on embankment with Tillington Road crossing beneath it via an underpass. The route remains on embankment until nearing Canon Pyon Road where it goes into cutting beneath it.
- 7.7.124. The Red route bisects several hedgerows although the route passes through mainly open agricultural fields. Green Lane (Bridleway BT4) directly crosses the proposed route alignment, as does Hereford footpath 1. The route crosses the southern section of the Burghill Hospital Unregistered Park and Garden, although would not affect the nearby traditional orchards above Hospital Farm.
- 7.7.125. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is rather uncharacteristic of this part of the landscape resulting in some visual severance of its rural character.
- 7.7.126. The character of Burghill hospital Unregistered Park and Garden would be eroded due to loss of parkland, permanently reducing the size of the remaining historic parkland. The route option would visually detract from the quality of this area.
- 7.7.127. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway, but effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape, the exception being around Burghill Hospital.
- 7.7.128. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the proposed Scheme and provide some integration into the landscape over time.
- 7.7.129. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.130. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Olive: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.131. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. The character area extends from north of Warham Farm to Green Lane (Bridleway BT4) . It has a sensitivity of High.
- 7.7.132. The route option at this point is in cutting, with Green Lane (Bridleway BT4) crossing above it via an overpass largely at grade. Whilst the earthworks would not be extensive, the size and scale of the option is still uncharacteristic of this character area, cutting a linear track north-south through the local landscape. The Olive route would result in the loss of a small area of Traditional Orchard due to the re-grading of a lane to form an overbridge as well as loss of part of the recently planted heritage orchards (created by the Pippin Trust) at Upper Hill Farm.
- 7.7.133. The character of the landscape would therefore be eroded through loss of trees, orchards and disruption of the rural character. Mitigation through planting of cutting slopes would help soften the proposed Scheme over time.
- 7.7.134. At Construction, the magnitude of this change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.135. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Olive: Summary of Potentially Significant Landscape Character effects on LCT 7.21

- 7.7.136. A domestic character containing a rich patchwork of land uses including traditional orchards and mixed farming of pasture and arable fields as well as variety of settlements. Tree cover is generally limited to thinly scattered hedgerows. This route option element extends from Green Lane (Bridleway BT4) to Burghill hospital. It has a sensitivity of Moderate.
- 7.7.137. The route option is on slight embankment towards Kings Acre Road, where a new junction at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade or on slight embankment. A junction with associated lighting columns/ signalisation enables the route to cross Kings Acre Road after which it rises up on embankment to enable Tillington Road to pass beneath it via an underpass. The route then rises up on embankment until reaching Canon Pyon Road at grade.
- 7.7.138. The Olive route mainly passes through mainly open agricultural fields. Green Lane (Bridleway BT4) directly crosses the proposed route alignment, as does Hereford footpath 1. The route option also crosses the southern section of the Burghill Hospital Unregistered Park and Garden, although would not affect the nearby traditional orchards above Hospital Farm.
- 7.7.139. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is uncharacteristic of this part of the landscape resulting in some discordance with the wider character if the landscape.
- 7.7.140. The character of Burghill hospital Unregistered Park and Garden would be eroded due to loss of parkland, permanently reducing the size of the remaining historic parkland. The route option would visually detract from the quality of this area.
- 7.7.141. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway, but effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape, the exception being around Burghill Hospital. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the option and provide some integration into the landscape over time.
- 7.7.142. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.143. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Black 1: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.144. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. The character area extends from north of Warham Farm to Green Lane (Bridleway BT4) . It has a sensitivity of High.
- 7.7.145. The route option at this point is in cutting, with Green Lane (Bridleway BT4) crossing above it via an overpass largely at grade. Whilst the earthworks would not be extensive, the size and scale of the route option is still uncharacteristic of this character area, cutting a linear track north-south through the local landscape. The Olive route would result in the loss of an area of Traditional Orchard at Little Breinton due to the re-grading of a lane to form an overbridge. The route would also result in the loss of a large part of the recently planted heritage orchards (created by the Pippin Trust) at Upper Hill Farm, impacting on the character of the local area by removing some of its characteristic orchards – a particularly historic connection with the nurseries around King's Acre.
- 7.7.146. The character of the landscape would therefore be eroded through loss of trees, orchards and disruption of the rural character. Mitigation through planting of cutting slopes would help soften the proposed Scheme over time although they would not replace the orchards.
- 7.7.147. At Construction, the magnitude of this change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.148. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Black 1: Summary of Potentially Significant Landscape Character effects on LCT 7.15

- 7.7.149. This character area is a secluded, pastoral landscape characterised by a regular pattern of hedged fields and ditches fringed by lines of willow and alder. It has a sensitivity of High.
- 7.7.150. The Black 1 route option crosses through the character area towards its eastern extent, causing severance of the character area and wetland and the rural character of the Yazor Brook. The current design shows the Yazor Brook being culverted underneath Black 1 route, disrupting its wetland character. The route option would add more hard surfacing, artificial lighting and traffic across a section of the character area and resulting in fragmentation of the character area to the east of the proposed route alignment. It is therefore likely to alter the perception of this character area in localised views. Limited mitigation is possible within the flood plain, although planting on cutting slopes would provide some screening of vehicle movement over time.
- 7.7.151. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.152. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Moderate/slight and adverse at Year 0 and Moderate and adverse at Year 15.

Black 1: Summary of Potentially Significant Landscape Character effects on LCT 7.21

- 7.7.153. A domestic character containing a rich patchwork of land uses including traditional orchards and mixed farming of pasture and arable fields as well as variety of settlements. Tree cover is generally limited to thinly scattered hedgerows. This route option element extends from Green Lane (Bridleway BT4) to Burghill hospital. It has a sensitivity of Moderate.
- 7.7.154. The route option is in slight cutting and then on a slight embankment towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade, where a further roundabout is located with associated lighting columns/ signalisation. The route then rises up on embankment to enable Tillington Road to pass beneath it via an underpass. The route then remains on embankment before going into cutting beneath Canon Pyon Road. Canon Pyon Road rises up on small embankments to cross via an overpass.
- 7.7.155. The Black 1 route mainly passes through open agricultural fields. Green Lane (Bridleway BT4) and Breinton bridleway 3 directly crosses the proposed route alignment, as does Burghill footpath 11. The route option also crosses the southern section of the Burghill Hospital Unregistered Park and Garden.
- 7.7.156. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is uncharacteristic of this part of the landscape resulting in some discordance with the wider character of the landscape. The location of part of the route adjacent to existing commercial activities north of Kings Acre Road reduces the visual discordance of the option within the adjoining landscape.
- 7.7.157. Black 1 route will bisect several hedgerows, some containing important trees. It will also cross through a large section of Drovers Wood, a Woodland Trust community woodland purchased in the 1980s. The woodland would become fragmented and considerably reduced in size, resulting in loss of tree cover, including potential loss of some important trees.
- 7.7.158. The character of Burghill hospital Unregistered Park and Garden would be eroded due to loss of parkland, permanently reducing the size of the remaining historic parkland. The route option would visually detract from the quality of this area.
- 7.7.159. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway and loss of tree cover would be perceivable in localised views. Effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape, the exception being around Burghill Hospital and around Upper Hill Farm.
- 7.7.160. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the proposed Scheme and provide some integration into the landscape over time.
- 7.7.161. At Construction, the magnitude of change is considered overall to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.162. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Black 2: Summary of Potentially Significant Landscape Character effects on LCT 7.10

- 7.7.163. The key element of LCT 7.10 is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses. The character area extends from north of Warham Farm to Green Lane (Bridleway BT4) . It has a sensitivity of High.
- 7.7.164. The route option at this point is in cutting, with Green Lane (Bridleway BT4) crossing above it via an overpass largely at grade. Whilst the earthworks would not be extensive, the size and scale of the option is still uncharacteristic of this character area, cutting a linear track north-south through the local landscape. The Black 2 route would result in the loss of scattered trees, including several individual trees protected by a TPO. It would also result in the loss of a very small area of Traditional Orchard due to the re-grading of a lane to form an overbridge as well as loss of part a large part of the recently planted heritage orchards (created by the Pippin Trust) at Upper Hill Farm.
- 7.7.165. The character of the landscape would therefore be eroded through loss of trees, characteristic orchards and disruption of the rural character. Mitigation through planting of cutting slopes would help soften the proposed Scheme over time.
- 7.7.166. At Construction, the magnitude of this change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.167. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Black 2: Summary of Potentially Significant Landscape Character effects on LCT 7.15

- 7.7.168. This character area is a secluded, pastoral landscape characterised by a regular pattern of hedged fields and ditches fringed by lines of willow and alder. It has a sensitivity of High.
- 7.7.169. The Black 2 route option crosses through the character area towards its eastern extent, causing severance of the character area and wetland and the rural character of the Yazor Brook. The current design shows the Yazor Brook being culverted underneath Black 2 route, disrupting its wetland character. The route option would add more hard surfacing, artificial lighting and traffic across a section of the character area and resulting in fragmentation of the character area to the east of the proposed route alignment. It is therefore likely to alter the perception of this character area in localised views. Limited mitigation is possible within the flood plain, although planting on cutting slopes would provide some screening of vehicle movement over time.
- 7.7.170. At Construction, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.171. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Moderate/slight and adverse at Year 0 and Moderate and adverse at Year 15.

Black 2: Summary of Potentially Significant Landscape Character effects on LCT 7.21

- 7.7.172. A domestic character containing a rich patchwork of land uses including traditional orchards and mixed farming of pasture and arable fields as well as variety of settlements. Tree cover is generally limited to thinly scattered hedgerows. This route option element extends from Green Lane (Bridleway BT4) to Burghill hospital. It has a sensitivity of Moderate.
- 7.7.173. The route option is in slight cutting and then on a slight embankment towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade, where a further roundabout is located with associated lighting columns/ signalisation. The route then rises up on embankment to enable Tillington Road to pass beneath it via an underpass. The route then remains on embankment before going into cutting beneath Canon Pyon Road. Canon Pyon Road rises up on small embankments to cross via an overpass.
- 7.7.174. The Black 2 route mainly passes through open agricultural fields. Green Lane (Bridleway BT4) and Breinton bridleway 3 directly crosses the proposed route alignment, as does Burghill footpath 11. The route option also crosses the southern section of the Burghill Hospital Unregistered Park and Garden.
- 7.7.175. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is uncharacteristic of this part of the landscape resulting in some discordance with the wider character of the landscape. The location of part of the route adjacent to existing commercial activities north of Kings Acre Road reduces the visual discordance of the option within the adjoining landscape.

- 7.7.176. The Black 2 route will also cross through a large section of Drovers Wood, a Woodland Trust community woodland purchased in the 1980s. The woodland would become fragmented and considerably reduced in size, resulting in loss of tree cover.
- 7.7.177. The character of Burghill Hospital Unregistered Park and Garden would be eroded due to loss of parkland, permanently reducing the size of the remaining historic parkland. The route option would visually detract from the quality of this area.
- 7.7.178. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway and loss of tree cover would be perceivable in localised views. Effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape, the exception being around Burghill Hospital and around Upper Hill Farm.
- 7.7.179. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the proposed Scheme and provide some integration into the landscape over time.
- 7.7.180. At Construction, the magnitude of change is considered overall to be Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.181. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

LANDSCAPE EFFECTS – ELEMENT 3

All Route Options: Summary of Potentially Significant Landscape Character effects on LCT 7.21

- 7.7.182. A domestic character containing a rich patchwork of land uses including traditional orchards and mixed farming of pasture and arable fields as well as variety of settlements. Tree cover is generally limited to thinly scattered hedgerows. This route option element extends from Green Lane (Bridleway BT4) to Burghill hospital. It has a sensitivity of Moderate.
- 7.7.183. The route options are largely on embankment before going into cutting to join at grade with the A49 via a roundabout. The route options cross agricultural fields as well as Pipe and Lyde footpath 9 and would cause fragmentation of the field patterns in the local landscape.
- 7.7.184. Overall this is a large and expansive character area, of which the route options would be a relatively contained area. It would create the presence of a new highway, but effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape.
- 7.7.185. Mitigation planting on earthworks and appropriate roadside vegetation would help to soften the proposed Scheme over time whilst consideration of embankment profiling would help provide some integration of the proposed Scheme into the landscape.
- 7.7.186. At Construction, the magnitude of change is considered overall to be Minor resulting in a significance of effect of Slight and adverse.
- 7.7.187. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and Slight and adverse at Year 15.

VISUAL EFFECTS – ELEMENT 1

Orange

Viewpoint 1 - Wye Valley Walk view west

- 7.7.188. The proposed route option would cross the River Wye on a bridge structure and is likely to be visible in glimpsed views along the river corridor. Some screening from foreground/ middle distance trees would limit visibility in summer but traffic and any lighting would be discernible in the middle distance. Construction activities would add uncharacteristic elements into the view, altering the nature of the rural views. The bridge crossing is not readily mitigated and some loss of tree canopies may be discernible in the wider landscape.
- 7.7.189. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.190. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 2: View north east from PRow bottom of garden of property near Dunan

- 7.7.191. The proposed route option would commence beyond the cottages in the middle distance and sweep away from the view. Screening from foreground/ middle distance trees would limit visibility in summer but traffic and any lighting would still be discernible. Construction activities would be noticeable and detract from the character of the view. Mitigation planting over time would provide some screening and softening of harsh engineering solutions.
- 7.7.192. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate/ Large and adverse.
- 7.7.193. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate/ Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 3: View south east from entrance to Belmont Hotel

- 7.7.194. The route would be clearly visible in the centre of the view in the middle distance, below the tower, detracting from its setting and adding urbanising elements into the view. The construction activities would be clearly visible. There is opportunity for mitigation planting.
- 7.7.195. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.196. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 4: View north east from St Michaels Belmont Abbey churchyard

- 7.7.197. The route would cut through the centre of the view, beyond the graveyard. It would be clearly visible and audible, adding a highly detracting and uncharacteristic feature into the view. Construction activities will be highly visible in short distance views, altering the tranquillity and character of the view and the setting of the graveyard. Some opportunity for mitigation planting and/ or acoustic bunding / barriers on cutting slopes. Over time, tops of trees would help provide some screening.
- 7.7.198. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.
- 7.7.199. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 5: View west from edge of Belmont Housing

- 7.7.200. This route would cut through the centre of the view, albeit behind foreground groups of trees. Despite being in cutting at this point, it would add a significant detracting and uncharacteristic element into the view, disrupting the tranquil parkland character. Construction impacts would be greater, with increased disturbance. Loss of trees and hedgerows would be noticeable. Some opportunity for mitigation planting in a well-treed landscape.
- 7.7.201. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.202. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 6a: View west from edge of Belmont Housing

- 7.7.203. Whilst the wooded structure would be largely retained, along with foreground bankside vegetation, the open span of the river would result in construction activities being highly visible in the middle distance, fundamentally altering the nature of the tranquil rural views. Loss of woodland may also be perceptible with a change in tree canopies to accommodate the route option. The route would be in cutting either side of the river, but the bridge spanning the water would be clearly visible in localised views. Whilst there is some scope for mitigation planting, the bridge across the river would remain visible, along with traffic and any lighting along this section.
- 7.7.204. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.205. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 6b: View east from PRow junction Wye Valley Walk

- 7.7.206. The construction activities would completely dominate the view, the openness of which would allow clear, wide views of the bridge works and earthworks. The activities would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The road would pass through the woodland within cutting but would span the river via a bridge. The wide flood plain at this point and curve of the river would increase visibility, extending views some way along the river corridor. However, the surrounding woodland and awareness of traffic would be relatively localised to the crossing point. The sense of seclusion and tranquillity would be substantially reduced although woodland associated with the cutting slopes would, over time, reduce the harshness associated with the engineered solutions. However, the bridge structure would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.207. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.208. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.209. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.210. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight/Moderate and adverse.
- 7.7.211. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and Slight and adverse at Year 15.

Cyan and Yellow

Viewpoint 1: Wye Valley Walk view west

- 7.7.212. The proposed route options would cross the River Wye on a bridge structure and is likely to be visible in glimpsed views along the river corridor. Some screening from foreground/ middle distance trees would limit visibility in summer but traffic and any lighting would be discernible in the middle distance. Construction activities would add uncharacteristic elements into the view, altering the nature of the rural views. The bridge crossing is not readily mitigated and some loss of tree canopies may be discernible in the wider landscape.
- 7.7.213. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.214. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 2: Wye Valley Walk view west View north east from PRow bottom of garden of property near Dunan

- 7.7.215. The proposed route options would commence beyond the cottages in the middle distance and sweep away from the view. Screening from foreground/ middle distance trees would limit visibility in summer but traffic and any lighting would still be discernible. Construction activities would be noticeable and detract from the character of the view. Mitigation planting over time would provide some screening and softening of harsh engineering solutions.
- 7.7.216. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate/ Large and adverse.
- 7.7.217. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate/ Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 3: View south east from entrance to Belmont Hotel

- 7.7.218. The route would be clearly visible in the centre of the view in the middle distance, below the tower, detracting from its setting and adding urbanising elements into the view. The construction activities would be clearly visible. There is opportunity for mitigation planting.

- 7.7.219. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.220. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 4: View north east from St Michaels Belmont Abbey churchyard

- 7.7.221. The proposed route would cut through the centre of the view, beyond the graveyard. It would be clearly visible and audible, adding a highly detracting and uncharacteristic feature into the view. Construction activities would be highly visible in short distance views, altering the tranquillity and character of the view and the setting of the graveyard. Some opportunity for mitigation planting and/ or acoustic bunding / barriers on cutting slopes. Over time, tops of trees would help provide some screening.
- 7.7.222. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.
- 7.7.223. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 5: View west from edge of Belmont Housing

- 7.7.224. This route would cut through the centre of the view, albeit behind foreground groups of trees. Despite being in cutting at this point, it would add a significant detracting and uncharacteristic element into the view, disrupting the tranquil parkland character. Construction impacts would be greater, with increased disturbance. Loss of trees and hedgerows would be noticeable. Some opportunity for mitigation planting in a well-treed landscape.
- 7.7.225. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.226. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 6a: View west from edge of Belmont Housing

- 7.7.227. Whilst the wooded structure would be largely retained, along with foreground bankside vegetation, the open span of the river would result in construction activities being highly visible in the middle distance, fundamentally altering the nature of the tranquil rural views. Loss of woodland may also be perceptible with a change in tree canopies to accommodate the Proposed Scheme. The route would be in cutting either side of the river, but the bridge spanning the water would be clearly visible in localised views. Whilst there is some scope for mitigation planting, the bridge across the river would remain visible, along with traffic and any lighting along this section.
- 7.7.228. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.229. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 6b: View east from PRow junction Wye Valley Walk

- 7.7.230. The construction activities would completely dominate the view, the openness of which would allow clear, wide views of the bridge works and earthworks. The activities would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The road would pass through the woodland within cutting but would span the river via a bridge. The wide flood plain at this point and curve of the river would increase visibility, extending views some way along the river corridor. However, the surrounding woodland and awareness of traffic would be relatively localised to the crossing point. The sense of seclusion and tranquillity would be substantially reduced although woodland associated with the cutting slopes would, over time, reduce the harshness associated with the engineered solutions. However, the bridge structure would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.231. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.232. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.233. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.234. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight/Moderate and adverse.
- 7.7.235. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and Slight and adverse at Year 15.

Red and Black 2

Viewpoint 1: Wye Valley Walk view west

- 7.7.236. The proposed route options would cross the River Wye on a bridge structure and is likely to be visible in glimpsed views along the river corridor. Some screening from foreground/ middle distance trees would limit visibility in summer but traffic and any lighting would be discernible in the middle distance. Construction activities would add uncharacteristic elements into the view, altering the nature of the rural views. The bridge crossing is not readily mitigated and some loss of tree canopies may be discernible in the wider landscape.
- 7.7.237. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.238. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 2: View north east from PROW bottom of garden of property near Dunan

- 7.7.239. The proposed route options would commence beyond the cottages and cut across the view, with only partial screening from foreground/ middle distance trees in summer. Traffic and lighting would be clearly visible in the centre of the view and construction activities would be highly visible. Mitigation planting over time would provide some screening and softening of harsh engineering solutions.
- 7.7.240. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.241. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at year 15 a magnitude of change of Moderate with a significance of effect of Moderate and adverse at Year 15.

Viewpoint 3: View south east from entrance to Belmont Hotel

- 7.7.242. The routes would be clearly visible across the centre foreground of the view, detracting from the setting of the tower and adding urbanising elements into the foreground of the view. The proposed route options would disrupt the parkland character and add an uncharacteristic element.
- 7.7.243. Construction activities would be highly visible in short range views where the works would dominate and significantly detract from the existing character of the view. There is the opportunity for mitigation screen planting, although views towards the tower may be lost.
- 7.7.244. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.
- 7.7.245. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 4: View north east from St Michaels Belmont Abbey churchyard

- 7.7.246. The proposed routes would cut through the centre of the view, beyond the graveyard. It would be clearly visible and audible, adding a highly detracting and uncharacteristic feature into the view. Construction activities would be highly visible in short distance views, altering the tranquillity and character of the view and the setting of the graveyard. Some opportunity for mitigation planting and/ or acoustic bunding / barriers on cutting slopes. Over time, tops of trees would help provide some screening.
- 7.7.247. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.

- 7.7.248. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 5: View west from edge of Belmont Housing

- 7.7.249. This route would cut through the centre of the view, albeit behind foreground groups of trees. Despite being in cutting at this point, it would add a significant detracting and uncharacteristic element into the view, disrupting the tranquil parkland character. Construction impacts would be greater, with increased disturbance. Loss of trees and hedgerows would be noticeable. Some opportunity for mitigation planting in a well-treed landscape.
- 7.7.250. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.251. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Red and Black 2 Options Visual effects on Viewpoint 6a: View west from edge of Belmont Housing

- 7.7.252. Whilst the wooded structure would be largely retained, along with foreground bankside vegetation, the open span of the river would result in construction activities being highly visible in the middle distance, fundamentally altering the nature of the tranquil rural views. Loss of woodland may also be perceptible with a change in tree canopies to accommodate the Proposed Scheme. The route would be in cutting either side of the river, but the bridge spanning the water would be clearly visible in localised views. Whilst there is some scope for mitigation planting, the bridge across the river would remain visible, along with traffic and any lighting along this section
- 7.7.253. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.254. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 6b: View east from PRow junction Wye Valley Walk

- 7.7.255. The construction activities would completely dominate the view, the openness of which will allow clear, wide views of the bridge works and earthworks. They would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The road would pass through the woodland within cutting but would span the river via a bridge. The wide flood plain at this point and curve of the river would increase visibility, extending views some way along the river corridor. However, the surrounding woodland and awareness of traffic would be relatively localised to the crossing point. The sense of seclusion and tranquillity would be substantially reduced although woodland associated with the cutting slopes would, over time, reduce the harshness associated with the engineered solutions. However, the bridge structure would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.256. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.257. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.258. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.259. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight/Moderate and adverse.
- 7.7.260. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Slight and adverse.

Olive and Black 1

Viewpoint 1: Wye Valley Walk view west

- 7.7.261. These route options would be more distant from the viewpoints and partially screened by natural bends in the river. The banks contain areas of well wooded slopes and vegetation, providing screening from longer distance views in summer. The construction activities are likely to be discernible due to earthworks and bridge construction across a stretch of open water. Mitigation is limited across the river and loss of tree canopies may be discernible in the wider landscape.
- 7.7.262. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate/ Large and adverse.
- 7.7.263. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate/ Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 2: View north east from PRow bottom of garden of property near Dunan

- 7.7.264. The route options would commence beyond the cottages and cut across the view, with only partial screening from foreground/ middle distance trees in summer. Traffic and lighting would be clearly visible in the centre of the view and construction activities would be highly visible. Mitigation planting over time would provide some screening and softening of harsh engineering solutions.
- 7.7.265. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.266. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 3: View south east from entrance to Belmont Hotel

- 7.7.267. The routes would be clearly visible in the centre of the view in the foreground, detracting from the setting of the tower and adding urbanising elements into the foreground of the view. The route options would significantly disrupt the parkland character and add an uncharacteristic element into the view. Construction activities would be highly visible in short range views where the works would dominate and significantly detract from the existing character of the view. There is the opportunity for mitigation screen planting, although views towards the tower may be lost.
- 7.7.268. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.
- 7.7.269. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 4: View north east from St Michaels Belmont Abbey churchyard

- 7.7.270. The route options, whilst more distant than the other options, would still be readily discernible in the landscape, cutting across currently open fields. The tranquillity and rural character of the view, as well as the setting of the graveyard would be altered. Construction activities would be visible in short distance views, altering the tranquillity and character of the view and the setting of the graveyard. Some opportunity for mitigation planting and/ or acoustic barriers on cutting slopes.
- 7.7.271. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.272. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 5: View west from edge of Belmont Housing

- 7.7.273. This routes would cut through the centre of the view, albeit behind foreground groups of trees. Despite being in cutting at this point, it would add a significant detracting and uncharacteristic element into the view, disrupting the tranquil parkland character. Construction impacts would be greater, with increased disturbance. Loss of trees and hedgerows would be noticeable. Some opportunity for mitigation planting in a well-treed landscape.
- 7.7.274. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.

- 7.7.275. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 6a: View west from edge of Belmont Housing

- 7.7.276. The positioning of these route options would bring the construction activities into much shorter distance views, and together with the awareness of the works in the wider woodlands, they would dominate and fundamentally alter the nature of the existing contained views and sense of tranquillity. The road would pass through the woodland within cutting but would span the river by a bridge. As a result, awareness of traffic would be localised to the crossing point, but beyond these views there is likely to be awareness of the loss of associated woodland. The sense of seclusion and tranquillity would be significantly reduced although woodland associated with the cutting slopes would, over time, reduce the harshness associated with the engineered solutions, replacing elements of woodland removed and increasing the sense of local-level impacts associated with the crossing of the corridor by the footpath.
- 7.7.277. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.
- 7.7.278. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 6c: View west towards footpath junction Wye Valley Walk

- 7.7.279. The construction activities would be clearly visible in short-range views, and together with the awareness of the works in the wider woodlands, they would dominate and fundamentally alter the nature of the existing contained views and sense of tranquillity. The road would pass through the woodland within cutting but would span the river by a bridge. As a result, awareness of traffic would be localised to the crossing point, but beyond these views there is likely to be awareness of the loss of associated woodland. The sense of seclusion and tranquillity would be significantly reduced although woodland associated with the cutting slopes would, over time, reduce the harshness associated with the engineered solutions, replacing elements of woodland removed and increasing the sense of local-level impacts associated with the crossing of the corridor by the footpath.
- 7.7.280. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.
- 7.7.281. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.282. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.283. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight/Moderate and adverse.
- 7.7.284. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Slight and adverse at Year 15.

VISUAL EFFECTS – ELEMENT 2

Orange

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.285. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.286. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.

- 7.7.287. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and Slight and adverse at Year 15.

Viewpoint 10b: View south east into field south of Bay Horse

- 7.7.288. Construction activities would be visible across mid-range views and would significantly alter the nature of the rural view. The proposed alignment would be in cutting for much of the view, emerging at grade/ slight embankment to join Kings Acre Road. Green Lane (Bridleway BT4) and adjoining Breinton bridleway 3 would bridge over the top in the mid-distance adding further elements into the view. Minor loss of trees and hedgerows would be discernible and further diminish the quality of the view. Mitigation planting on slope cuttings and along the route option would partially, over time, reduce the dominance of the traffic in the view.

- 7.7.289. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.

- 7.7.290. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Large and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 11: View south west from PRow behind Kings Court Housing

- 7.7.291. The route option would be on a slight embankment after emerging from cutting below Green Lane (Bridleway BT4) . Construction activities would dominate the foreground of the view and fundamentally alter the character and tranquillity of the view. The flat, open landscape would further emphasise the uncharacteristic noise, colour, and visual intrusion of the construction activities and traffic would be clearly visible on the raised sections of road. Planting alongside the route option would over time soften the harshness of the route option and provide some screening of traffic, but in turn this screening would contribute to a loss of the extended view across countryside and a rural landscape.

- 7.7.292. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very large and adverse.

- 7.7.293. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 12: View west from PRow at edge of housing in White Cross

- 7.7.294. The view is representative of views from residential properties in White Cross and users of the PRow network (Green Lane – Bridleway BT4). A wide, expansive long distance view looking across a large arable field towards distant rolling hills. Orchards are visible in the middle distance, along with housing estates, hedgerows and scattered trees. The view is largely a rural one with limited detracting features.

- 7.7.295. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.

- 7.7.296. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 14: View northwest from junction of PRow Yazor Brook south of Bovingdon housing

- 7.7.297. Construction activities would be just visible across part of the middle distance of the field of view, slightly altering the nature of the rural view. The proposed alignment would be largely at grade or on slight embankment although much of the hedge line would remain. Some slight loss of hedgerow, scattered trees and vegetation might slightly diminish the quality of the view. Mitigation planting along the route corridor would reduce visual effects of the route corridor in the view.

- 7.7.298. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.

- 7.7.299. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Viewpoint 15: View east from PRow near Priory Hotel

- 7.7.300. The route option would be largely screened by intervening hedgerows, scattered trees and occasional built form, but construction activities in winter may be discernible in the far distance. The construction works would

add uncharacteristic elements into the more distant view, including noise, colour and activity incongruent with the rural view.

- 7.7.301. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.302. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Viewpoint 16: View east from PRow entrance to Livestock Market

- 7.7.303. The construction activities would be visible in the middle to far distance field of view, particularly to the right of the view where the existing openness will allow views towards the earthworks and road construction. Screening from intervening trees and hedgerows would, even in winter, provide some softening of the construction activities and traffic at operation, although both would be clearly discernible and slightly alter the nature of the existing rural views and level of relative tranquillity. Mitigation planting over time would fill in any potential gaps in the canopy and restore some of the existing hedgelines.
- 7.7.304. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.305. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

Viewpoint 17: View south west from gateway PRow Tillington Road

- 7.7.306. The route option would be partially in cutting at this point, with Tillington Road on slight embankment over. Whilst the local topography would provide some screening in the foreground at this point, the construction activities would still be clearly visible in the view, adding uncharacteristic noise, colour and activity into the rural view, substantially altering its character. At operation, the tops of vehicles are likely to be readily discernible beyond the foreground topography and on lower ground in the middle distance although mitigation planting on earthworks and along the route option may provide some screening, albeit at the expense of longer-distance views.
- 7.7.307. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.308. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 18: View south west from gateway PRow Tillington Road

- 7.7.309. The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route option and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.310. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.311. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Large and adverse.

Viewpoint 20: View south west from gateway PRow Tillington Road

- 7.7.312. The construction activities would be visible in longer distance views, particularly the earthworks and bridges for Tillington Road and Canon Pyon Road bridge. The rural nature of the view would be altered, along with the sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible, although the potential for mitigation planting on earthworks would, over time, add tree canopies into the view and provide some screening, as well as softening the harshness associated with the engineered solutions.

- 7.7.313. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.314. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Cyan

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.315. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.316. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.
- 7.7.317. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and Slight and adverse at Year 15.

Viewpoint 10b: View south east into field south of Bay Horse

- 7.7.318. Construction activities would be highly visible across the foreground of the field of view and would fundamentally alter the nature of the rural view. The proposed alignment would be in cutting for much of the view, with Green Lane (Bridleway BT4) bridging over the top in the mid-distance. However, the proximity of the viewpoint to the route option would provide clear views across and into the cutting, and particularly where it emerges at grade to join Kings Acre Road. Loss of housing and scattered trees would further diminish the quality of the view. Mitigation planting on slope cuttings and along the route option would partially, over time, reduce the dominance of the traffic in the view.
- 7.7.319. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.
- 7.7.320. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large at Year 15.

Viewpoint 11: View south west from PRoW behind Kings Court Housing

- 7.7.321. The proposed route option would be on a slight embankment after emerging from cutting below Green Lane (Bridleway BT4). Construction activities would dominate the foreground of the view and fundamentally alter the character and tranquillity of the view. The flat, open landscape would further emphasise the uncharacteristic noise, colour, and visual intrusion of the construction activities and traffic would be clearly visible on the raised sections of road. Planting alongside the route option would over time soften the harshness of the route option and provide some screening of traffic, but in turn this screening would contribute to a loss of the extended view across countryside and a rural landscape.
- 7.7.322. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very large and adverse.
- 7.7.323. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very large and adverse at Year 0 and large and adverse at Year 15.

Viewpoint 12: View west from PRoW at edge of housing in White Cross

- 7.7.324. The view is representative of views from residential properties in White Cross and users of the PRoW network (Green Lane - Bridleway BT4). A wide, expansive long distance view looking across a large arable field towards distant rolling hills. Orchards are visible in the middle distance, along with housing estates, hedgerows and scattered trees. The view is largely a rural one with limited detracting features.
- 7.7.325. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.326. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 15: View east from PRow near Priory Hotel

- 7.7.327. The route option would be largely screened in the view by intervening hedgerows, scattered trees and occasional built form, but construction activities in winter would be discernible in the middle distance. The construction works would add uncharacteristic elements into the view, including noise, colours and activity incongruent with the rural view.
- 7.7.328. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.329. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and Slight and adverse at Year 15.

Viewpoint 16: View east from PRow entrance to Livestock Market

- 7.7.330. The construction activities would be highly visible in the middle range field of view, particularly to the right of the view where the existing openness will allow clear, wide views of the earthworks and road construction. Whilst some screening would be obtained from intervening trees and hedgerows, in winter, the construction activities and traffic at operation would be distinctive and alter the nature of the existing rural views and level of relative tranquillity. Mitigation planting over time would reduce the harshness associated with the engineered solutions.
- 7.7.331. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.332. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 17: View south west from gateway PRow Tillington Road

- 7.7.333. The construction activities would completely dominate the view, the openness of which will allow clear, wide views of the bridge works over Tillington Road and accompanying earthworks. All longer distance views would be lost. The construction activities would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The proposed route option would span the existing Tillington Road via embankment and bridge, blocking views beyond. The sense of openness and tranquillity would be lost. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions but could not mitigate loss of openness and long-distance views. The bridge structure and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.334. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.335. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Major resulting in a significance of effect of Large and adverse.

Viewpoint 18: View south west from gateway PRow Tillington Road

- 7.7.336. The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route option and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.337. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.338. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Large and adverse.

Viewpoint 20: View south west from gateway PRoW Tillington Road

- 7.7.339. The construction activities would be visible in longer distance views, particularly the earthworks and bridges for Tillington Road and Canon Pyon Road bridge. The rural nature of the view would be altered, along with the sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible, although the potential for mitigation planting on earthworks would, over time, add tree canopies into the view and provide some screening, as well as softening the harshness associated with the engineered solutions.
- 7.7.340. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.341. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Yellow

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.342. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.343. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.
- 7.7.344. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and Slight and adverse at Year 15.

Viewpoint 10b: View south east into field south of Bay Horse

- 7.7.345. Construction activities would be visible across mid-range views and would significantly alter the nature of the rural view. The proposed alignment would be in cutting for much of the view, emerging at grade/ slight embankment to join Kings Acre Road. Green Lane (Bridleway BT4) and adjoining Breinton bridleway 3 would bridge over the top in the mid-distance adding further elements into the view. Minor loss of trees and hedgerows would be discernible and further diminish the quality of the view. Mitigation planting on slope cuttings and along the route option would partially, over time, reduce the dominance of the traffic in the view.
- 7.7.346. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.347. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Large and adverse at Year 0 and moderate and adverse at Year 15.

Viewpoint 11: View south west from PRoW behind Kings Court Housing

- 7.7.348. The proposed route option would be on a slight embankment after emerging from cutting below Green Lane (Bridleway BT4). Construction activities would dominate the foreground of the view and fundamentally alter the character and tranquillity of the view. The flat, open landscape would further emphasise the uncharacteristic noise, colour, and visual intrusion of the construction activities and traffic would be clearly visible on the raised sections of road. Planting alongside the route option would over time soften the harshness of the route option and provide some screening of traffic, but in turn this screening would contribute to a loss of the extended view across countryside and a rural landscape.
- 7.7.349. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very large and adverse.
- 7.7.350. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very large and adverse at Year 0 and large and adverse at Year 15.

Viewpoint 12: View west from PRoW at edge of housing in White Cross

- 7.7.351. The view is representative of views from residential properties in White Cross and users of the PRoW network (Green Lane - Bridleway BT4). A wide, expansive long distance view looking across a large arable field towards distant rolling hills. Orchards are visible in the middle distance, along with housing estates, hedgerows and scattered trees. The view is largely a rural one with limited detracting features.

7.7.352. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.

7.7.353. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 14: View northwest from junction of PRow Yazor Brook south of Bovingdon housing

7.7.354. Construction activities would be highly visible across part of the foreground and middle distance of the field of view and would substantially alter the nature of the rural view. The proposed alignment would be largely at grade or on slight embankment within the view, cutting through the hedgeline and across behind the mobile homes. The proximity of the viewpoint to the route option would provide clear views of the construction works and at operation. Loss of hedgeline, scattered trees and vegetation would further diminish the quality of the view. Mitigation planting along the route option would partially, over time, reduce the dominance of the traffic in the view.

7.7.355. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.

7.7.356. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 15: View east from PRow near Priory Hotel

7.7.357. The route option would be largely screened by intervening hedgerows, scattered trees and occasional built form, but construction activities in winter may be discernible in the far distance. The construction works would add uncharacteristic elements into the more distant view, including noise, colour and activity incongruent with the rural view.

7.7.358. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.

7.7.359. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Viewpoint 16: View east from PRow entrance to Livestock Market

7.7.360. The construction activities would be visible in the middle to far distance field of view, particularly to the right of the view where the existing openness will allow views towards the earthworks and road construction. Screening from intervening trees and hedgerows would, even in winter, provide some softening of the construction activities and traffic at operation, although both would be clearly discernible and slightly alter the nature of the existing rural views and level of relative tranquillity. Mitigation planting over time would fill in any potential gaps in the canopy and restore some of the existing hedgelines.

7.7.361. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.

7.7.362. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

Viewpoint 17: View south west from gateway PRow Tillington Road

7.7.363. The route option would be partially in cutting at this point, with Tillington Road on slight embankment over. Whilst the local topography would provide some screening in the foreground at this point, the construction activities would still be clearly visible in the view, adding uncharacteristic noise, colour and activity into the rural view, substantially altering its character. At operation, the tops of vehicles are likely to be readily discernible beyond the foreground topography and on lower ground in the middle distance although mitigation planting on earthworks and along the route option may provide some screening, albeit at the expense of longer-distance views.

7.7.364. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.

- 7.7.365. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 18: View south west from gateway PRow Tillington Road

- 7.7.366. The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route option and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.367. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.368. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Large and adverse.

Viewpoint 20: View south west from gateway PRow Tillington Road

- 7.7.369. The construction activities would be visible in longer distance views, particularly the earthworks and bridges for Tillington Road and Canon Pyon Road bridge. The rural nature of the view would be altered, along with the sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible, although the potential for mitigation planting on earthworks would, over time, add tree canopies into the view and provide some screening, as well as softening the harshness associated with the engineered solutions.
- 7.7.370. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.371. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Red

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.372. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.373. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight/Moderate and adverse.
- 7.7.374. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Slight and adverse.

Viewpoint 8: View north east from Green Lane Park Home Estate

- 7.7.375. Glimpses of construction activities would be discernible beyond intervening hedgerows. The road would be in cutting between Kings Acre Rod (A438) and Breinton Road (northern junction) so traffic would be largely obscured from view. With mitigation planting on cutting slopes, the route option would not be readily discernible in the view.
- 7.7.376. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight /Moderate and adverse.
- 7.7.377. At Operation, the magnitude of change is considered to be Negligible resulting in a significance of effect of Slight and adverse at Year 0 and Slight and adverse at Year 15.

Viewpoint 9: View south east from PRow junction Green Lane Wood

- 7.7.378. The route proposal would be largely screened by intervening hedgerow, orchards and trees, but construction activities may be just discernible in winter through loss of woodland and uncharacteristic noise and visual intrusion. Glimpses of the route may become discernible further south along the footpath where woodland is

removed although the route here is in cutting. The proposed alignment would bridge over C1189 (Lower Breinton Road) on embankment and therefore more visible in the wider landscape, before going into cutting. Whilst the route option would be largely screened from view, some awareness of the top of traffic may be visible. There may be a slight loss of trees in the middle distance (Upper Hill Farm).

- 7.7.379. Over time the mitigation planting and existing trees will partially restore the canopy.
- 7.7.380. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.381. At Operation, the magnitude of change is considered to be Negligible resulting in a significance of effect of Slight and adverse at Year 0 and Neutral at Year 15.

Viewpoint 10b: View south east into field south of Bay Horse

- 7.7.382. Construction activities would be highly visible across the foreground of the field of view and would fundamentally alter the nature of the rural view. The proposed alignment would be in cutting for much of the view, with Green Lane (Bridleway BT4) bridging over the top in the mid-distance. However, the proximity of the viewpoint to the route option would provide clear views across and into the cutting, and particularly where it emerges at grade to join Kings Acre Road. Loss of housing and scattered trees would further diminish the quality of the view. Mitigation planting on slope cuttings and along the route option would partially, over time, reduce the dominance of the traffic in the view.
- 7.7.383. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.
- 7.7.384. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large and adverse at Year 15.

Viewpoint 11: View south west from PRow behind Kings Court Housing

- 7.7.385. The proposed route option would be on a slight embankment after emerging from cutting below Green Lane (Bridleway BT4). Construction activities would dominate the mid-level field of view, significantly altering the character and tranquillity of the view. The flat, open landscape would further emphasise the uncharacteristic noise, colour, and visual intrusion of the construction activities and traffic would be clearly visible on the raised sections of road. Planting alongside the route option would over time soften the harshness of the route option and provide some screening of traffic, but would foreshorten the long distance views across the rural landscape.
- 7.7.386. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.387. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 12: View west from PRow at edge of housing in White Cross

- 7.7.388. The construction activities would be visible in glimpsed mid-range views, although the earthworks and machinery will be more visible to the north as the cuttings are created and fewer hedgerows intervene for screening. Despite the suburbanising effect of houses edging the farmland, the view is predominantly a rural one. The construction activities would alter the character of the wider view, and the proposed route would add uncharacteristic movement and materials into the view. Although the route would largely be in cutting, the crossing of the bridleway may be discernible in the distance along with the tops of vehicles. Mitigation planting could reduce the visual prominence of the route option, over time.
- 7.7.389. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.390. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 14: View northwest from junction of PRow Yazor Brook south of Bovingdon housing

- 7.7.391. Construction activities would be highly visible across part of the foreground and middle distance of the field of view and would substantially alter the nature of the rural view. The proposed alignment would be largely at grade or on slight embankment within the view, cutting through the hedgeline and across behind the mobile homes. The proximity of the viewpoint to the route option would provide clear views of the construction works

and at operation. Loss of hedgeline, scattered trees and vegetation would further diminish the quality of the view. Mitigation planting along the route option would partially, over time, reduce the dominance of the traffic in the view.

- 7.7.392. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.393. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 15: View east from PRow near Priory Hotel

- 7.7.394. The route option would be largely screened by intervening hedgerows, scattered trees and occasional built form, but construction activities in winter may be discernible in the far distance. The construction works will add uncharacteristic elements into the more distant view, including noise, colour and activity incongruent with the rural view.
- 7.7.395. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.396. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Viewpoint 16: View east from PRow entrance to Livestock Market

- 7.7.397. The construction activities would be visible in the middle to far distance field of view, particularly to the right of the view where the existing openness would allow views towards the earthworks and road construction. Screening from intervening trees and hedgerows would, even in winter, provide some softening of the construction activities and traffic at operation, although both would be clearly discernible and slightly alter the nature of the existing rural views and level of relative tranquillity. Mitigation planting over time would fill in any potential gaps in the canopy and restore some of the existing hedgelines.
- 7.7.398. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.399. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

Viewpoint 17: View south west from gateway PRow Tillington Road

- 7.7.400. The route option would be partially in cutting at this point, with Tillington Road on slight embankment over. Whilst the local topography would provide some screening in the foreground at this point, the construction activities would still be clearly visible in the view, adding uncharacteristic noise, colour and activity into the rural view, substantially altering its character. At operation, the tops of vehicles are likely to be readily discernible beyond the foreground topography and on lower ground in the middle distance although mitigation planting on earthworks and along the route option may provide some screening, albeit at the expense of longer-distance views.
- 7.7.401. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.402. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 18: View south west from gateway PRow Tillington Road

- 7.7.403. The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route option and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.

- 7.7.404. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.405. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Large and adverse.

Viewpoint 20: View south west from gateway PRoW Tillington Road

- 7.7.406. The construction activities would be visible in longer distance views, particularly the earthworks and bridges for Tillington Road and Canon Pyon Road bridge. The rural nature of the view would be altered, along with the sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible, although the potential for mitigation planting on earthworks would, over time, add tree canopies into the view and provide some screening, as well as softening the harshness associated with the engineered solutions.
- 7.7.407. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.408. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Olive

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.409. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.410. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight/Moderate and adverse.
- 7.7.411. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Slight and adverse.

Viewpoint 8: View north east from Green Lane Park Home Estate

- 7.7.412. Glimpses of construction activities would be discernible beyond intervening hedgerows. The road would be in cutting between Kings Acre Road (A438) and Breinton Road (northern junction) so traffic would be largely obscured from view. With mitigation planting on cutting slopes, the route option would not be readily discernible in the view.
- 7.7.413. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight /Moderate and adverse.
- 7.7.414. At Operation, the magnitude of change is considered to be Negligible resulting in a significance of effect of Slight and adverse at Year 0 and Slight and adverse at Year 15.

Viewpoint 9: View south east from PRoW junction Green Lane Wood

- 7.7.415. The route proposal would be largely screened by intervening hedgerow, orchards and trees, but construction activities may be just discernible in winter through loss of woodland and uncharacteristic noise and visual intrusion. Glimpses of the route may become discernible further south along the footpath where woodland is removed although the route here is in cutting. The proposed alignment would bridge over C1189 (Lower Breinton Road) on embankment and therefore more visible in the wider landscape, before going into cutting. Whilst the route option would be largely screened from view, some awareness of the top of traffic may be visible. There may be a slight loss of trees in the middle distance (Upper Hill Farm).
- 7.7.416. Over time the mitigation planting and existing trees will partially restore the canopy.
- 7.7.417. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.418. At Operation, the magnitude of change is considered to be Negligible resulting in a significance of effect of Slight and adverse at Year 0 and Neutral at Year 15.

Viewpoint 10b: View south east into field south of Bay Horse

- 7.7.419. Construction activities would be highly visible across the foreground of the field of view and would fundamentally alter the nature of the rural view. The proposed alignment would be in cutting for much of the view, with Green Lane (Bridleway BT4) bridging over the top in the mid-distance. However, the proximity of the viewpoint to the route option would provide clear views across and into the cutting, and particularly where it emerges at grade to join Kings Acre Road. Loss of housing and scattered trees would further diminish the quality of the view. Mitigation planting on slope cuttings and along the route option would partially, over time, reduce the dominance of the traffic in the view.
- 7.7.420. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Very Large and adverse.
- 7.7.421. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Very Large and adverse at Year 0 and Large at Year 15.

Viewpoint 11: View south west from PRow behind Kings Court Housing

- 7.7.422. The proposed route option would be on a slight embankment after emerging from cutting below Green Lane (Bridleway BT4). Construction activities would dominate the mid-level field of view, significantly altering the character and tranquillity of the view. The flat, open landscape would further emphasise the uncharacteristic noise, colour, and visual intrusion of the construction activities and traffic would be clearly visible on the raised sections of road. Planting alongside the route option would over time soften the harshness of the route option and provide some screening of traffic, but would foreshorten the long distance views across the rural landscape.
- 7.7.423. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.424. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 12: View west from PRow at edge of housing in White Cross

- 7.7.425. The construction activities would be visible in glimpsed mid-range views, although the earthworks and machinery will be more visible to the north as the cuttings are created and fewer hedgerows intervene for screening. Despite the suburbanising effect of houses edging the farmland, the view is predominantly a rural one. The construction activities would alter the character of the wider view, and the proposed route would add uncharacteristic movement and materials into the view. Although the route would largely be in cutting, the crossing of the bridleway may be discernible in the distance along with the tops of vehicles. Mitigation planting could reduce the visual prominence of the route option, over time.
- 7.7.426. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.427. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and Moderate and adverse at Year 15.

Viewpoint 14: View northwest from junction of PRow Yazor Brook south of Bovingdon housing

- 7.7.428. Construction activities would be highly visible across part of the foreground and middle distance of the field of view and would substantially alter the nature of the rural view. The proposed alignment would be largely at grade or on slight embankment within the view, cutting through the hedgeline and across behind the mobile homes. The proximity of the viewpoint to the route option would provide clear views of the construction works and at operation. Loss of hedgeline, scattered trees and vegetation would further diminish the quality of the view. Mitigation planting along the route option would partially, over time, reduce the dominance of the traffic in the view.
- 7.7.429. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.430. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 15: View east from PRow near Priory Hotel

- 7.7.431. The route option would be largely screened by intervening hedgerows, scattered trees and occasional built form, but construction activities in winter may be discernible in the far distance. The construction works will add uncharacteristic elements into the more distant view, including noise, colour and activity incongruent with the rural view.
- 7.7.432. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.433. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Viewpoint 16: View east from PRow entrance to Livestock Market

- 7.7.434. The construction activities would be visible in the middle to far distance field of view, particularly to the right of the view where the existing openness would allow views towards the earthworks and road construction. Screening from intervening trees and hedgerows would, even in winter, provide some softening of the construction activities and traffic at operation, although both would be clearly discernible and slightly alter the nature of the existing rural views and level of relative tranquillity. Mitigation planting over time would fill in any potential gaps in the canopy and restore some of the existing hedgelines.
- 7.7.435. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.436. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

Viewpoint 17: View south west from gateway PRow Tillington Road

- 7.7.437. The route option would be partially in cutting at this point, with Tillington Road on slight embankment over. Whilst the local topography would provide some screening in the foreground at this point, the construction activities would still be clearly visible in the view, adding uncharacteristic noise, colour and activity into the rural view, substantially altering its character. At operation, the tops of vehicles are likely to be readily discernible beyond the foreground topography and on lower ground in the middle distance although mitigation planting on earthworks and along the route option may provide some screening, albeit at the expense of longer-distance views.
- 7.7.438. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.439. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 18: View south west from gateway PRow Tillington Road

- 7.7.440. The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route option and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.441. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.442. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Large and adverse.

Viewpoint 20: View south west from gateway PRow Tillington Road

- 7.7.443. The construction activities would be visible in longer distance views, particularly the earthworks and bridges for Tillington Road and Canon Pyon Road bridge. The rural nature of the view would be altered, along with the

sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible, although the potential for mitigation planting on earthworks would, over time, add tree canopies into the view and provide some screening, as well as softening the harshness associated with the engineered solutions.

- 7.7.444. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.445. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Neutral.

Black 1

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.446. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.447. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight/Moderate and adverse.
- 7.7.448. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Slight and adverse.

Viewpoint 8: View north east from Green Lane Park Home Estate

- 7.7.449. Construction activities would be visible across mid to background views and would alter the nature of the rural view. The proposed option would be predominantly in cutting at this point, largely screening traffic movements, along with screening by Green Lane Wood. Hedgerows associated with the highway boundary would replace or restore existing remnant hedges and help to reduce awareness of the cutting. In association with mitigation planting and pockets of woodland this would largely integrate the option into the view.
- 7.7.450. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.
- 7.7.451. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight / Moderate/ and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Slight and adverse.

Viewpoint 9: View south east from PRow junction Green Lane Wood

- 7.7.452. The route proposal would be largely screened by intervening hedgerow, orchards and trees, but construction activities may be just discernible in winter through loss of woodland and uncharacteristic noise and visual intrusion. The proposed alignment would bridge over C1189 (Lower Breinton Road) on embankment before going into cutting. Whilst the route option would be largely screened from view, some awareness of the top of traffic may be visible. There would be a slight loss of trees in the middle distance (Upper Hill Farm orchards) which are important elements within the view. Over time the mitigation planting and existing trees will partially restore the canopy.
- 7.7.453. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.454. At Operation, the magnitude of change is considered to be Negligible resulting in a significance of effect of Slight and adverse at Year 0 and Neutral at Year 15.

Viewpoint 10a: View south west from PRow opp. Bay Horse Pub

- 7.7.455. The foreground view would remain largely unchanged but construction activities would be clearly visible in mid-distance views, significantly altering the rural character of the view. Some slight loss of tree canopies may be discernible around Green Lane orchards but the route is largely in cutting throughout the view. Mitigation planting on slope cuttings will help, over time, to reduce visibility of traffic.
- 7.7.456. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.

- 7.7.457. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and Slight at Year 15.

Viewpoint 12: View west from PRow at edge of housing in White Cross

- 7.7.458. The construction activities would not be readily discernible in the view, being screened by intervening orchards, hedgerows and hedgerow trees. Glimpses of construction activities in distant views may be obtained, adding uncharacteristic movement, materials and colour into the wider view. Although the route would largely be in cutting, the crossing of the bridleway may be discernible in the distance (with some loss of trees) along with the tops of vehicles. Mitigation planting could reduce the visual prominence of the route option, over time.
- 7.7.459. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.
- 7.7.460. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Moderate and adverse at Year 0 and Slight and adverse at Year 15.

Viewpoint 15: View east from PRow near Priory Hotel

- 7.7.461. The foreground of the view would remain unaltered, but the route option would be visible in the middle distance beyond intervening hedgerows and scattered trees. The construction works would add highly uncharacteristic elements into the view, including noise, colours and activity incongruent with the rural view. Some loss of hedgerows and tree cover, particularly around Pinstone House and Trunkquility treehouse may be discernible, further disrupting the view.
- 7.7.462. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.463. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Slight and adverse.

Viewpoint 16: View east from PRow entrance to Livestock Market

- 7.7.464. The construction activities would completely dominate the view, the openness of which in the foreground/middle distance will allow clear, wide views of the roundabout, earthworks and road construction. They would dominate and fundamentally alter the nature of the existing rural views and level of relative tranquillity. The road would pass through woodland around Pinstone House and Trunkquility tree house and their fishing lake, being on slight embankment throughout and further opening views along the route option. Mitigation planting over time could reduce the harshness associated with the engineered solutions. However, the route option would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.465. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.466. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Major resulting in a significance of effect of Large and adverse.

Viewpoint 17: View south west from gateway PRow Tillington Road

- 7.7.467. The construction activities would completely dominate the view, the openness of which will allow clear, wide views of the bridge works over Tillington Road and accompanying earthworks. All longer distance views would be lost. The construction activities would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The proposed route option would span the existing Tillington Road via embankment and bridge, blocking views beyond. The sense of openness and tranquillity would be lost. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions but could not mitigate loss of openness and long-distance views. The bridge structure and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.468. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.

- 7.7.469. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Major resulting in a significance of effect of Large and adverse.

Viewpoint 18: View south west from gateway PRow Tillington Road

- 7.7.470. The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks (bridge and embankment) over Tillington Road as well as the accompanying earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route option and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.471. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.

- 7.7.472. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Major resulting in a significance of effect of Large and adverse.

Viewpoint 20: View south west from gateway PRow Tillington Road

- 7.7.473. The construction activities would be visible in longer distance views, particularly the earthworks and bridge works associated with crossing above Tillington Road and the Canon Pylon road bridge. The rural nature of the view would be altered, along with the sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible, particularly where the route option crosses over Tillington Road and the bridge for Canon Pylon Road. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions and provide some screening. The route option and embankments would remain a visible, uncharacteristic element in the view.
- 7.7.474. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.475. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

Black 2

Viewpoint 7: View east from Wye Valley Walk top of hill west of Upper Breinton

- 7.7.476. The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.
- 7.7.477. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of High resulting in a significance of effect of Slight/Moderate and adverse.
- 7.7.478. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Slight and adverse at Year 15.

Viewpoint 8: View north east from Green Lane Park Home Estate

- 7.7.479. Construction activities would be visible across mid to background views and would alter the nature of the rural view. The proposed option would be predominantly in cutting at this point, largely screening traffic movements, along with screening by Green Lane Wood. Hedgerows associated with the highway boundary would replace or restore existing remnant hedges and help to reduce awareness of the cutting. In association with mitigation planting and pockets of woodland this would largely integrate the option into the view.
- 7.7.480. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.

- 7.7.481. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/ Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Negligible resulting in a significance of effect of Slight and adverse.

Viewpoint 9: View south east from PRow junction Green Lane Wood

- 7.7.482. The route proposal would be largely screened by intervening hedgerow, orchards and trees, but construction activities may be just discernible in winter through loss of woodland and uncharacteristic noise and visual intrusion. The proposed alignment would bridge over C1189 (Lower Breinton Road) on embankment before going into cutting. Whilst the route option would be largely screened from view, some awareness of the top of traffic may be visible. There would be a slight loss of trees in the middle distance (Upper Hill Farm orchards) which are important elements within the view. Over time the mitigation planting and existing trees will partially restore the canopy.
- 7.7.483. At Construction, the magnitude of change is considered to be Minor on a receptor sensitivity of Moderate resulting in a significance of effect of Slight and adverse.
- 7.7.484. At Operation, the magnitude of change is considered to be Negligible resulting in a significance of effect of Slight and adverse at Year 0 and Neutral at Year 15.

Viewpoint 10a: View south west from PRow opp. Bay Horse Pub

- 7.7.485. The foreground view would remain largely unchanged but construction activities would be clearly visible in mid-distance views, significantly altering the rural character of the view. Some slight loss of tree canopies may be discernible around Green Lane orchards but the route is largely in cutting throughout the view. Mitigation planting on slope cuttings will help, over time, to reduce visibility of traffic.
- 7.7.486. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.
- 7.7.487. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight/ Moderate and adverse at Year 0 and Slight at Year 15.

Viewpoint 12: View west from PRow at edge of housing in White Cross

- 7.7.488. The construction activities would not be readily discernible in the view, being screened by intervening orchards, hedgerows and hedgerow trees. Glimpses of construction activities in distant views may be obtained, adding uncharacteristic movement, materials and colour into the wider view. Although the route would largely be in cutting, the crossing of the bridleway may be discernible in the distance (with some loss of trees) along with the tops of vehicles. Mitigation planting could reduce the visual prominence of the route option, over time.
- 7.7.489. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.
- 7.7.490. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Moderate and adverse at Year 0 and Slight and adverse at Year 15.

Viewpoint 15: View east from PRow near Priory Hotel

- 7.7.491. The foreground of the view would remain unaltered, but the route option would be visible in the middle distance beyond intervening hedgerows and scattered trees. The construction works would add highly uncharacteristic elements into the view, including noise, colours and activity incongruent with the rural view. Some loss of hedgerows and tree cover, particularly around Pinstone House and Trunkquility treehouse may be discernible, further disrupting the view.
- 7.7.492. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.493. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

Viewpoint 16: View east from PRow entrance to Livestock Market

- 7.7.494. The construction activities would completely dominate the view, the openness of which in the foreground/middle distance will allow clear, wide views of the roundabout, earthworks and road construction. They would dominate and fundamentally alter the nature of the existing rural views and level of relative

tranquillity. The road would pass through woodland around Pinstone House and Trunkquility tree house and their fishing lake, being on slight embankment throughout and further opening views along the route option. Mitigation planting over time could reduce the harshness associated with the engineered solutions. However, the route option would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.

- 7.7.495. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.496. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Major resulting in a significance of effect of Large and adverse.

Viewpoint 17: View south west from gateway PRow Tillington Road

- 7.7.497. The construction activities would completely dominate the view, the openness of which will allow clear, wide views of the bridge works over Tillington Road and accompanying earthworks. All longer distance views would be lost. The construction activities would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The proposed route option would span the existing Tillington Road via embankment and bridge, blocking views beyond. The sense of openness and tranquillity would be lost. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions but could not mitigate loss of openness and long-distance views. The bridge structure and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.498. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.499. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Major resulting in a significance of effect of Large and adverse.

Viewpoint 18: View south west from gateway PRow Tillington Road

- 7.7.500. The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks (bridge and embankment) over Tillington Road as well as the accompanying earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route option and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.501. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.502. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Major resulting in a significance of effect of Large and adverse.

Viewpoint 20: View south west from gateway PRow Tillington Road

- 7.7.503. The construction activities would be visible in longer distance views, particularly the earthworks and bridge works associated with crossing above Tillington Road and the Canon Pylon road bridge. The rural nature of the view would be altered, along with the sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible, particularly where the route option crosses over Tillington Road and the bridge for Canon Pylon Road. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions and provide some screening. The route option and embankments would remain a visible, uncharacteristic element in the view.
- 7.7.504. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.505. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

VISUAL EFFECTS – ELEMENT 3

All Options

Viewpoint 18: View south west from gateway PRow Tillington Road

- 7.7.506. The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks (bridge and embankment) over Tillington Road as well as the accompanying earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route option and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.
- 7.7.507. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.508. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Major resulting in a significance of effect of Large and adverse.

Viewpoint 19: View south from gateway in front of Burlton Court

- 7.7.509. The route options would be in cutting beneath Canon Pyon Road and then largely on embankment to meet at grade with the A49. The construction activities, particularly in relation to the Canon Pyon bridge and the earthworks to the east are likely to be discernible in the view, adding uncharacteristic noise, colour and activity. Whilst the distance of the viewpoint from the proposed route options and the elevation of the viewpoint is likely to result in some screening of the construction activities and operational road, it is likely that the tops of traffic and any lighting would be visible, creating a detracting feature in part of the view. Mitigation planting over time would soften and potentially screen much of the route option from the view.
- 7.7.510. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.511. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

Viewpoint 20: View south west from gateway PRow Tillington Road

- 7.7.512. The construction activities would be visible in longer distance views, particularly the earthworks and bridge works associated with crossing above Tillington Road and the Canon Pyon road bridge. The rural nature of the view would be altered, along with the sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible, particularly where the route option crosses over Tillington Road and the bridge for Canon Pylon Road. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions and provide some screening. The route option and embankments would remain a visible, uncharacteristic element in the view.
- 7.7.513. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.514. At Operation, the magnitude of change is considered to be Minor resulting in a significance of effect of Slight and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

Viewpoint 21: View south west from gateway PRow Tillington Road

- 7.7.515. Whilst the foreground of the view would remain unaltered, the construction activities would be clearly visible beyond the hedgerow in the middle distance. They would add highly uncharacteristic noise, colour, materials and activity into the existing rural view and the Canon Pyon bridge would add a further uncharacteristic and visible element into the view. The route options at this point are largely on embankment so vehicles would be clearly visible at operation across the view, and using the Canon Pyon bridge. Mitigation planting would, in time, provide some screening although some blocking of longer views beyond may result.
- 7.7.516. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.

- 7.7.517. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 22: View south west from gateway PRow Tillington Road

- 7.7.518. Whilst the foreground of the view would remain unaltered but the middle distance view would fundamentally change from a rural one to uncharacteristic construction activities. The construction activities would be clearly visible beyond the hedgerow in the middle distance. They would add highly uncharacteristic noise, colour, materials and activity into the existing rural view and the Canon Pyon bridge would add a further uncharacteristic and visible element into the view. The route options at this point are largely on embankment so vehicles will be clearly visible at operation across the view, and using the Canon Pyon bridge. Mitigation planting would, in time, provide some screening although some blocking of longer views beyond may result.
- 7.7.519. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of High resulting in a significance of effect of Large and adverse.
- 7.7.520. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 23: View north from Gateway north of Hospital Farm

- 7.7.521. The construction activities would dominate the view, the relative openness and proximity of which would allow clear, wide views of the earthworks, including the bridge to take Canon Pyon Road. Whilst the route options would be in cutting beneath the Canon Pyon Road and for a portion of the view, it is then on embankment to the left of the view. The construction works would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions but the route option, embankments and bridge would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering its character.
- 7.7.522. At Construction, the magnitude of change is considered to be Major on a receptor sensitivity of Moderate resulting in a significance of effect of Large and adverse.
- 7.7.523. At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 and at Year 15 a magnitude of change of Moderate resulting in a significance of effect of Moderate and adverse.

Viewpoint 24: View north from PRow north of Ayers Brook

- 7.7.524. The construction activities would be clearly visible in the middle distance beyond intervening low hedges. The route options are on embankment through much of the view, increasing visibility. Whilst at a little distance, the construction activities would disrupt the rural and tranquil nature of the view, with the footpath leading towards a construction site. Uncharacteristic noise, colour and patterns would create a detracting focal point in the view. Mitigation planting may help to soften harsh engineering solutions over time, but traffic is likely to remain visible.
- 7.7.525. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of Moderate resulting in a significance of effect of Moderate and adverse.
- 7.7.526. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

Viewpoint 25: View northwest from Holmer Churchyard

- 7.7.527. Construction activities would considerably disrupt the view in the middle distance, particularly the section in cutting against the adjacent hillside. The route options for much of the view are on embankment, raising it slightly above the foreground topography. Whilst local topography, hedgerows and trees provide some screening, the construction activities would provide a very disruptive and uncharacteristic element in the view. At operation, traffic would be clearly visible until mitigation planting starts to provide some screening and softening of the harsh engineering solutions. The route options would still be a discordant element in the view.
- 7.7.528. At Construction, the magnitude of change is considered to be Moderate on a receptor sensitivity of High resulting in a significance of effect of Moderate and adverse.

- 7.7.529. At Operation, the magnitude of change is considered to be Moderate resulting in a significance of effect of Moderate and adverse at Year 0 and at Year 15 a magnitude of change of Minor resulting in a significance of effect of Slight and adverse.

7.8 SUMMARY OF EFFECTS

LANDSCAPE CHARACTER EFFECTS

Element 1

- 7.8.1. Element 1 of all route options would pass in close proximity to Belmont, at the southern end of the route, and are here located within Local Landscape Character Area 7.18: Wooded Estatelands. This character area is considered to be of High Sensitivity, with issues including the following:
- The open, large scale nature of the landscape allows long distance views, for example, intervisibility between Warham House and Belmont Abbey. The traditional roadside hedgerows obstruct views from many locations, and this can be augmented as part of mitigation for the scheme.
 - The Belmont Estate is included on the Council's list of Unregistered Historic Parks and Gardens. It is associated with key figures of the C18 Picturesque movement, including Humphrey Repton, as well as later artists such as Brian Hatton (1887-1916). The groups of mature ornamental parkland trees are reflective of the former designed landscape and are extant in the grazed fields north of Ruckhall Lane. The landscape would have been designed to frame views of the River Wye and countryside beyond and although there are no identified publically accessible views, given screening from existing woodland and steep topography, the character and views of the river have important cultural connections.
 - Blocks of woodland, including Ancient Woodland, are a key element of the local landscape character
- 7.8.2. Element 1 of all route options would pass through Local Landscape Character Area 7.14: Riverside Meadows. The River Wye is a sensitive natural environment and includes the National Trail Wye Valley Walk along its north bank. The route is noticeably tranquil and rural in nature, however views are frequently constrained by riverbank and field boundary vegetation. The crossing of the River Wye by all route options has direct impacts on this riverine character area.
- 7.8.3. Element 1 of all route options would pass through Local Landscape Character Area 7.10: Principal Timbered Farmlands, the Breinton Area. This is a High Sensitivity landscape receptor due to its complex, small scale and historic rural character. Issues include the following:
- Warham House and its immediate environs are included on the Unregistered Historic Parks and Gardens list. There is an historic association with the Belmont Estate, which is visible across the river, as well as with local artist Brian Hatton. The house and garden are currently well screened by vegetation.
 - Two belts of Ancient Woodland on either side of Warham House are characteristic of the Wye Valley, clothing steep slopes and enclosing flat meadowland. The copse associated with a pond and frequent mature field and hedgerow oaks on Warham Farm further north are also characteristic of this Landscape.
 - The many productive orchards found in this area aid screening and take many years to establish, adding both character and cultural context to the area.
- 7.8.4. Within Element 1, Olive, Red, Black 1 and Black 2 route options would be located furthest from the majority of high sensitivity receptors, notably the community at Belmont Abbey and housing at Belmont. Cyan, Yellow and Orange route options are located closer to these sensitive receptors and would therefore have a greater impact on them and on the wider LCT 7.18. Conversely, the alignment of Olive and Black 1 route options are located across a narrower width of the unregistered park and garden. Overall Red and Black 2 route options are preferable for LCT 7.18.
- 7.8.5. Alignment of the route options across the River Wye and through LCA 7.14 varies however, with Olive and Black 1 route options located across a wider stretch of river on a bend. Orange, Cyan, Yellow, Red and Black 2 route options would be routed across a narrower stretch of river, again on a bend, allowing some screening through steep topography and riverside vegetation and providing some screening from highly valued long views down the River Wye and from Central Hereford to the east. Orange, Cyan, Yellow, Red and Black 2 route options are therefore preferable for LCT 7.14.
- 7.8.6. It is considered that Orange, Cyan, Yellow, Red and Black 2 route options are preferable for LCT 7.10 to avoid avoiding breaking up the setting and cultural connections of Warham House.

Element 2

- 7.8.7. All elements fall within LCT 7.10 and LCT 7.21, with some falling within LCT 7.15.
- 7.8.8. The area south of Kings Acre has several Public Rights of Way, which are well screened by hedgerows and woodland belts. Traditional orchards are also characteristic. Kings Acre Road and the area north of this to Roman Road are assessed to be of Medium-Low Sensitivity in the Urban Fringe Landscape Sensitivity Analysis. The settlement around Kings Acre is linear and strung out along the road, which is uncharacteristic of this area.
- 7.8.9. North of King's Acre the route options enter LCT 7.21: Principle Settled Farmlands Landscape Character Area, which is of a domestic agricultural character that is dominant across Herefordshire. The landscape in this area is very flat with limited tree cover to provide visual screening. An exception to this is the Yazor Brook option which is lined with vegetation and also hosts a PRow. Cyan, Black 1 and Black 2 route options cross this character area.
- 7.8.10. Following the Yazor brook to the north of King's Acre is Huntington Court is a small hamlet designated as a conservation area with four listed buildings and a historic (unregistered) Garden of approx. 2Ha attached to the Grade II Listed building (Huntington Court). The settlement is well screened by woodland and hedges, which also create a sense of containment that is further reinforced by its setting of orchards, agricultural fields and the tree lined brook.
- 7.8.11. North of the A4103 Roman Road the Landscape Sensitivity becomes High-Medium again, with more discrete, traditional settlements and individual scattered properties amongst medium scale fields with hedge lined boundaries. There are relatively few designations in this area, however the landscape as a whole is rural and tranquil in character.
- 7.8.12. All route options would directly affect Green Lane (Bridleway BT4) and disrupt the local field pattern. Black 1 and Black 2 would result in direct impacts on traditional orchards around Little Breinton and Upper Hill Farm, disrupting the field pattern and character of the area. These two routes would also pass in proximity to commercial operations of the Plant Nursery, Farms and Cattle Market north of King's Acre, although this would equally provide screening of views of the route options from receptors further west.
- 7.8.13. The Bay Horse Pub would be in very close proximity to Cyan, Red and Olive route options, with likely impacts on amenity of customers and users of the PRow. Orange, Yellow, Red and Olive route options all pass in close proximity to Huntington and Bovington Park but do not impact on LCT 7.15 and the Yazor Brook as a result.
- 7.8.14. Red, Olive, Black 1 and Black 2 route options would directly impact the unregistered park and garden of Burghill Hospital. Overall, the Olive, Black 1 and Black 2 route options are likely to have the biggest impact on LCT 7.10 and LCT 7.21.

Element 3

- 7.8.15. All route options would cross through LCT 7.21: Principle Settled Farmlands Landscape Character Area.
- 7.8.16. The Burghill Hospital Grounds, developed for housing, are an Unregistered Park and Garden. The central shared amenity space and outlying properties overlook the fields to the south and there would be visual amenity and noise impacts on residents.
- 7.8.17. Residents of the row of houses on the east side of Canon Pyon Rd/ A4110 would experience more immediate impacts, but would be seen in the context of existing highway routes.
- 7.8.18. The route would cross between the A4110 and A49 on a line that would be partially visible from Hereford, for example from the Race Course, due to being on the ridge or south facing slope through open fields to the north of the city. Element 3 would cross a well-used PRow between the northern fringe of Hereford and Arundel Farm and the traditional field pattern (at least 7 fields) and frequent hedgerows would be fragmented by the route options.
- 7.8.19. Views from the settlements to the east of the A49 are largely constrained by the rolling topography of this area, similarly for properties further north along this road.
- 7.8.20. Element 3 is not considered to have a significant adverse effect on local landscape character.

Summary Table

7.8.21. The following table provides a summary of the potential effects of the different route options on identified landscape receptors, taking the 'worst case scenario' for the elements as a whole.

Table 7-7: Summary of Effects of each Route Option on Landscape Receptors

Route Option	Landscape Receptors	Significance of Effect at Construction	Significance of Effect Year 0	Significance of Effect Year 15
Orange	LCT 7.10 Principal Timbered Farmlands LCT 7.14 Riverside Meadows LCT 7.15 Wet Pasture Meadows LCT 7.18 Wooded Estatelands LCT 2.21 Principal Settled Farmland	Large adverse Moderate/Large adverse Slight/moderate adverse Major adverse Moderate adverse	Large adverse Moderate/Large adverse Slight adverse Major adverse Moderate adverse	Large adverse Moderate/Large adverse Slight adverse Major adverse Slight adverse
Cyan	LCT 7.10 Principal Timbered Farmlands LCT 7.14 Riverside Meadows LCT 7.15 Wet Pasture Meadows LCT 7.18 Wooded Estatelands LCT 2.21 Principal Settled Farmland	Large adverse Moderate/Large adverse Slight/moderate adverse Large adverse Moderate adverse	Large adverse Moderate/Large adverse Slight adverse Large adverse Moderate adverse	Large adverse Moderate/Large adverse Slight adverse Moderate adverse Slight adverse
Yellow	LCT 7.10 Principal Timbered Farmlands LCT 7.14 Riverside Meadows LCT 7.18 Wooded Estatelands LCT 2.21 Principal Settled Farmland	Large adverse Moderate/Large adverse Large adverse Moderate adverse	Large adverse Moderate/Large adverse Large Adverse Slight/moderate adverse	Large adverse Moderate/Large adverse Moderate adverse Slight adverse
Red	LCT 7.10 Principal Timbered Farmlands LCT 7.14 Riverside Meadows LCT 7.18 Wooded Estatelands LCT 2.21 Principal Settled Farmland	Large adverse Moderate/Large adverse Large adverse Moderate adverse	Large adverse Moderate/Large adverse Large adverse Moderate adverse	Large adverse Moderate/Large adverse Moderate adverse Moderate adverse
Olive	LCT 7.10 Principal Timbered Farmlands LCT 7.14 Riverside Meadows LCT 7.18 Wooded Estatelands LCT 2.21 Principal Settled Farmland	Large adverse Large adverse Large adverse Moderate adverse	Large adverse Large adverse Large adverse Moderate adverse	Large adverse Moderate/Large adverse Moderate Adverse Moderate adverse
Black 1	LCT 7.10 Principal Timbered Farmlands LCT 7.14 Riverside Meadows LCT 7.15 Wet Pasture Meadows LCT 7.18 Wooded Estatelands LCT 2.21 Principal Settled Farmland	Large adverse Large adverse Moderate adverse Large adverse Moderate adverse	Large adverse Large adverse Slight/moderate adverse Large adverse Moderate adverse	Large adverse Moderate/Large adverse Slight adverse Moderate adverse Moderate adverse
Black 2	LCT 7.10 Principal Timbered Farmlands LCT 7.14 Riverside Meadows LCT 7.15 Wet Pasture Meadows LCT 7.18 Wooded Estatelands LCT 2.21 Principal Settled Farmland	Large adverse Moderate/Large adverse Moderate adverse Large adverse Moderate adverse	Large adverse Moderate/Large adverse Moderate/Large adverse Large adverse Moderate adverse	Large adverse Moderate/Large adverse Moderate/Large adverse Moderate adverse Moderate adverse

VISUAL AMENITY EFFECTS

- 7.8.22. The options are likely to be visible from two areas of unregistered parks and gardens to the north and south of the Wye River. Views will in part be determined by the typology and character of the lowland landscapes, including scenic views looking west towards traditional orchards adjacent to the River Wye. Potential loss of vegetation screening may broaden views within 250m of the Proposed Scheme, including for the scattered individual properties of Warham House, Bovingdon Park estate area and former Burghill Hospital.
- 7.8.23. Views from the linear riverine landscape of the River Wye and Yazor Brook will likely be subject to fragmented visual impacts as a result of the proposed route options (i.e. through the introduction of new infrastructure such as an elevated bridge crossing over the River Wye). The existing flat, generally well defined floodplain characterised by the meandering tree-lined river edge and meadows of the watercourses currently provides extensive views along the edge of the watercourse corridor.
- 7.8.24. The construction of the Proposed Scheme may potentially impact important trees, locally designated Traditional Orchard sites and associated Priority Habitats. Vegetation currently provides screening for views in and out of the Proposed Scheme as well as contributing to the overall character of the Core Study Area. Any loss of vegetation (such as of hedgerows or trees) may therefore adversely affect local visual amenity and local character.

Summary Table

- 7.8.25. The following table provides a summary of the potential effects of the different route options on identified visual receptors, taking the 'worst case scenario' for the elements as a whole.

Table 7-8 Summary of Effects of each Route Option on Visual Receptors

Route Option	Landscape Receptors	Significance of Effect at Construction	Significance of Effect Year 0	Significance of Effect Year 15
Orange	Viewpoint 1	Large adverse	Moderate/Large adverse	Moderate adverse
	Viewpoint 2	Moderate /Large adverse	Large adverse	Moderate adverse
	Viewpoint 3	Large adverse	Large adverse	Moderate adverse
	Viewpoint 4	Very large adverse	Very large adverse	Large adverse
	Viewpoint 5	Large adverse	Large adverse	Moderate adverse
	Viewpoint 6a	Large adverse	Large adverse	Moderate adverse
	Viewpoint 6b	Large adverse	Large adverse	Moderate adverse
	Viewpoint 7	Moderate adverse	Slight/Moderate adverse	Slight adverse
	Viewpoint 10b	Large adverse	Large adverse	Moderate adverse
	Viewpoint 11	Very large adverse	Very large adverse	Large adverse
	Viewpoint 12	Large adverse	Large adverse	Moderate adverse
	Viewpoint 14	Moderate adverse	Slight adverse	Negligible
	Viewpoint 15	Slight adverse	Slight adverse	Negligible
	Viewpoint 16	Moderate adverse	Moderate adverse	Slight adverse
	Viewpoint 17	Large adverse	Large adverse	Moderate adverse
	Viewpoint 18	Large adverse	Large adverse	Large adverse
	Viewpoint 19	Moderate adverse	Slight adverse	Slight adverse
	Viewpoint 20	Moderate adverse	Slight adverse	Slight adverse
	Viewpoint 21	Large adverse	Large adverse	Moderate adverse
	Viewpoint 22	Large adverse	Large adverse	Moderate adverse
	Viewpoint 23	Large adverse	Large adverse	Moderate adverse
	Viewpoint 24	Moderate adverse	Moderate adverse	Slight adverse
	Viewpoint 25	Moderate adverse	Moderate adverse	Slight adverse
Cyan	Viewpoint 1	Large adverse	Large adverse	Large adverse
	Viewpoint 2	Moderate/large adverse	Moderate/Large adverse	Moderate adverse
	Viewpoint 3	Large adverse	Large adverse	Moderate adverse
	Viewpoint 4	Very large adverse	Very large adverse	Large adverse
	Viewpoint 5	Large adverse	Large adverse	Moderate adverse
	Viewpoint 6a	Large adverse	Large adverse	Moderate adverse
	Viewpoint 6b	Large adverse	Large adverse	Moderate adverse
	Viewpoint 7	Moderate adverse	Slight/Moderate adverse	Slight adverse
	Viewpoint 10b	Very large adverse	Very large adverse	Large adverse

Route Option	Landscape Receptors	Significance of Effect at Construction	Significance of Effect Year 0	Significance of Effect Year 15
	Viewpoint 11 Viewpoint 12 Viewpoint 15 Viewpoint 16 Viewpoint 17 Viewpoint 18 Viewpoint 19 Viewpoint 20 Viewpoint 21 Viewpoint 22 Viewpoint 23 Viewpoint 24 Viewpoint 25	Very large adverse Large adverse Moderate adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse	Very large adverse Large adverse Slight adverse Large adverse Large adverse Large adverse Slight adverse Slight adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse	Large adverse Moderate adverse Slight adverse Moderate adverse Large adverse Large adverse Slight adverse Slight adverse Moderate adverse Moderate adverse Moderate adverse Slight adverse Slight adverse
Yellow	Viewpoint 1 Viewpoint 2 Viewpoint 3 Viewpoint 4 Viewpoint 5 Viewpoint 6a Viewpoint 6b Viewpoint 7 Viewpoint 10b Viewpoint 11 Viewpoint 12 Viewpoint 14 Viewpoint 15 Viewpoint 16 Viewpoint 17 Viewpoint 18 Viewpoint 19 Viewpoint 20 Viewpoint 21 Viewpoint 22 Viewpoint 23 Viewpoint 24 Viewpoint 25	Large adverse Moderate/large adverse Large adverse Very large adverse Large adverse Large adverse Large adverse Moderate adverse Large adverse Very large adverse Large adverse Large adverse Slight adverse Moderate adverse Large adverse Large adverse Moderate adverse Moderate adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse	Large adverse Moderate/Large adverse Large adverse Very large adverse Large adverse Large adverse Large adverse Slight/Moderate adverse Large adverse Very large adverse Large adverse Large adverse Slight adverse Moderate adverse Large adverse Large adverse Slight adverse Slight adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse	Large adverse Moderate adverse Moderate adverse Large adverse Moderate adverse Moderate adverse Moderate adverse Slight adverse Moderate adverse Large adverse Moderate adverse Moderate adverse Negligible Slight adverse Moderate adverse Large adverse Slight adverse Slight adverse Moderate adverse Moderate adverse Slight adverse Slight adverse
Red	Viewpoint 1 Viewpoint 2 Viewpoint 3 Viewpoint 4 Viewpoint 5 Viewpoint 6a Viewpoint 6b Viewpoint 7 Viewpoint 8 Viewpoint 9 Viewpoint 10b Viewpoint 11 Viewpoint 12 Viewpoint 14 Viewpoint 15 Viewpoint 16 Viewpoint 17 Viewpoint 18 Viewpoint 19 Viewpoint 20 Viewpoint 21 Viewpoint 22	Large adverse Large adverse Very large adverse Very large adverse Large adverse Large adverse Large adverse Slight/Moderate adverse Slight/Moderate adverse Slight adverse Very large adverse Large adverse Large adverse Large adverse Slight adverse Moderate adverse Large adverse Large adverse Moderate adverse Moderate adverse Large adverse Large adverse	Large adverse Large adverse Very large adverse Very large adverse Large adverse Large adverse Large adverse Slight/Moderate adverse Slight adverse Slight adverse Very large adverse Moderate adverse Moderate adverse Large adverse Slight adverse Moderate adverse Large adverse Large adverse Slight adverse Slight adverse Large adverse Large adverse	Large adverse Moderate adverse Large adverse Large adverse Moderate adverse Moderate adverse Moderate adverse Slight adverse Slight adverse Neutral Large adverse Moderate adverse Moderate adverse Moderate adverse Negligible Slight adverse Moderate adverse Moderate adverse Slight adverse Slight adverse Moderate adverse Moderate adverse

Route Option	Landscape Receptors	Significance of Effect at Construction	Significance of Effect Year 0	Significance of Effect Year 15
	Viewpoint 23 Viewpoint 24 Viewpoint 25	Large adverse Moderate adverse Moderate adverse e	Large adverse Moderate adverse Moderate adverse	Moderate adverse Slight adverse Slight adverse
Olive	Viewpoint 1 Viewpoint 2 Viewpoint 3 Viewpoint 4 Viewpoint 5 Viewpoint 6a Viewpoint 6c Viewpoint 7 Viewpoint 8 Viewpoint 9 Viewpoint 10b Viewpoint 11 Viewpoint 12 Viewpoint 14 Viewpoint 15 Viewpoint 16 Viewpoint 17 Viewpoint 18 Viewpoint 19 Viewpoint 20 Viewpoint 21 Viewpoint 22 Viewpoint 23 Viewpoint 24 Viewpoint 25	Moderate/Large adverse Large adverse Very large adverse Large adverse Large adverse Very large adverse Very large adverse Slight/Moderate adverse Slight/moderate adverse Slight adverse Very large adverse Large adverse Large adverse Large adverse Slight adverse Moderate adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse	Moderate/ Large adverse Large adverse Very large adverse Large adverse Large adverse Very large adverse Very large adverse Slight/Moderate adverse Slight adverse Slight adverse Very large adverse Moderate adverse Moderate adverse Large adverse Moderate adverse Large adverse Large adverse Slight adverse Slight adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse Moderate adverse	Moderate adverse Moderate adverse Large adverse Moderate adverse Moderate adverse Large adverse Large adverse Slight/Moderate adverse Slight adverse Neutral Large adverse Moderate adverse Moderate adverse Moderate adverse Negligible Slight adverse Moderate adverse Large adverse Slight adverse Slight adverse Moderate adverse Moderate adverse Slight adverse Slight adverse
Black 1	Viewpoint 1 Viewpoint 2 Viewpoint 3 Viewpoint 4 Viewpoint 5 Viewpoint 6a Viewpoint 6b Viewpoint 7 Viewpoint 8 Viewpoint 9 Viewpoint 10a Viewpoint 12 Viewpoint 15 Viewpoint 16 Viewpoint 17 Viewpoint 18 Viewpoint 19 Viewpoint 20 Viewpoint 21 Viewpoint 22 Viewpoint 23 Viewpoint 24 Viewpoint 25	Moderate/Large adverse Large adverse Very large adverse Large adverse Large adverse Very large adverse Very large adverse Slight/Moderate adverse Moderate adverse Slight adverse Moderate adverse Moderate adverse Moderate adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse Large adverse Large adverse Moderate adverse Moderate adverse	Moderate/ Large adverse Large adverse Very large adverse Large adverse Large adverse Very large adverse Very large adverse Slight/Moderate adverse Slight/Moderate adverse Slight adverse Moderate adverse Moderate adverse Moderate adverse Large adverse Large adverse Large adverse Slight adverse Moderate adverse Large adverse Large adverse Large adverse Moderate adverse Moderate adverse	Moderate adverse Moderate adverse Large adverse Moderate adverse Moderate adverse Large adverse Large adverse Slight/Moderate adverse Negligible Neutral Slight adverse Slight adverse Slight adverse Large adverse Large adverse Large adverse Slight adverse Slight adverse Moderate adverse Moderate adverse Slight adverse Slight adverse
Black 2	Viewpoint 1 Viewpoint 2 Viewpoint 3	Large adverse Large adverse Very large adverse	Large adverse Large adverse Very large adverse	Large adverse Moderate adverse Large adverse

Route Option	Landscape Receptors	Significance of Effect at Construction	Significance of Effect Year 0	Significance of Effect Year 15
	Viewpoint 4	Very large adverse	Very large adverse	Large adverse
	Viewpoint 5	Large adverse	Large adverse	Moderate adverse
	Viewpoint 6a	Large adverse	Large adverse	Moderate adverse
	Viewpoint 6b	Large adverse	Large adverse	Moderate adverse
	Viewpoint 7	Slight/Moderate adverse	Slight/Moderate adverse	Slight adverse
	Viewpoint 8	Moderate adverse	Moderate adverse	Negligible
	Viewpoint 9	Slight adverse	Slight adverse	Neutral
	Viewpoint 10a	Moderate adverse	Slight / Moderate adverse	Slight adverse
	Viewpoint 12	Moderate adverse	Moderate adverse	Slight adverse
	Viewpoint 15	Moderate adverse	Moderate adverse	Slight adverse
	Viewpoint 16	Large adverse	Large adverse	Large adverse
	Viewpoint 17	Large adverse	Large adverse	Large adverse
	Viewpoint 18	Large adverse	Large adverse	Large adverse
	Viewpoint 19	Moderate adverse	Slight adverse	Slight adverse
	Viewpoint 20	Moderate adverse	Slight adverse	Slight adverse
	Viewpoint 21	Large adverse	Large adverse	Moderate adverse
	Viewpoint 22	Large adverse	Large adverse	Moderate adverse
	Viewpoint 23	Large adverse	Large adverse	Moderate adverse
	Viewpoint 24	Moderate adverse	Moderate adverse	Slight adverse
	Viewpoint 25	Moderate adverse	Moderate adverse	Slight adverse

8 CULTURAL HERITAGE

8.1 LEGISLATION AND POLICY FRAMEWORK NATIONAL POLICY

Ancient Monuments and Archaeological Areas Act 1979

- 8.1.1. The Ancient Monuments and Archaeological Areas Act 1979²⁹ largely relates to Scheduled Monuments. Section 61 defines sites that warrant protection due to their being of national importance as 'ancient monuments'. A monument is defined by the Act as *"any building, structure or work above or below the surface of the land, any cave or excavation; any site comprising the remains of any such building, structure or work or any cave or excavation; and any site comprising or comprising the remains of any vehicle, vessel or aircraft or other movable structure or part thereof."*
- 8.1.2. Section 61 of the Act states that deliberate damage to a monument is a criminal offence and any works taking place within one would require Scheduled Monument Consent from the Secretary of State.

Planning (Listed Buildings and Conservation Areas) Act 1990

- 8.1.3. Sections 16 and 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990³⁰, applies to all decisions concerning listed buildings. When making a decision on all listed building consent applications or any decision on a planning application for development that affects a listed building or its setting, a local planning authority must have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses. Preservation in this context means not harming the interest in the building, as opposed to keeping it utterly unchanged.
- 8.1.4. Section 72 of the Act places a duty upon the decision maker in determining applications for planning permission within conservation areas to pay *"...special attention to the desirability of preserving or enhancing the character or appearance of that area..."*.

Hedgerow Regulations Act 1997

- 8.1.5. The Hedgerow Regulations Act 1997³¹ presents the following criteria for determining important hedgerows (archaeology and history):
- The hedgerow marks the boundary, or part of the boundary, of at least one historic parish or township and for this purpose "historic" means existing before 1850;
 - The hedgerow incorporates an archaeological feature which is: (a) included in the schedule of monuments compiled by the Secretary of State under section 1 (schedule of monuments) of the Ancient Monuments and Archaeological Areas Act 1979; or (b) recorded at the relevant date in a Sites and Monuments Record (Now Historic Environment Record (HER));
 - The hedgerow is: (a) is situated wholly or partly within an archaeological site included or recorded as mentioned in paragraph 2 or on land adjacent to and associated with such a site; and (b) is associated with any monument or feature on that site;
 - The hedgerow: (a) marks the boundary of a pre-1600 AD estate or manor recorded at the relevant date in a Sites and Monuments Record or in a document held at that date at a Record Office; or (b) is visibly related to any building or other feature of such an estate or manor; and
 - The hedgerow is: (a) recorded in a document held at the relevant date at a Record Office as an integral part of a field system pre-dating the Enclosure Acts; or (b) is part of, or visibly related to, any building or other feature associated with such a system, and that system is (i) substantially complete; or (ii) is of a pattern which is recorded in a document prepared before the relevant date by a local planning authority,

²⁹ Ancient Monuments and Archaeological Areas Act 1979, c.12, available online at <http://www.legislation.gov.uk/ukpga/1979/46>, accessed 20/03/2018.

³⁰ Planning (Listed Building and Conservation Areas) Act 1990, available online at <http://www.legislation.gov.uk/ukpga/1990/9/contents>, accessed: 20/03/2018.

³¹ Hedgerow Regulations Act 1997, available online at <http://www.legislation.gov.uk/uksi/1997/1160/contents/made>, accessed: 20/03/2018

within the meaning of the Planning (Listed Buildings and Conservation Areas) Act 1990, for the purposes of development control within the authority's area, as a key landscape characteristic.

National Networks National Policy Statement

8.1.6. Policies 5.125 to 5.142 of the National Policy Statement for National Networks³² (NNNPS) are concerned with the historic environment:

- *Policy 5.125:* The Secretary of State should also consider the impacts on other non-designated heritage assets (as identified either through the development plan process by local authorities, including 'local listing', or through the nationally significant infrastructure project examination and decision making process) on the basis of clear evidence that the assets have a significance that merit consideration in that process, even though those assets are of lesser value than designated heritage assets.
- *Policy 5.126:* Where the development is subject to EIA the applicant should undertake an assessment of any likely significant heritage impacts of the proposed project as part of the EIA and describe these in the environmental statement.
- *Policy 5.127:* The applicant should describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the asset's importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant Historic Environment Record should have been consulted and the heritage assets assessed using appropriate expertise. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, the applicant should include an appropriate desk-based assessment and, where necessary, a field evaluation.
- *Policy 5.128:* In determining applications, the Secretary of State should seek to identify and assess the particular significance of any heritage asset that may be affected by the proposed development (including by development affecting the setting of a heritage asset), taking account of the available evidence and any necessary expertise from:
 - Relevant information provided with the application and, where applicable, relevant information submitted during examination of the application;
 - Any designation records;
 - The relevant Historic Environment Record(s), and similar sources of information;
 - Representations made by interested parties during the examination; and
 - Expert advice, where appropriate, and when the need to understand the significance of the heritage asset demands it.
- *Policy 5.129:* In considering the impact of a proposed development on any heritage assets, the Secretary of State should take into account the particular nature of the significance of the heritage asset and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between their conservation and any aspect of the proposal.
- *Policy 5.130:* The Secretary of State should take into account the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution that their conservation can make to sustainable communities – including their economic vitality. The Secretary of State should also take into account the desirability of new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials, use and landscaping (for example, screen planting).
- *Policy 5.131:* When considering the impact of a proposed development on the significance of a designated heritage asset, the Secretary of State should give great weight to the asset's conservation. The more important the asset, the greater the weight should be. Once lost, heritage assets cannot be replaced and their loss has a cultural, environmental, economic and social impact. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Given that heritage assets are irreplaceable, harm or loss affecting any designated heritage asset should require clear and convincing justification. Substantial harm to or loss of a grade II Listed Building or a grade II Registered Park or Garden should be exceptional. Substantial harm to or loss of designated assets of the highest

³² Department for Transport (2014), National Policy Statement for National Networks, available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf, accessed 01/05/2018.

significance, including World Heritage Sites, Scheduled Monuments, grade I and II* Listed Buildings, Registered Battlefields, and grade I and II* Registered Parks and Gardens should be wholly exceptional.

- *Policy 5.132:* Any harmful impact on the significance of a designated heritage asset should be weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset, the greater the justification that would be needed for any loss.
- *Policy 5.133:* Where the proposed development would lead to substantial harm to or total loss of significance of a designated heritage asset, the Secretary of State should refuse consent unless it can be demonstrated that the substantial harm or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm, or alternatively that all of the following apply:
 - The nature of the heritage asset prevents all reasonable uses of the site; and •no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that would enable its conservation;
 - Conservation by grant-funding or some form of charitable or public ownership is demonstrably not possible; and
 - The harm or loss is outweighed by the benefit of bringing the site back into use.
- *Policy 5.134:* Where the proposed development would lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal, including securing its optimum viable use.
- *Policy 5.135:* Not all elements of a World Heritage Site or Conservation Area would necessarily contribute to its significance. The Secretary of State should treat the loss of a building (or other element) that makes a positive contribution to the site's significance either as substantial harm or less than substantial harm, as appropriate, taking into account the relative significance of the elements affected and their contribution to the significance of the Conservation Area or World Heritage Site as a whole.
- *Policy 5.136:* Where the loss of significance of any heritage asset has been justified by the applicant based on the merits of the new development and the significance of the asset in question, the Secretary of State should consider imposing a requirement that the applicant would prevent the loss occurring until the relevant development or part of development has commenced.
- *Policy 5.137:* Applicants should look for opportunities for new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset should be treated favourably.
- *Policy 5.138:* Where there is evidence of deliberate neglect of or damage to a heritage asset the Secretary of State should not take its deteriorated state into account in any decision.
- *Policy 5.140:* Where the loss of the whole or part of a heritage asset's significance is justified, the Secretary of State should require the applicant to record and advance understanding of the significance of the heritage asset before it is lost (wholly or in part). The extent of the requirement should be proportionate to the importance and the impact. Applicants should be required to deposit copies of the reports with the relevant Historic Environment Record. They should also be required to deposit the archive generated in a local museum or other public depository willing to receive it.
- *Policy 5.141:* The Secretary of State may add requirements to the development consent order to ensure that this is undertaken in a timely manner in accordance with a written scheme of investigation that meets the requirements of this section and has been agreed in writing with the relevant Local Authority (or, where the development is in English waters, with the Marine Management Organisation and English Heritage) and that the completion of the exercise is properly secured.
- *Policy 5.142:* Where there is a high probability that a development site may include as yet undiscovered heritage assets with archaeological interest, the Secretary of State should consider requirements to ensure that appropriate procedures are in place for the identification and treatment of such assets discovered during construction.

National Planning Policy Framework

8.1.7. Section 12 of the National Planning Policy Framework³³ (NPPF) Conserving and enhancing the historic environment states the following:

- *Policy 126:* Local planning authorities should set out in their Local Plan a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats. In doing so, they should recognise that heritage assets are an irreplaceable resource and conserve them in a manner appropriate to their significance. In developing this strategy, local planning authorities should take into account:
 - The desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;
 - The wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring;
 - The desirability of new development making a positive contribution to local character and distinctiveness; and
 - Opportunities to draw on the contribution made by the historic environment to the character of a place.
- *Policy 127:* When considering the designation of conservation areas, local planning authorities should ensure that an area justifies such status because of its special architectural or historic interest, and that the concept of conservation is not devalued through the designation of areas that lack special interest.
- *Policy 128:* In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.
- *Policy 129:* Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this assessment into account when considering the impact of a proposal on a heritage asset, to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposal.
- *Policy 130:* Where there is evidence of deliberate neglect of or damage to a heritage asset the deteriorated state of the heritage asset should not be taken into account in any decision.
- *Policy 131:* In determining planning applications, local planning authorities should take account of:
 - The desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;
 - The positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality; and
 - The desirability of new development making a positive contribution to local character and distinctiveness.
- *Policy 132:* When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation. The more important the asset, the greater the weight should be. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, notably scheduled monuments, protected wreck sites, battlefields, grade I and II*

³³ Communities and Local Government (2012), available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf, accessed 01/05/2018.

listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional.

- **Policy 133:** Where a proposed development will lead to substantial harm to or total loss of significance of a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:
 - The nature of the heritage asset prevents all reasonable uses of the site;
 - No viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation;
 - Conservation by grant-funding or some form of charitable or public ownership is demonstrably not possible; and
 - The harm or loss is outweighed by the benefit of bringing the site back into use.
- **Policy 134:** Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal, including securing its optimum viable use.
- **Policy 135:** The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.
- **Policy 136:** Local planning authorities should not permit loss of the whole or part of a heritage asset without taking all reasonable steps to ensure the new development will proceed after the loss has occurred.
- **Policy 137:** Local planning authorities should look for opportunities for new development within Conservation Areas and World Heritage Sites and within the setting of heritage assets to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset should be treated favourably.
- **Policy 138:** Not all elements of a World Heritage Site or Conservation Area will necessarily contribute to its significance. Loss of a building (or other element) which makes a positive contribution to the significance of the Conservation Area or World Heritage Site should be treated either as substantial harm under paragraph 133 or less than substantial harm under paragraph 134, as appropriate, taking into account the relative significance of the element affected and its contribution to the significance of the Conservation Area or World Heritage Site as a whole.
- **Policy 139:** Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.
- **Policy 140:** Local planning authorities should assess whether the benefits of a proposal for enabling development, which would otherwise conflict with planning policies but which would secure the future conservation of a heritage asset, outweigh the disbenefits of departing from those policies.
- **Policy 141:** Local planning authorities should make information about the significance of the historic environment gathered as part of plan-making or development management publicly accessible. They should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible. However, the ability to record evidence of our past should not be a factor in deciding whether such loss should be permitted.

LOCAL POLICY

Herefordshire Local Plan – Core Strategy 2011-2031 (Adopted October 2016)

8.1.8. With regard to the historic environment and heritage assets the following strategy and policies are set out:

- **Paragraph 5.3.23:** The historic environment is defined as all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora. Those elements of significance with statutory protection are referred to as designated heritage assets. Policy LD4 is applicable to heritage assets throughout Herefordshire whether formally designated e.g. listed buildings and conservation areas, or not, ranging from individual structures and their settings, archaeological remains, to larger neighbourhoods of historic value, parks, gardens and other green spaces of local interest.

- *Paragraph 5.3.24:* The historic environment and heritage assets are significant contributors to sustainable development. Important local buildings have a social value and can act as focal points for local communities. The historic environment is of cultural value as it illustrates the historical development of Herefordshire. Heritage assets also bring economic benefits as Herefordshire's well preserved historic environment is a major factor in its tourism industry and the county's quality of life can also serve to attract and retain investment. The sustainable re-use of existing buildings can also help mitigate climate change through reducing development pressures on greenfield sites, reducing demand for construction energy and materials and by minimising construction waste.
- *Paragraph 5.3.25:* Where important heritage assets are at risk or underutilised, development proposals for alternative uses which are sympathetic and contribute to the conservation of the heritage asset and its wider environment will be supported. Due to the site-specific nature of heritage assets, the Core Strategy does not seek to stipulate particular uses and each proposal will be evaluated on its individual merits.
- *Paragraph 5.3.26:* During the Core Strategy plan period, Herefordshire Council will review the Archaeology and Development Supplementary Planning Document (SPD) in particular in the light of any changes to the existing evidence base, the Historic Landscape Characterisation, emerging farmstead assessment guidance and growing knowledge of heritage assets contained within the council's historic environment record. This existing data and evidence base together with the Rapid Townscape Assessments 2010 for the market towns and the Hereford Streetscape Design Strategy 2009 should be used to shape development proposals from the outset. The evidence base will also guide forthcoming Development Plan Documents and Neighbourhood Development Plans which should be supported where necessary, with careful appraisal of sites within or adjacent to those villages where development may be proposed - in terms of effect on archaeological remains and the setting of historic assets.
- *Paragraph 5.3.27:* Large-scale developments should embrace the historic environment rather than regard it as a constraint. Utilising existing locally distinctive heritage assets within wider regeneration proposals can help create new developments that integrate positively with their surroundings, and can reinforce existing cultural and social characteristics. Where the loss of or substantial harm to a heritage asset or its significance is outweighed by the public benefits of a development proposal which is allowed to proceed, developers shall, in a manner proportionate to its importance, record and advance understanding of the heritage asset. This evidence shall be made publicly accessible normally through Herefordshire Historic Environment Record, a museum or other local archive as appropriate.
- *Policy LD4 – Historic environment and heritage assets:* Development proposals affecting heritage assets and the wider historic environment should:
 - Protect, conserve, and where possible enhance heritage assets and their settings in a manner appropriate to their significance through appropriate management, uses and sympathetic design, in particular emphasising the original form and function where possible;
 - Where opportunities exist, contribute to the character and local distinctiveness of the townscape or wider environment, especially within conservation areas;
 - Use the retention, repair and sustainable use of heritage assets to provide a focus for wider regeneration schemes;
 - Record and advance the understanding of the significance of any heritage assets to be lost (wholly or in part) and to make this evidence or archive generated publicly accessible; and
 - Where appropriate, improve the understanding of and public access to the heritage asset. The scope of the works required to protect, conserve and enhance heritage assets and their settings should be proportionate to their significance. Development schemes should emphasise the original form and function of any asset and, where appropriate, improve the understanding of and public access to them.

8.2 STUDY AREA

- 8.2.1. An inner 500m study area from the outer limits of the route options was applied for non-designated heritage assets which include parks and gardens, standing structures, earthworks and below-ground heritage assets. Non-designated assets within the 500m study area are presented per option on Figures 8-8 to 8-14 in Appendix 8-1.
- 8.2.2. A wider 1km study area from the outer limits of the route options was applied for statutory designated assets and their settings including Scheduled Monuments, Grade I, Grade II* and Grade II listed buildings and Conservation Areas. Designated assets within the 1km study area are presented per option on Figures 8-1 to 8-7 in Appendix 8-1.

8.3 BASELINE CONDITIONS

- 8.3.1. All of the statutory designated assets are of national importance or sensitivity. The following key receptors for each option have been identified through evaluation of the baseline information. There are no World Heritage Sites (WHS) or non-designated assets of national importance within the 1km and 500m study areas. See Tables 1-1 to 1-15 in Appendix 8-2 for Baseline Conditions.

ELEMENT 1 – ALL OPTIONS

- 8.3.2. A total of 24 designated heritage assets are present within the 1km study area comprising one Scheduled Monument, two Grade II* and twenty Grade II listed buildings and one conservation area. Twenty non-designated assets are present in the 500m study area five of which are parks and gardens. These assets are presented in Tables 1-1 to 1.6 in Appendix 8-2, and the locations of the assets are presented on Figures 8-1 to 8-14 in Appendix 8-1.

ELEMENT 2 – ALL OPTIONS

- 8.3.3. A total of 9 designated heritage assets are present within the 1km study area comprising eight Grade II listed buildings and one conservation area. Thirty-six non-designated assets are present in the 500m study area two of which are parks and gardens. These assets are presented in Tables 1-7 to 1-10 in Appendix 8-2, and the locations of the assets are presented on Figures 8-1 to 8-14 in Appendix 8-1.

ELEMENT 3 – ALL OPTIONS

- 8.3.4. A total of 8 designated heritage assets are present within the 1km study area comprising one Scheduled Monument, one Grade I listed building and six Grade II listed buildings. Twenty non-designated assets are present in the 500m study area one of which is a park and garden. These assets are presented in Tables 1-11 to 1-15 in Appendix 8-2, and the locations of the assets are presented on Figures 8-1 to 8-14 in Appendix 8-1.

8.4 ASSESSMENT METHODOLOGY STANDARDS AND GUIDANCE

- 8.4.1. This assessment has been written in compliance with the Cultural Heritage Section (Volume 11, Section 3, Part 2) of the Design Manual for Road and Bridges (DMRB), National Planning Policy Framework (NPPF) Planning Practice Guide³⁴ and The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Second Edition)³⁵. Professional judgement is applied throughout.

BASELINE CONDITION OVERVIEW

- 8.4.2. This assessment consists of an analysis of existing written, graphic, photographic and electronic information in order to identify heritage assets, their settings and importance that have the potential to be affected by the proposed Scheme or lend context to the archaeological and historical potential of the proposed Scheme. In support of this the historical landscape character of the area of the proposed Scheme has been considered in detail. The sensitivity or importance of the assets identified is judged in a local, regional, national or international context as appropriate³⁶.

DATA COLLECTION

- 8.4.3. The principal sources of information consulted were historical and modern maps, although published and unpublished secondary sources were also reviewed. The following sources were consulted during the data-gathering process:

- Hereford Historic Environment Record (HER);
- National Heritage List for England (NHLE) as maintained by Historic England;

³⁴ Ministry of Housing, Communities & Local Government (2016), available online at <https://www.gov.uk/government/collections/planning-practice-guidance>, accessed 01/05/2018.

³⁵ Historic England (2017), Historic Environment Good Practice Advice in Planning Note 3, The Setting of Heritage Assets (2nd Edition), available online at <https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/>, accessed 01/05/2018.

³⁶ Chartered Institute for Archaeologists (2014), CIfA regulations, standards and guidelines, available online at <https://www.archaeologists.net/codes/cifa>, accessed 01/05/2018.

- The Herford Archive Centre (HARC);
- Historical maps including Ordnance Survey; and
- Online sources such as Herefordshirehistory.org.uk

SITE VISIT

- 8.4.4. Various plots of land within the study areas were visited in February and March 2017 and March 2018 in order to assess its character, and assess possible factors which may affect the survival or condition of known or potential assets identify any visible heritage assets. The heritage assets in the wider 1km study area were also visited to establish the nature and importance of their settings.

SETTING ASSESSMENT

- 8.4.5. The definition of setting used in this document is taken from the NPPF; setting is *'the surroundings in which an asset is experienced. Its extent is not fixed and may change as the asset and its surrounding evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral'* (Annex 2). Historic England³⁷ considers that the importance of setting lies in what it contributes to the significance of the heritage asset or to the ability to appreciate that significance. This depends on a wide range of physical elements within, as well as perceptual and associational attributes pertaining to, the heritage asset's surroundings.
- 8.4.6. Historic England discusses several other general considerations including: cumulative change; change over time; appreciating setting; buried assets and setting; designated settings; setting and urban design; and setting and economic viability and has provided a stepped approach to the assessment and importance of setting to heritage assets. The attributes of settings contribute to its sensitivity and its contribution to the significance of the asset. Table 8-1 presents examples of definitions for the sensitivity of settings but these should not be seen as exhaustive.

Table 8-1 - Definitions of Sensitivity for the Settings of Heritage Assets

Examples of sensitivity of settings	Contribution to significance of the asset
A defined setting that is contemporary with and historically and functionally linked with the heritage asset, may contain other heritage assets of international or national importance, has a very high degree of intervisibility with the asset and makes a very substantial contribution to both the significance of the heritage asset and to the understanding and appreciation of the significance of the asset.	Very substantial (very high)
Contemporary with and historically and functionally linked with the heritage asset, with minor alterations (in extent and/or character), has a high degree of intervisibility with the asset and which makes a substantial contribution to both the significance of the heritage asset and to the understanding and appreciation of the significance of the asset.	Substantial (high)
Contemporary with and/or historically and/or functionally linked with the heritage asset but with alterations which may detract from the understanding of the heritage asset, and/or with a moderate degree of intervisibility with the asset and/or which makes a moderate contribution to the significance of the heritage asset and/or a moderate contribution to the understanding and appreciation of the significance of the asset.	Moderate (medium)
Largely altered so that there is very little evidence of contemporaneous and/or historic and/or functional links with the heritage asset, and/or with a low degree of intervisibility with the asset and/or which makes a minor contribution to both the significance of the	Minor (low)

³⁷ Historic England (2017), Historic Environment Good Practice Advice in Planning Note 3, The Setting of Heritage Assets (2nd Edition), available online at <https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/>, accessed 01/05/2018.

Examples of sensitivity of settings	Contribution to significance of the asset
heritage asset and to the understanding and appreciation of the significance of the asset.	

- 8.4.7. Having assessed the contribution of the setting to the cultural heritage significance of the asset, the effect of a proposed development on the setting can be determined by consideration of the potential attributes of a proposed development affecting setting. Once the sensitivity and contribution of the setting has been determined and the potential attributes of a proposed development identified, the level of harm or beneficial impact of a proposed development needs to be evaluated. The criteria for assessing the level of harm are presented in Table 8-2.

8.5 INVESTIGATION, DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

- 8.5.1. The NPPF draws a distinction between archaeological remains of national or international importance and other remains considered to be of lesser significance. Those perceived to be of international or national importance may require preservation in situ, whilst those of lesser significance may undergo recording, where they are of Regional/County or Local/Borough significance. No physical impacts are expected upon any known nationally important assets as a result of the route options.
- 8.5.2. It is proposed that, where viable, preliminary archaeological investigations are undertaken within the preferred route to establish the nature, extent, significance and survival of both known and unknown below-ground archaeological remains. This is likely to comprise a geophysical survey, followed by an appropriate form of intrusive investigation such as archaeological trial trenching. The results of these investigations can be used to devise a suitable programme of mitigation where appropriate. Mitigation measures such as open area excavations would be devised in consultation with the County Archaeologist.
- 8.5.3. High quality design will be important for the preferred route that would have an adverse effect on the setting of heritage assets. This could include sensitive design to minimise the impact of high infrastructure (such as bridges), scale of cuttings and embankments for route options in particular Element 1 (Olive and Black 2, Orange, Cyan and Yellow). These will need to be carefully considered in Stage 3 as Element 1 would be located within Belmont Unregistered Park and Garden and Warham Unregistered Park and Garden, and close to Belmont Abbey, Belmont House and Warham House where it would interrupt the intervisibility between the historically associated assets.
- 8.5.4. In some instances, the scale, location, positioning and design of the road across the landscape would not accommodate suitable mitigation and the adverse effect would remain unchanged. Here, the opportunity to enhance the affected assets should be explored, such as the addition of interpretation panels at suitable locations and the opening up of lost key views from affected assets. Again, this is something that will result from a detailed assessment in Stage 3 following option selection.

8.6 POTENTIAL IMPACTS NON DESIGNATED ARCHAEOLOGICAL BELOW-GROUND AND EARTHWORK REMAINS

- 8.6.1. Archaeological remains including earthworks, structures and previously occupied sites (houses) are present within the route option dating from the Prehistoric to Industrial Period. There is also potential for unknown archaeological remains to be present which has been taken into consideration when assessing potential impacts of the options.
- 8.6.2. Full design proposals are as yet unknown and the magnitude of impact on archaeological remains would be largely influenced by the extent and depth of intrusive groundworks during construction. Intrusive works that have the potential to disturb below-ground and earthwork remains include, but are not limited to, the excavation for the road option, additional land allocated to ecological and flood compensation, associated services, compound areas, landscaping features, retaining ponds, geotechnical trial pits, temporary access routes and topsoil stripping. These works are likely to completely remove or partially disturb archaeological assets within their footprint.

Element 1

Olive & Black 1

- 8.6.3. Archaeological assets within these options are unlikely to be impacted due to the disturbance of land within Belmont House Unregistered Park and Garden (31136) in creating the modern golf course which may have already impacted the earthworks (23161), however the potential for unknown remains cannot be ruled out.

Orange

- 8.6.4. There are no known archaeological assets within this option however the potential for unknown remains cannot be ruled out. The disturbance of land within Belmont House Landscape Park (31136) in creating the modern golf course may have already impacted the earthworks (23161).

Cyan & Yellow, Red & Black 2

- 8.6.5. There are no known archaeological assets within these options however the potential for unknown remains cannot be ruled out. The disturbance of land within Belmont House Unregistered Park and Garden (31136) in creating the modern golf course may have already impacted the earthworks (23161).

Red & Black 2

- 8.6.6. There are no known archaeological assets within these options however the potential for unknown remains cannot be ruled out. The disturbance of land within Belmont House Unregistered Park and Garden (31136) in creating the modern golf course may have impacted the earthworks (23161).

Element 2

Orange

- 8.6.7. Ground disturbance has the potential to disturb archaeological and earthwork remains. Non-designated ridge and furrow (23210); linear feature, Huntington meadow (42839); Cottage (site of), north-west of Bovingdon, Hereford (19145); Cottage (site of), north-west of Bovingdon, Hereford (19149) are likely to be physically impacted by the option resulting in partial or full removal of the assets and any associated hitherto unknown archaeological remains.

Cyan

- 8.6.8. Ground disturbance has the potential to disturb archaeological and earthwork remains. There is potential for ground disturbance of archaeological remains within Burghill Hospital Landscape Park (31698); the site of boundary stones (23186); House (site of), Kings Acre, Hereford (19151); Linear Feature (42839) and Sluice Gates, The Bolts, Huntington (31960) are likely to be physically impacted by the option resulting in partial or full removal of the asset and any associated hitherto unknown archaeological remains.

Yellow

- 8.6.9. Ground disturbance has the potential to disturb archaeological and earthwork remains. The Site of Boundary Stones (23186); Linear Feature (42839); Cottage (site of), NW of Bovingdon, Hereford (19145); Cottage (site of), NW of Bovingdon, Hereford (19149); and Possible Lynchet, Burghill (23174) are likely to be physically impacted by the option resulting in partial or full removal of the asset and any associated hitherto unknown archaeological remains.

Red

- 8.6.10. Ground disturbance has potential to disturb archaeological remains. House (site of), Kings Acre, Hereford (19151); Linear Feature (42839), ridge and furrow (2310); Cottage (site of), NW of Bovingdon, Hereford (19145); and Cottage (site of), NW of Bovingdon, Hereford (19149) are likely to be physically impacted by the option resulting in partial or full removal of the asset and any associated hitherto unknown archaeological remains.

Olive

- 8.6.11. Ground disturbance has the potential to disturb archaeological remains. House (site of), Kings Acre, Hereford (19151); ridge and furrow (23210); Cottage (site of), NW of Bovingdon, Hereford (19145); Cottage (site of), NW of Bovingdon, Hereford (19149) and Linear Feature (42839) are likely to be physically impacted by the option resulting in partial or full removal of the asset and any associated hitherto unknown archaeological remains.

Black 1 & Black 2

- 8.6.12. There are no known archaeological assets within this option however the potential for unknown remains cannot be ruled out.

Element 3 – All Options

- 8.6.13. There are no known archaeological assets within this option however the potential for unknown remains cannot be ruled out.

DESIGNATED BUILT HERITAGE ASSETS (IMPACTS ON SETTING) AND LANDSCAPED PARKS

- 8.6.14. Potential adverse impacts upon the setting of designated assets from the route options are likely to include harm to the relationship between the individual assets and their settings so that the relationship is no longer readily appreciable. The interpretability of the significance of the asset can also be significantly reduced. A loss or reduction of rural tranquillity and / or where noise and air pollutants are likely to increase is also possible.

Element 1

Orange

- 8.6.15. This option would have adverse impacts on the setting of Belmont Abbey and associated assets by reducing historic views of the wider landscape which is functionally, historically and aesthetically linked to these assets. It is anticipated that increased noise levels associated with the route option will adversely impact the setting of the Barn and Granary at north of Clehonger Court (1099698 and 1301151), Merryhill Farmhouse and Stables (1167443 and 1099674) and Merryhill Landscape Park (Non-Designated). The setting of heritage assets at Breinton, Belmont and Warham estates will be adversely impacted by traffic noise deriving from the A438 and A4110.³⁸ The introduction of large development to this sensitive landscape is predicted to have an adverse impact on the setting of the landscape and those assets described above due to loss of appreciation and tranquillity.

Cyan & Yellow

- 8.6.16. These options would have adverse impacts on the setting of Belmont Abbey and associated assets by reducing historic views of the wider landscape which is functionally, historically and aesthetically linked to these assets. It is anticipated that increased noise levels associated with the route options will adversely impact the setting of the Barn and Granary at north of Clehonger Court (1099698 and 1301151), Merryhill Farmhouse and Stables (1167443 and 1099674), Merryhill Landscape Park (Non-Designated). The setting of heritage assets at Breinton, Belmont and Warham estates will be adversely impacted by traffic noise deriving from the A438 and A4110.³⁹ The introduction of large development to this sensitive landscape is predicted to have an adverse impact on the setting of the landscape and those assets described above due to loss of appreciation and tranquillity.

Red & Black 2

- 8.6.17. These options would have adverse impacts on the settings of a number of designated assets associated within the Belmont estate. The option would impact the landscape overlooked by Belmont Abbey, affecting inter-visibility with Grade II* listed Belmont House (1167079) and Belmont House Unregistered Park and Garden. Landscaped views between the assets would be substantially reduced which is functionally, historically and aesthetically linked to these assets. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of Belmont House (1167079) and Unregistered Park and Garden. In addition, the traversing road between Warham House (Non-Designated) and Grade II listed Warham Court (1099317) would visually isolate the two assets by reducing open views and inter-visibility.
- 8.6.18. The option would have adverse impacts on the settings of the two Grade II listed assets of Clehonger Barn (1099698) and granary (1301151) by reducing views of the wider agricultural landscape which is functionally, historically and aesthetically linked to these assets. It is anticipated that increased noise levels associated with

³⁸ Chapter 6, Noise and Vibration Assessment

³⁹ Chapter 6, Noise and Vibration Assessment

the route options will adversely affect the setting of the Barn and Granary at north of Clehonger Court (1099698 and 1301151), Merryhill Farmhouse and Stables (1167443 and 1099674), Merryhill Landscape Park (Non-Designated). The setting of heritage assets at Breinton, Belmont and Warham estates will be adversely impacted by traffic noise deriving from the A438 and A4110.⁴⁰ The introduction of large development to the landscape is predicted to have an adverse impact on the setting of the landscape and those assets described above due to loss of appreciation and tranquillity.

- 8.6.19. The option would have adverse impacts on the setting of the two Grade II listed assets of Merryhill farmhouse (1167443), stables (1099674) and Merry Hill Landscape Park (Non-Designated). The option is likely to increase noise and light levels in the rural landscape which is functionally, historically and aesthetically linked to these assets. The introduction of large development to this sensitive landscape is predicted to have an adverse impact on the setting of the landscape and those assets described above due to loss of appreciation and tranquillity.

Olive & Black 1

- 8.6.20. The option would have adverse impacts on the settings of a number of designated assets associated within the Belmont estate. The option would impact the landscape overlooked by Belmont House (1167079), Belmont Abbey and associated assets and Warham House (Non-Designated) which is functionally, historically and aesthetically linked to these assets. Views from Belmont House towards Warham House would be impacted in addition to views from the abbey towards Belmont House Unregistered Park and Garden. The introduction of large development to this sensitive landscape is predicted to have an adverse impact on the setting of the landscape and those assets described above due to loss of appreciation and tranquillity.
- 8.6.21. The option would have adverse impacts on the setting of designated assets the Grade II listed Almshouses and Chapel (1167068) and Grade II listed stables at Belmont Home Farmhouse (1099701), affecting inter-visibility with Belmont House and the abbey which are functionally, historically and aesthetically linked to these assets. There would also be adverse impacts on key views and inter-visibility between Warham House and Belmont House (1167079), by traversing through Warham Unregistered Park and Garden which is functionally, historically and aesthetically linked to these assets. It is anticipated that increased noise levels associated with proposed route options will adversely affect the setting of the Barn and Granary at north of Clehonger Court (1099698 and 1301151), Merryhill Farmhouse and Stables (1167443 and 1099674), Merryhill Landscape Park (Non-Designated). The setting of heritage assets at Breinton, Belmont and Warham estates will be adversely impacted by traffic noise deriving from the A438 and A4110. The introduction of large development to this sensitive landscape is predicted to have an adverse impact on the setting of the landscape and those assets described above due to loss of appreciation and tranquillity.
- 8.6.22. Adverse impacts on the setting of designated assets at Breinton, include the Grade II listed Church of St Michael (1296675) and associated assets, the Scheduled moated site (1001740) and the Grade II listed adjoining barns (1349004). Noise and light spill would impact the tranquillity of their rural setting, in addition to the introduction of movement and activity from the option which is likely to impact the tranquillity of its setting.

Element 2 – All Options

- 8.6.23. All options of Element 2 would have adverse impacts on Burghill Hospital Landscape Park (Non-Designated) by reducing open views from hospital buildings and cottages (Non-Designated), impacting the rural and tranquil setting of the assets. It is anticipated that increases in noise levels derived from all options of Element 2 will have an adverse impact on the settings of the Farmhouse at Upper Hill Farm (1393549), Burghill Hospital Landscape Park and associated assets, Huntington Conservation Area and the assets within it. Options Olive and Black 1 would also have adverse impacts on the Farmhouse at Upper Hill Farm (1393549) by severing existing farmland and open views associated with the asset.

Element 3 – All Options

- 8.6.24. All options would have adverse impacts to the setting of the Grade I listed Church of Bartholomew (1099290) and associated church assets. The option would sever adjacent fields and impact open views from the church. It is anticipated that all options of Element 3 will have a negligible to moderate beneficial noise impact on the settings of Holmer House (1296577), St. Bartholomew's Church (1099290) and associated assets, Summer

⁴⁰ Op Cit.

House at Holmer Park (135469), Holmer Park Landscape Park (Non-Designated) and Copelands House (1099292).

ASSESSMENT OF EFFECTS

- 8.6.25. An assessment of the significance of the effects on the setting of designated assets and including non-designated parks and gardens and the physical impacts on non-designated assets are presented per option in Tables 8-4 to 8-15. Where an asset is not listed below, it is considered that they are unlikely to be harmed by that option.

Assessment of effects on the setting of heritage assets

- 8.6.26. The criteria given in Table 8-2 below are used to determine the level of harm / benefit on the setting of a heritage asset.

Table 8-2: Criteria for Assessment of the level of harm / benefit on the Setting of a Heritage Assets

Level of Harm or Benefit	Guideline Criteria
Major beneficial	The contribution of setting to the cultural heritage asset's significance is considerably enhanced as a result of the development; a lost relationship between the asset and its setting is restored, or the legibility of the relationship is greatly enhanced. Elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance are removed.
Moderate beneficial	The contribution of setting to the cultural heritage asset's significance is enhanced to a clearly appreciable extent as a result of the development; as a result the relationship between the asset and its setting is rendered more readily apparent. The negative effect of elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance is appreciably reduced.
Minor beneficial	The setting of the cultural heritage asset is slightly improved as a result of the development, slightly improving the degree to which the setting's relationship with the asset can be appreciated.
Negligible	The setting of the cultural heritage asset is changed by the development in ways that do not alter the contribution of setting to the asset's significance.
Less than substantial harm:	
Minor harm (Slight Adverse)	The contribution of the setting of the cultural heritage asset to its significance is slightly degraded as a result of the development, but without adversely affecting the interpretability of the asset and its setting; characteristics of historic value can still be appreciated, the changes do not strongly conflict with the character of the site, and could be easily reversed to approximate the pre-development conditions.
Harm (Moderate Adverse)	The contribution of the setting of the cultural heritage asset to its significance is reduced appreciably as a result of the development. Relevant setting characteristics can still be appreciated but less readily.
Substantial harm (Large Adverse)	The contribution of the setting of the cultural heritage asset to its significance is effectively lost or substantially reduced as a result of the development, the relationship between the asset and its setting is no longer readily appreciable.

- 8.6.27. The following matrix (Table 8-3) is used to determine the significance of effect on heritage assets (excluding settings).

Table 8-3 - Significance of Effect on Heritage Assets

		Magnitude of impact (degree of harm)				
		No change	Negligible	Minor	Moderate	Major
Heritage Asset Value (Sensitivity)	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight
		Significance of effect				

Element 1

Olive & Black 1

- 8.6.28. Within Element 1 a total of 23 heritage assets are expected to be affected by the Olive & Black 1 route options. These include one Scheduled Monument, two Grade II* listed buildings, 13 Grade II listed buildings, one conservation area and six non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-4.

Orange

- 8.6.29. Within Element 1 a total of 34 heritage assets are expected to be affected by the Orange route option. These include one Scheduled Monument, two Grade II* listed buildings, 23 Grade II listed buildings, one conservation area and 7 non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-5.

Cyan & Yellow

- 8.6.30. Within Element 1 a total of 28 heritage assets are expected to be affected by the Cyan & Yellow route options. These include one Scheduled Monument, two Grade II* listed buildings, eighteen Grade II listed buildings, one conservation area and six non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-6.

Red & Black 2

- 8.6.31. Within Element 1 a total of 29 heritage assets are expected to be affected by the Red & Black 2 route options. These include one Scheduled Monument, two Grade II* listed buildings, eighteen Grade II listed buildings, one conservation area and seven non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-7.

Table 8-4 - Significance of effect on the Historic Environment in Element 1 from Olive & Black 1 route options

Name / NHLE Ref Number	Sensitivity of the asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Grade II* listed Belmont House (1167079) and non-designated Belmont Landscape Park (31136) Field surveyed earthwork (23161)	High / Moderate (National / Regional)	These options would cross the eastern extent of Belmont House Landscape Park on inclined infrastructure towards the River Wye and Warham House. As the options would include high infrastructure such as bridges, glimpsed views from the house across this open landscape could be reduced, interrupting intervisibility between other assets from the Belmont Estate (Belmont Abbey, Almshouse and Chapel, and stables at Belmont Home Farm). It is likely to be seen from a key view of Belmont House which would introduce a conspicuous modern and dynamic element to a tranquil and rural landscape, strongly conflicting with the character of the setting. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets. Archaeological assets within this option are unlikely to be impacted due to the disturbance of land within Belmont House Landscape Park in creating the modern golf course which may have already impacted the earthworks (23161), however the potential for unknown remains cannot be ruled out. There are no known archaeological assets within this option however the potential for unknown remains cannot be ruled out. The disturbance of land within Belmont House Landscape Park (31136) in creating the modern golf course may have already impacted the earthworks (23161).	Moderate	Substantial Harm (Large Adverse)	Permanent
Grade II listed Walled Garden north-west of Belmont House (1411713) and Grade II listed Stone and Plaque (1099702)	All High (National)	These options pass to the far north of the assets which are enclosed within a private property set back from the park, therefore it is unlikely that the options would impact the setting of the assets which have been lost over time.	Negligible	Neutral	Permanent
Belmont Abbey – Grade II* listed Abbey Church of St Michael of All Angels (1099699), Grade II listed associated assets: Gates and gate piers of Abbey Church (1166999), Monastery Buildings of the Benedictine Abbey of St Michael of All Angels (1167050), School, Chapel of St Peter and St Paul, and House south of the Abbey (1348796), Statue south-west of west porch of the Abbey Church (1099700), The Lynch Gate, Curved Walls and Piers north of graveyard of the Abbey Church (1411804)	All High (National)	These options interrupt land to the north, east and west of the assets due to high infrastructure, such as bridges, severing land between the Abbey and Belmont Landscape Park. Hilltop views to the wider landscape would be reduced by the option introducing a conspicuous modern and dynamic element to a tranquil and rural landscape, strongly conflicting with the character of the setting and interrupting intervisibility between other assets from the Belmont Estate (Belmont Abbey, Almshouse and Chapel, and stables at Belmont Home Farm). It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Substantial Harm (Large Adverse)	Permanent
Grade II listed Almshouses and Chapel (1167068) and Grade II listed Stables north-east of Belmont Home Farmhouse (1099701)	All High (National)	These options would potentially reduce the inter-visibility between the assets towards Belmont House and Belmont Abbey. Glimpsed views of the wider landscape could potentially be impacted by the options, thus detaching the assets from their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Warham Court (1099317), non-designated Warham House (4802), non-designated Warham House Landscape Park (34070), Non-designated Warham Medieval Settlement (25886)	High (National)/ Moderate (Regional)/ Moderate (Regional)/ Regional (Moderate) for non-designated	Embankments associated with the options would cut through a section of Warham Landscape Park, disrupting key landscaped views between Warham House and Belmont House across the River Wye. The introduction of activity is likely to increase noise and light levels which would substantially impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets. The medieval settlement in Warham is close to the option and hitherto unknown archaeological remains could be impacted by intrusive construction works.	Moderate	Substantial Harm (Large Adverse)	Permanent
Broomy Hill Conservation Area	High (National)	These options are in the far distance of the Conservation Area and confined in its immediate setting with limited outward views. Therefore the route options would have minimal impacts to the asset or its setting.	Negligible	Neutral	Permanent
Grade II listed Breinton House (1099315), non-designated Breinton House and Landscape Park (23044), non-designated Breinton Court and Landscape Park (34057), Scheduled Moated Site south-west of the church (1001740), Grade II listed Church of	High (National) for all designated /Regional (Moderate) for	These options are in close distance to the moat, church and associated church listings which are enclosed within a shared setting. While tree coverage limits views of the wider setting, the assets, in addition to the barn at Upper Hill Farm, are likely to experience increases in noise and light spill associated with the Route. Embankment cuttings could potentially sever farm land linked with the barn and interrupt landscaped views	Moderate	Harm (Moderate Adverse)	Permanent

St. Michael (1296675), Grade II Two adjoining barns north-west of Church of St Michael (1349004)	the parks and gardens	associated with its historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.			
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Table 8-5 - Significance of effect on the Historic Environment in Element 1 from Orange route options

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Grade II* listed Belmont House (1167079) and non-designated Belmont Landscape Park (31136) Field Surveyed Earthwork (23161)	High (National) for all designated /Regional (Moderate) for the parks and gardens/Regional (Moderate) for non-designated	The option crosses the eastern extent of Belmont Landscape Park on inclined infrastructure towards the River Wye and Warham House. As the option would be high infrastructure such as bridges, glimpsed views from the house across this open landscape could be reduced, interrupting intervisibility between other assets from the Belmont Estate (Belmont Abbey, Almshouse and Chapel, and stables at Belmont Home Farm). It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets. There are no known archaeological assets within this option however the potential for unknown remains cannot be ruled out. The disturbance of land within Belmont House Landscape Park (31136) in creating the modern golf course may have already impacted the earthworks (23161).	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Walled Garden north-west of Belmont House (1411713) and Grade II listed Stone and Plaque (1099702)	High (National) for all designated	As the option is in far distance to the assets which are enclosed within their immediate settings, there would be no interruption to their settings.	Negligible	Neutral	Permanent
Belmont Abbey – Grade II* listed Abbey Church of St Michael of All Angels (1099699), Grade II listed associated assets: Gates and gate piers of Abbey Church (1166999), Monastery Buildings of the Benedictine Abbey of St Michael of All Angels (1167050), School, Chapel of St Peter and St Paul, and House south of the Abbey (1348796), Statue south-west of west porch of the Abbey Church (1099700), The Lynch Gate, Curved Walls and Piers north of graveyard of the Abbey Church (1411804)	High (National) for all designated	The option interrupts land to the immediate west of the Abbey, restructuring the streetscape and traversing across Belmont Landscaped Park on a steep incline interrupting intervisibility between other assets from the Belmont Estate (Belmont Abbey, Almshouse and Chapel, and stables at Belmont Home Farm), in particular framed views created by two protected conifer trees. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Substantial Harm (Large Adverse)	Permanent
Grade II listed Almshouses and Chapel (1167068) and Grade II listed Stables north-east of Belmont Home Farmhouse (1099701)	High (National) for all	The option would potentially reduce the inter-visibility between the assets towards Belmont House and Belmont Abbey. Glimpsed views of the wider landscape could potentially be impacted, thus detaching the assets from their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Warham Court (1099317), non-designated Warham House (4802), non-designated Warham House Landscape Park (34070)	High (National) for all designated /Regional (Moderate) for all others	Embankments associated with the option are likely to sever rural land and inter-visibility between Warham Court and Warham House, while the introduction of activity is likely to increase noise and light levels which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Substantial Harm (Large Adverse)	Permanent
Broomy Hill Conservation Area	High (National)	The option is in far distance of the Conservation Area and confined in its immediate setting with limited outward views. Therefore the Route would have minimal impacts to the asset or its setting.	Negligible	Neutral	Permanent
Grade II listed Breinton House (1099315), non-designated Breinton House and Landscape Park (23044), non-designated Breinton Court and Landscape Park (34057), Scheduled Moated Site south-west of the church (1001740), Grade II listed Church of St. Michael (1296675),	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is in far distance to the moat, church and associated church listings which are enclosed within a shared setting. While tree coverage limits views of the wider setting, the assets, in addition to the barn at Upper Hill Farm, may experience increases in noise and light spill associated with the Route. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Minor	Minor Harm (Slight Adverse)	Permanent

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Grade II Two adjoining barns north-west of Church of St Michael (1349004)					
Huntington Conservation Area and Grade II listed assets within it - Huntington House (1298843), Huntington Court Farm and Granary (1297409), Church of St Mary Magdalene (1196847), Huntington Court (1024992), non-designated Huntington Court Landscape Park (31173)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is in close proximity to Huntington Conservation Area and assets within it. Outward views are majorly screened by trees, with possible glimpsed views of the option. It is likely that the assets would experience increases in noise and light levels which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Merryhill Farmhouse (1167443), Grade II listed Stables north west of Merryhill Farmhouse (1099674), non-designated Merry Hill Landscape Park (25453)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is within far distance of the assets, separated by woodland in the direction of the Route. Despite this separation, movement and activity derived from the Route is likely to increase noise and light levels, impacting the setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Minor	Minor Harm (Slight Adverse)	Permanent
Grade II listed Barn north of Clehonger Court (1099698), Grade II listed Granary north-east of Clehonger Court (1301151)	High (National) for all designated	The option is within close distance to the barn and granary. High infrastructure and embankment cutting of adjacent land would reduce views of the wider agricultural setting. The introduction of movement and activity would increase noise and light levels, impact the setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Milestone at NGR SO475373 (1167452)	High (National) for all designated	The option is within far distance of the location of the asset which has disappeared over time. The absence of the asset means that there is no impact on its setting.	No Change	Neutral	Permanent

Table 8-6 - Significance of effect on the Historic Environment in Element 1 from Cyan & Yellow route options

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Grade II* listed Belmont House (1167079) and non-designated Belmont Landscape Park (31136) Field Survey Earthworks (23161)	High (National) for all designated /Regional (Moderate) for the parks and gardens / Regional (Moderate) for non-designated	These options cross the eastern extent of Belmont Landscape Park on inclined infrastructure towards the River Wye and Warham House. As the option would be high infrastructure such as bridges, glimpsed views from the house across this open landscape could be reduced, interrupting intervisibility between other assets from the Belmont Estate (Belmont Abbey, Almshouse and Chapel, and stables at Belmont Home Farm). It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets. There are no known archaeological assets within this option however the potential for unknown remains cannot be ruled out. The disturbance of land within Belmont House Landscape Park (31136) in creating the modern golf course may have impacted the earthworks (23161).	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Walled Garden north-west of Belmont House (1411713) and Grade II listed Stone and Plaque (1099702)	High (National) for all designated	As the options are in far distance to the assets and enclosed within their immediate settings, there would be no interruption to their settings which have already been lost.	Negligible	Neutral	Permanent
Belmont Abbey – Grade II* listed Abbey Church of St Michael of All Angels (1099699), Grade II listed associated assets: Gates and gate piers of Abbey Church (1166999), Monastery Buildings of the Benedictine Abbey of St Michael of All Angels (1167050), School, Chapel of St Peter and St Paul, and House south of the Abbey (1348796), Statue south-west of west porch of the Abbey Church (1099700), The Lynch Gate, Curved Walls and Piers north of graveyard of the Abbey Church (1411804)	High (National) for all designated	The options interrupts land to the immediate west of the Abbey, restructuring the streetscape and traversing across Belmont Landscaped Park on a steep incline interrupting inter-visibility between other assets from the Belmont Estate (Belmont Abbey, Almshouse and Chapel, and stables at Belmont Home Farm), in particular framed views created by two protected conifer trees. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Substantial harm (Large Adverse)	Permanent

Grade II listed Almshouses and Chapel (1167068) and Grade II listed Stables north-east of Belmont Home Farmhouse (1099701)	High (National) for all designated	The options would potentially reduce the inter-visibility between the assets towards Belmont House and Belmont Abbey. Glimpsed views of the wider landscape could potentially be impacted, thus detaching the assets from their historical context.	Moderate	Substantial harm (Large Adverse)	Permanent
Grade II listed Warham Court (1099317), non-designated Warham House (4802), non-designated Warham House Landscape Park (34070)	High (National) for all designated /Regional (Moderate) for all others	Embankments associated with the options would sever rural land and inter-visibility between Warham Court and Warham House, while the introduction of activity is likely to increase noise and light levels would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Substantial harm (Large Adverse)	Permanent
Broomy Hill Conservation Area	High (National)	The options is in far distance of the Conservation Area and confined in its immediate setting with limited outward views. Therefore the Route would have minimal impacts to the asset or its setting.	Negligible	Neutral	Permanent
Grade II listed Breinton House (1099315), non-designated Breinton House and Landscape Park (23044), non-designated Breinton Court and Landscape Park (34057), Scheduled Moated Site south-west of the church (1001740), Grade II listed Church of St. Michael (1296675), Grade II Two adjoining barns north-west of Church of St Michael (1349004)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is in far distance to the moat, church and associated church listings which are enclosed within a shared setting. While tree coverage limits views of the wider setting, the assets, in addition to the barn at Upper Hill Farm, may experience increases in noise and light spill associated with the Route. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Minor	Harm (Slight Adverse)	Permanent
Grade II listed Merryhill Farmhouse (1167443), Grade II listed Stables north west of Merryhill Farmhouse (1099674), non-designated Merry Hill Landscape Park (25453)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The options are within far distance of the assets, separated by woodland in the direction of the Route. Despite this separation, movement and activity derived from the Route is likely to increase noise and light levels, impacting the setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Minor	Harm (Moderate Adverse)	Permanent
Grade II listed Barn north of Clehonger Court (1099698), Grade II listed Granary north-east of Clehonger Court (1301151)	High (National) for all designated	The option is within close distance to the barn and granary. High infrastructure and embankment cutting of adjacent land would reduce views of the wider agricultural setting. The introduction of movement and activity would increase noise and light levels, impact the setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Milestone at NGR SO475373 (1167452)	High (National) for all designated	The option is within far distance of the location of the asset which has disappeared over time. The absence of the asset means that there is no impact on its setting.	No Change	Neutral	Permanent

Table 8-7 - Significance of effect on the Historic Environment in Element 1 from Red & Black 2 route options

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Grade II* listed Belmont House (1167079) and non-designated Belmont Landscape Park (31136) Field Survey Earthwork (23161)	High (National) for all designated /Regional (Moderate) for the parks and gardens /Regional (Moderate) for non-designated	These options cross the eastern extent of Belmont Landscape Park on inclined infrastructure towards the River Wye and Warham House. As the option would be high infrastructure such as bridges, glimpsed views from the house across this open landscape could be reduced, interrupting intervisibility between other assets from the Belmont Estate (Belmont Abbey, Almshouse and Chapel, and stables at Belmont Home Farm). It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets. There are no known archaeological assets within this option however the potential for unknown remains cannot be ruled out. The disturbance of land within Belmont House Landscape Park (31136) in creating the modern golf course may have impacted the earthworks (23161).	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Walled Garden north-west of Belmont House (1411713) and Grade II listed Stone and Plaque (1099702)	High (National) for all designated	As the options are in far distance to the assets and enclosed within their immediate settings, there would be no interruption to their settings which have already been lost.	Negligible	Neutral	Permanent

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Belmont Abbey – Grade II* listed Abbey Church of St Michael of All Angels (1099699), Grade II listed associated assets: Gates and gate piers of Abbey Church (1166999), Monastery Buildings of the Benedictine Abbey of St Michael of All Angels (1167050), School, Chapel of St Peter and St Paul, and House south of the Abbey (1348796), Statue south-west of west porch of the Abbey Church (1099700), The Lynch Gate, Curved Walls and Piers north of graveyard of the Abbey Church (1411804)	High (National) for all designated	Hilltop views from the assets to the wider landscape would be affected by these options and introduce a conspicuous modern and dynamic element to a tranquil and rural landscape, thus strongly conflicting with the character of the setting. Long distant key views towards Hereford/Hereford Cathedral from the Abbey would be reduced and interrupt intervisibility between other assets from the Belmont Estate (Belmont Abbey, Almshouse and Chapel, and stables at Belmont Home Farm). It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Substantial harm (Large Adverse)	Permanent
Grade II listed Almshouses and Chapel (1167068) and Grade II listed Stables north-east of Belmont Home Farmhouse (1099701)	High (National) for all designated	The options would potentially reduce the inter-visibility between the assets towards Belmont House and Belmont Abbey. Glimpsed views of the wider landscape could potentially be impacted, thus detaching the assets from their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Warham Court (1099317), non-designated Warham House (4802), non-designated Warham House Landscape Park (34070)	High (National) for all designated /Regional (Moderate) for the parks and gardens	Embankments associated with the options are likely to sever rural land and inter-visibility between Warham Court and Warham House, while the introduction of activity is likely to increase noise and light levels which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Moderate	Substantial Harm (Large Adverse)	Permanent
Broomy Hill Conservation Area	High (National) for all designated	The options are in far distance of the Conservation Area and confined in its immediate setting with limited outward views. Therefore the Route would have minimal impacts to the asset or its setting.	Negligible	Neutral	Permanent
Grade II listed Breinton House (1099315), non-designated Breinton House and Landscape Park (23044), non-designated Breinton Court and Landscape Park (34057), Scheduled Moated Site south-west of the church (1001740), Grade II listed Church of St. Michael 1296675), Grade II Two adjoining barns north-west of Church of St Michael (1349004) , Non-Designated Warham Farm, Breinton (45685)	High (National) for all designated /Regional (Moderate) for all others	The options are in far distance to the moat, church and associated church listings which are enclosed within a shared setting. While tree coverage limits views of the wider setting, the assets, in addition to the barn at Upper Hill Farm, are likely to experience increases in noise and light spill associated with the Route. The option are likely to be severed by embankment cuttings from Black 2 resulting in partial or full removal of the asset and associated hitherto unknown archaeological remains are likely to be impacted by intrusive construction works. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Minor	Harm (Moderate Adverse)	Permanent
Grade II listed Merryhill Farmhouse (1167443), Grade II listed Stables north west of Merryhill Farmhouse (1099674), non-designated Merry Hill Landscape Park (25453)	High (National) for all designated /Regional (Moderate) for	The option are within far distance of the assets, separated by woodland in the direction of the Route. Despite this separation, movement and activity derived from the Route is likely to increase noise and light levels, impacting the setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route options will have an adverse effect on the setting of heritage assets.	Minor	Minor Harm (Slight Adverse)	Permanent
Grade II listed Barn north of Clehonger Court (1099698), Grade II listed Granary north-east of Clehonger Court (1301151)	High (National) for all designated	The options are within close distance to the barn and granary. High infrastructure and embankment cutting of adjacent land would reduce views of the wider agricultural setting. The introduction of movement and activity would increase noise and light levels, impact the setting of the assets in their historical context.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Milestone at NGR SO475373 (1167452)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The options are within far distance of the location of the asset which has disappeared over time. The absence of the asset means that there is no impact on its setting.	No Change	Neutral	Permanent

Element 2

Orange

- 8.6.32. Within Element 2 a total of 12 heritage assets are expected to be affected by the Orange route option. These include two Scheduled Monuments, five Grade II listed buildings and five non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in the Table 8-8.

Yellow

- 8.6.33. Within Element 2 a total of 11 heritage assets are expected to be affected by the Yellow route option. These include two Scheduled Monuments, five Grade II listed buildings and four non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-9.

Cyan

- 8.6.34. Within Element 2 a total of 12 heritage assets are expected to be affected by the Cyan route option. These include two Scheduled Monuments, five Grade II listed buildings and five non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in the Table 8-10.

Red

- 8.6.35. Within Element 2 a total of 12 heritage assets are expected to be affected by the Red route option. These include two Scheduled Monuments, five Grade II listed buildings and five non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-11.

Olive

- 8.6.36. Within Element 2 a total of 12 heritage assets are expected to be affected by the Olive route option. These include two Scheduled Monuments, five Grade II listed buildings and five non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-12.

Black 2

- 8.6.37. Within Element 2 a total of 12 heritage assets are expected to be affected by the Black 2 route option. These include one Scheduled Monument, seven Grade II listed buildings, one conservation area and three non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-13.

Black 1

- 8.6.38. Within Element 2 a total of 12 heritage assets are expected to be affected by the Black 1 route option. These include one Scheduled Monument, seven Grade II listed buildings, one conservation area and three non-designated assets. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-14.

Element 3 – All Options

- 8.6.39. Within Element 3 a total of 9 heritage assets are expected to be affected from all route options. These include two Scheduled Monuments, one Grade I listed building, five Grade II listed buildings and one non-designated asset. Adverse effects are also anticipated on hitherto unknown below-ground archaeology. The assessment of these assets is presented in Table 8-15.

Table 8-8 - Significance of effect on the Historic Environment in Element 2 from the Orange route option

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Non-designated Burghill Hospital Landscape Park (31698), Hospital buildings and cottages (Un-Designated) Non-designated Ridge and Furrow (23210), Linear Feature (42839), Cottage (site), NW of Bovingdon, Hereford (19145), Cottage (site), NW of Bovingdon, Hereford (19149)	Regional (Moderate) for the parks and gardens/ Regional (Moderate) for non-designated	Embankment cuttings would partially sever land of Burghill Hospital Landscape Park and high infrastructure would interrupt open views which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets. Ground disturbance has the potential to disturb archaeological and earthwork remains which are likely to be physically by the option resulting in partial or full removal of the asset and any associated hitherto unknown archaeological remains	Moderate	Harm (Moderate Adverse)	Permanent
Huntington Conservation Area and Grade II listed assets within it - Huntington House (1298843), Huntington Court Farm and Granary (1297409), Church of St Mary Magdalene (1196847), Huntington Court (1024992), non-designated Huntington Court Landscape Park (31173)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is in close proximity to Huntington Conservation Area and assets within it. Outward views are majorly screened by trees, with possible glimpsed views of the option. It is likely that the assets would experience increases in noise and light levels which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Bridge south east of Stretton Court (1349018), Grade II listed Barn west of Little Burlton Farmhouse (1099278)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is within far distance of the assets and are considerably enclosed within their immediate settings. There would	Negligible	Neutral	Permanent

		be no impact on the setting of the assets within their historical context.			
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Table 8-10 - Significance of effect on the Historic Environment in Element 2 from the Cyan route option

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Non-designated Burghill Hospital Landscape Park (31698), Hospital buildings and cottages (non-designated) Site of Boundary Stones (23186), House (site of), Kings Acre, Hereford (19151); Linear Feature (42839) and Sluice Gates, The Bolts, Huntington (31960)	Regional (Moderate) for the parks and gardens/ Regional (Moderate) for non-designated	Embankment cuttings would partially sever land of Burghill Hospital Landscape Park and high infrastructure would interrupt open views which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets. Ground disturbance has the potential to disturb archaeological and earthwork remains, resulting in partial or full removal of the asset and associated hitherto unknown archaeological remains	Moderate	Harm (Moderate Adverse)	Permanent
Huntington Conservation Area and Grade II listed assets within it - Huntington House (1298843), Huntington Court Farm and Granary (1297409), Church of St Mary Magdalene (1196847), Huntington Court (1024992), non-designated Huntington Court Landscape Park (31173), Non-Designated Sluice Gates, The Bolts, Huntington (31960)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is in close proximity to Huntington Conservation Area and assets within it. Outward views are majorly screened by trees, with possible glimpsed views of the option. It is likely that the assets would experience increases in noise and light levels which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets. The non-designated sluice gates are likely to be physically impacted by the roundabout at	Minor	Minor Harm (Slight Adverse)	Permanent

		the Roman Road resulting in partial or full removal of the asset and any associated hitherto unknown archaeological remains.			
Scheduled Medieval Bridge north east of Stretton Court Farm (1017923), Grade II listed Bridge south east of Stretton Court (1349018), Grade II listed Barn west of Little Burlton Farmhouse (1099278)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is within far distance of the assets and are considerably enclosed within their immediate settings. No impact on the setting of the assets within their historical context.	Negligible	Neutral	Permanent

Table 8-11 - Significance of effect on the Historic Environment in Element 2 from the Red route option

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Non-designated Burghill Hospital Landscape Park (31698), Hospital buildings and cottages (Un-Designated), Non-Designated House (site), Kings Acre, Hereford (19151), Ridge and Furrow (23210), Cottage (site), NW of Bovingdon, Hereford (19145), Cottage (site), NW of Bovingdon, Hereford (19149)	Regional (Moderate) for the parks and gardens/ Regional (Moderate) for non-designated	Embankment cuttings would partially sever land of Burghill Hospital Landscape Park and high infrastructure would interrupt open views and impact the rural, tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets. Ground disturbance has the potential to disturb archaeological remains which are likely to be physically impacted by the option resulting in partial or full removal of the asset and any unknown archaeological remains.	Moderate	Harm (Moderate Adverse)	Permanent
Huntington Conservation Area and Grade II listed assets within it - Huntington House (1298843), Huntington Court Farm and Granary (1297409), Church of St Mary Magdalene (1196847), Huntington Court (1024992), non-designated Huntington Court Landscape Park (31173), Non-Designated Ridge and Furrow, Breinton (23210), Non-Designated Linear Feature, Huntington Meadow (42839)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is in close proximity to Huntington Conservation Area and assets within it. Outward views are majorly screened by trees, with possible glimpsed views of the option. It is likely that the assets would experience increases in noise and light levels which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets. The archaeological remains are likely to be impacted by the option near Huntington resulting in partial or full removal of the asset and any unknown archaeological remains.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Bridge south east of Stretton Court (1349018), Grade II listed Barn west of Little Burlton Farmhouse (1099278)	High (National) for all designated	The option is within far distance of the assets and are considerably enclosed within their immediate settings. There would be no impact on the setting of the assets within their historical context.	Negligible	Neutral	Permanent

Table 8-12 - Significance of effect on the Historic Environment in Element 2 from the Olive route option

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Grade II listed Farmhouse, attached barn and threshing barn at Upper Hill Farm, Breinton (1393549) - designated House (site of), Kings Acre, Hereford (19151), Ridge and Furrow (23210), Cottage (site of), NW of Bovingdon, Hereford (19145), Cottage (site of), NW of Bovingdon, Hereford (19149) and Linear Feature (42839)	High (National) for all designated / Regional (Moderate) for non-designated	Embankment cuttings would sever rural fields and associated farmland in addition to high infrastructure which would interrupt open views and the skyline towards Hereford, impacting the rural and tranquil setting of the asset in its historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets. Ground disturbance has the potential to disturb archaeological remains which are likely to be physically impacted by the option resulting in partial or full removal of the asset and any associated hitherto unknown archaeological remains.	Moderate	Harm (Moderate Adverse)	Permanent
Non-designated Burghill Hospital Landscape Park (31698), Hospital buildings and cottages (non-designated)	Regional (Moderate) for the parks and gardens	Embankment cuttings would partially sever land of Burghill Hospital Landscape Park and high infrastructure would interrupt open views which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Huntington Conservation Area and Grade II listed assets within it - Huntington House (1298843), Huntington Court Farm and Granary (1297409), Church of St Mary Magdalene (1196847), Huntington Court (1024992), non-designated Huntington Court Landscape Park (31173)	High (National) for all designated /Regional (Moderate) for the parks and gardens	Outward views are majorly screened by trees, with possible glimpsed views of the option. It is likely that the assets would experience increases in noise and light levels which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Bridge south east of Stretton Court (1349018), Grade II	High (National) for	The option is within far distance of the assets which are considerably enclosed within their immediate settings.	Negligible	Neutral	Permanent

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
listed Barn west of Little Burlton Farmhouse (1099278)	all designated	There would be no impact on the setting of the assets within their historical context.			

Table 8-13 - Significance of effect on the Historic Environment in Element 2 from the Black 2 route option

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Non-designated Burghill Hospital Landscape Park (31698), Hospital buildings and cottages (Un-Designated)	Regional (Moderate) for the parks and gardens	Embankment cuttings would partially sever land of Burghill Hospital Landscape Park and high infrastructure would interrupt open views which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Huntington Conservation Area and Grade II listed assets within it - Huntington House (1298843), Huntington Court Farm and Granary (1297409), Church of St Mary Magdalene (1196847), Huntington Court (1024992), non-designated Huntington Court Landscape Park (31173)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is in far distance to Huntington Conservation Area and assets within it. Outward views are majorly screened by trees, with possible glimpsed views of the option. It is unlikely that the assets would be impacted by this option. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets.	Moderate	Minor harm (Slight Adverse)	Permanent
Scheduled Medieval Bridge north east of Stretton Court Farm (1017923), Grade II listed Bridge south-east of Stretton Court (1349018), Grade II listed Barn west of Little Burlton Farmhouse (1099278)	High (National) for all designated	The option is within far distance of the assets and they are considerably enclosed within their immediate settings. There would be no impact on the setting of the assets within their historical context.	Negligible	Neutral	Permanent

Table 8-14 - Significance of effect on the Historic Environment in Element 2 from the Black 1 route option

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Grade II listed Farmhouse, attached barn and threshing barn at Upper Hill Farm, Breinton (1393549)	High (National) for all designated	Embankment cuttings would sever rural fields and associated farmland in addition to high infrastructure which would interrupt open views and the skyline towards Hereford, impacting the rural and tranquil setting of the asset in its historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Non-designated Burghill Hospital Landscape Park (31698), Hospital buildings and cottages (Un-Designated)	Regional (Moderate) for the parks and gardens	Embankment cuttings associated with Element 2 (all options) would partially sever land of Burghill Hospital Landscape Park and high infrastructure would interrupt open views which would impact the rural and tranquil setting of the assets in their historical context. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets.	Moderate	Moderate Adverse	Permanent
Huntington Conservation Area and Grade II listed assets within it - Huntington House (1298843), Huntington Court Farm and Granary (1297409), Church of St Mary Magdalene (1196847), Huntington Court (1024992), non-designated Huntington Court Landscape Park (31173)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The option is in far distance to Huntington Conservation Area and assets within it. Outward views are majorly screened by trees, with possible glimpsed views of the option. It is unlikely that the assets would be packed by this option. It is anticipated that increased noise levels associated with the route option will have an adverse effect on the setting of heritage assets.	Moderate	Minor Harm (Slight Adverse)	Permanent
Scheduled Medieval Bridge north east of Stretton Court Farm (1017923), Grade II listed Bridge south east of Stretton Court	High (National) for all designated	The option is within far distance of the assets and are considerably enclosed within their immediate settings. There would be no impact	Negligible	Neutral	Permanent

(1349018), Grade II listed Barn west of Little Burlton Farmhouse (1099278)		on the setting of the assets within their historical context.			
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Table 8-15 - Significance of effect on the Historic Environment in Element 3 from all route options

Name / NHLE Ref Number	Sensitivity of the Asset	Nature of the Impact	Magnitude of Harm	Significance of Effect	Duration of Effect
Grade I listed Church of St. Bartholomew (1099290), Scheduled Churchyard cross (1016345), Grade II Detached bell tower (1168081), Grade II listed Triangular-shaped pedestal tomb (1296573), Grade II listed Holmer House (1296577)	High (National) for all designated	Embankment cuttings and high infrastructure would sever adjacent fields and impact open views from the church. It is anticipated that increased noise levels associated with all route options will have an adverse effect on the setting of heritage assets.	Moderate	Harm (Moderate Adverse)	Permanent
Grade II listed Summer House at Holmer Park (1385469), Non-designated Holmer Park Landscape Park (31171), Grade II listed Copelands House (1099292)	High (National) for all designated /Regional (Moderate) for the parks and gardens	The options are within far distance of the assets which are confined within their immediate settings. Therefore it is unlikely that the option would impact the setting of the assets in their historical context. It is anticipated that increased noise levels associated with all route options will have an adverse effect on the setting of heritage assets.	Negligible	Neutral	Permanent
Scheduled Churchyard cross in St Peter's Churchyard (1016344)	High (National) for all designated	The options are within far distance of the asset and is considerably enclosed within its immediate setting of the churchyard. The options would have no impact on the setting of the asset within its historical context.	Negligible	Neutral	Permanent

8.7 CONCLUSION

- 8.7.1. Elements 1, 2 and 3 would have adverse impacts on a number of designated and non-designated heritage assets, including below-ground archaeological remains/earthworks, built heritage and landscaped parks as demonstrated in Tables 8-4 to 8-15 above.
- 8.7.2. The significance of a number of designated assets in their historic settings are likely to be adversely impacted by the introduction of large infrastructure (raised and embankment cuttings), movement and activity, and increases noise and light levels in the 1km study area. The route options would adversely impact a number of non-designated archaeological below-ground and earthwork remains (including unknown hitherto archaeological remains) located within options in the 500m study area. Intrusive groundworks associated with the route options would have the potential to completely remove or partially disturb these assets within their footprint.
- 8.7.3. It is therefore recommended that investigation, mitigation and enhancement measures are taken into consideration on the preferred route to prevent loss or reduction of the appreciation / interpretability of designated assets and their settings, and to establish the nature, extent, significance and survival of both known and unknown below-ground archaeological remains.

9 ECOLOGY

9.1 INTRODUCTION

- 9.1.1. This chapter of the EAR presents a high level assessment of the potential impacts on ecology and nature conservation as a result of the seven proposed route options, separated into the three Elements as described in Section 4.8.
- 9.1.2. The purpose of this assessment is to enable a comparison of potential impacts between route options, to inform the preferred route selection process.
- 9.1.3. Ecological survey work is ongoing and therefore it is not possible at this stage to evaluate the importance of ecological features with certainty. However, it is possible to identify the likely important ecological features and potential impacts, and to make comparisons between routes based on habitat suitability and desk study information. It should also be noted that this chapter does not contain an assessment of the highways attenuation ponds, which will be carried out for the Stage 3 Environmental Statement (ES).

9.2 LEGISLATION AND POLICY FRAMEWORK

- 9.2.1. The appraisal has been compiled with reference to the following relevant nature conservation legislation, planning policy and the UK Biodiversity Framework from which the protection of sites, habitats and species is derived in England.
- The Conservation of Habitats and Species Regulations 2017 (Habitats Regulations);
 - The Wildlife and Countryside Act 1981 (as amended) (W&CA);
 - Countryside Rights of Way Act 2000;
 - The Natural Environment and Rural Communities (NERC) Act 2006;
 - The Protection of Badgers Act 1992;
 - The Hedgerows Regulations 1997;
 - The UK Post-2010 Biodiversity Framework (2011-2020) (JNCC and DEFRA, 2012);
 - Biodiversity 2020: A strategy for England's wildlife and ecosystem services (DEFRA, 2011);
 - UK Biodiversity Action Plan (UKBAP) ;
 - The National Planning Policy Framework (NPPF) 2012 (DCLG, 2012); and
 - Herefordshire Core Strategy Local Plan.
- 9.2.2. The following local policy within the Herefordshire Core Strategy Local Plan is also relevant to this assessment:
- *Policy SS6 - Environmental quality and local distinctiveness: "Development proposals should be shaped through an integrated approach to planning the following environmental components from the outset..... biodiversity and geodiversity especially Special Areas of Conservation and Sites of Special Scientific Interest"*
 - *Policy LD1 – Landscape and townscape: "Development proposals should: conserve and enhance the natural, historic and scenic beauty of important landscapes and features, including Areas of Outstanding Natural Beauty, nationally and locally designated parks and gardens and conservation areas; through the protection of the area's character and by enabling appropriate uses, design and management; maintain and extend tree cover where important to amenity, through the retention of important trees, appropriate replacement of trees lost through development and new planting to support green infrastructure."*
 - *Policy LD2 – Biodiversity and geodiversity: "Development proposals should conserve, restore and enhance the biodiversity and geodiversity assets of Herefordshire, through the:*
 - *1. Retention and protection of nature conservation sites and habitats, and important species in accordance with their status as follows: a) Development that is likely to harm sites and species of European Importance will not be permitted; b) Development that would be liable to harm Sites of Special Scientific Interest or nationally protected species will only be permitted if the conservation status of their habitat or important physical features can be protected by conditions or other material considerations are sufficient to outweigh nature conservation considerations; c) Development that would be liable to harm the nature conservation value of a site or species of local nature conservation interest will only be permitted if the importance of the development outweighs the local value of the site, habitat or physical feature that supports important species. d) Development that will potentially*

reduce the coherence and effectiveness of the ecological network of sites will only be permitted where adequate compensatory measures are brought forward.

- *2. Restoration and enhancement of existing biodiversity and geodiversity features on site and connectivity to wider ecological networks; and*
- *3. Creation of new biodiversity features and wildlife habitats. Where appropriate the council will work with developers to agree a management strategy to ensure the protection of, and prevention of adverse impacts on, biodiversity and geodiversity features.”*
- *Policy LD3 – Green infrastructure: “Development proposals should protect, manage and plan for the preservation of existing and delivery of new green infrastructure, and should achieve the following objectives:*
 - *1. Identification and retention of existing green infrastructure corridors and linkages; including the protection of valued landscapes, trees, hedgerows, woodlands, water courses and adjoining flood plain;*
 - *2. Provision of on-site green infrastructure; in particular proposals will be supported where this enhances the network; and*
 - *3. integration with, and connection to, the surrounding green infrastructure network.*

9.3 STUDY AREA

- 9.3.1. The study area for desk study information and field survey information is variable depending on the potential Zone of Influence (Zoi) of the ecological feature.
- 9.3.2. The search radii applied for biological records (desk study information) is summarised below in Table 9-1.

Table 9-1: Search radii applied to biological record searches

Data type	Search area
European Sites: Special Areas of Conservation (SAC), Special Protection Area (SPA), Ramsar site.	2km (30 km for SACs with bat qualifying features) ⁴¹
National statutory designated sites	2km ⁴²
Non-statutory designated sites	2km
Habitats of Principal Importance and Ancient Woodland	2km
Bat species records	10km ⁴³
All other protected and notable species records	2km ⁴⁴

- 9.3.3. Appropriate field study areas are designed for each survey type dependent on assessments of the Zoi for likely impacts. The refinement of the field study areas is also developed alongside the route selection process. Surveys undertaken in 2017 were undertaken on the wide Core Strategy Corridor (as defined within Herefordshire Council's Core Strategy). Surveys undertaken in 2018 to inform the Environmental Statement (ES) will largely focus on the shortlisted and preferred route plus the relevant Zoi.

⁴¹ DMRB (2009). Volume 11, Section 4, Part 1 HD 44/09. Assessment of implications (of highways and/or roads projects) on European sites (including Appropriate Assessment).

⁴² Based on the relevant Natural England SSSI Impact Risk Zone for highways schemes

⁴³ Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed). The Bat Conservation Trust, London

⁴⁴ CIEEM (2013). Guidelines for Preliminary Ecological Appraisal. CIEEM, Winchester

9.4 BASELINE CONDITIONS

- 9.4.1. All route options are situated around the western outskirts of Hereford and bisect the River Wye SAC and Site of Special Scientific Interest (SSSI) and a mosaic of important, common and widespread habitats. The study area has potential to support protected species including bats, badgers *Meles meles*, dormice *Muscardinus avellanarius*, otters *Lutra lutra*, water voles *Arvicola amphibius*, breeding and wintering birds, reptiles, great crested newts *Triturus cristatus*, fish, aquatic and terrestrial invertebrates and flora.

STATUTORY DESIGNATED SITES

- 9.4.2. The River Wye SAC and SSSI would be crossed by all route options. Other SACs designated for or in part for bat species are present within the search radii presented in Table 9-1 above, however these are distant from all route options and are not relevant to the selection of a preferred route (as should impacts arise they would likely be realised for all route options), and are therefore not detailed within this report. These SACs will however be considered further within the Habitats Regulations Assessment (HRA) and ES.
- 9.4.3. The River Wye SAC and SSSI are designated due to their European and UK important freshwater riverine habitats, and the ability to support large populations of migratory fish, otters *Lutra lutra* and white-clawed crayfish *Austropotamobius pallipes*, as well as freshwater pearl mussel *Margaritifera margaritifera*.
- 9.4.4. Refer to Chapter 17 Constraints Plans for the locations of designated and non-designated sites.

NON-STATUTORY DESIGNATED SITES

- 9.4.5. There are several non-statutory designated sites within the desk study area. Those within the Core Strategy Corridor plus 100 m radius are described below (using descriptions provided by Herefordshire Biological Records Centre (HBRC), as these are the sites most relevant to the selection of a preferred route:
- SO43/19. Belmont Wood and Hunderton Rough Special Wildlife Site (SWS) is a mixed woodland with a dense understorey.
 - SO53/06. The River Wye SWS is one of the largest, relatively unpolluted, unmodified river systems in the country. Also see SSSI and SAC description above in paragraphs 9.4.2. to 9.4.4.
 - SO43/17. Breinton Wood SWS is a mixed woodland.
 - SO44/23. Kings Acre Reserve SWS (Wyevale Wood Herefordshire Wildlife Trust Reserve) is an area of grazed grassland, damp in parts, and with mature trees over most of the site.
 - SINC_01: 'Railway Line near Green Farm' is part of a dismantled railway line near Green Farm, comprising mostly scrub.
 - SINC_02: 'Yazor Brook'. The register states that Yazor Brook is an important habitat forming a part of a narrow corridor through arable farmland.
 - SINC_03: 'Pond at Huntingdon Court'. The register states that this is the smaller and western of the two ponds at Huntingdon. It is in a private garden in a widening of the Yazor Brook.

HABITATS

Overview

- 9.4.6. The Phase 1 Habitat survey area consisted of predominantly terrestrial habitats including arable land and grazed pasture with semi-natural broadleaved woodland, traditional orchards, wood pasture and parkland. Aquatic habitats were also present, including running water (rivers and streams), associated riparian habitats and ponds. The majority of the land parcels were bounded by intact mature hedgerows. Residential and commercial buildings including a horticultural business and associated greenspace are also scattered throughout.

Habitats of Principal Importance

- 9.4.7. Habitats of Principal Importance, as listed on Section 41 of the Natural Environment and Rural Communities Act (2006), are present within the Study Area. These habitats were identified through the Natural England (NE) HPI database as provided by the MAGIC website and the inventories provided by HBRC. In addition, areas of habitat identified as having potential to qualify as HPI during the Phase 1 Habitat Survey were identified and will be further assessed.
- 9.4.8. The following Habitats of Principal Importance have been considered:
- Woodlands;
 - Traditional Orchards;

- Wood-pasture and parkland habitats;
- Rivers and streams;
- Ponds;
- Hedgerows; and
- Arable field margins (this habitat is being assessed further as it is currently unclear whether it qualifies as HPI).

Ancient Woodlands

- 9.4.9. Several Ancient Woodlands are present adjacent to the route options, as listed on the Ancient Woodland Inventory (AWI) held by MAGIC, which is known to have been updated with a revised County Inventory in 2014. These include:
- 9.4.10. Wye Coppice and Rough Coppice: Located approximately 100 m to the north of the River Wye, these two woodlands run end-to-end with each other along a steep bank, parallel to the river. To the north they are adjacent to arable fields, and to the south pasture fields used for cattle grazing are present separating the woodland and the River Wye. The tree species present within the woodland are predominantly broad-leaved.
- 9.4.11. Wyevale Wood (formally known as Green Lane Wood): Located approximately 600m to the south of Kings Acre Road, this woodland is designated as a SWS. It is surrounded predominantly by arable land, with commercial and non-commercial orchards also present. The woodland is used recreationally for walking and bird watching, with established paths throughout. The tree species present within the woodland are predominantly broad-leaved.
- 9.4.12. Hunderton Rough (Hunderton Wood): located immediately south of the River Wye, east of the route options.
- 9.4.13. Newton Coppice and Hayleasow Wood: located south of the A465, in proximity to the proposed junction with the A4194 Southern Link Road (SLR).

SPECIES

- 9.4.14. The potential for the habitats within and adjacent to the route options to support legally protected species and notable species has been assessed using the results of the desk study and observations made during the Phase 1 Habitat Survey. Species surveys are ongoing; however some results have been gathered to date and are referenced within this report. Desk study records have been considered if they are recent (from the last 10 years) and/or if they relate to species that may be supported by habitats present. The habitats within and adjacent to the route options are suitable for the following species or groups:

- Badger;
- Dormouse;
- Otter;
- Water vole;
- Bats;
- Birds;
- Reptiles;
- Amphibians;
- Fish;
- Terrestrial invertebrates;
- Aquatic invertebrates;
- Higher plants;
- Lower plants; and
- Fungi.

Badger

- 9.4.15. The desk study returned 29 records of badgers within 2km of the route options. Suitable foraging and breeding habitat for badgers was recorded throughout, in particular in woodland and scrub habitats and linear features such as hedgerows. Numerous setts, including main setts, were located throughout, mostly associated with woodland habitats.

Dormouse

- 9.4.16. The desk study returned eight records of dormice within 2km of the Core Strategy Corridor, with the closest record 1.3km away. Suitable habitat for dormice was present throughout, particularly along hedgerow boundaries and within areas of woodland and dense scrub.

- 9.4.17. A dormouse presence/absence survey was completed between April and November 2017 using nest tubes. No evidence of dormouse was found and as such this species is not considered further.

Otter

- 9.4.18. Otters are one of the qualifying features of the River Wye SAC and the desk study returned 14 records of otters within 2km of the route options. The sections of the River Wye and the Yazor Brook within and adjacent to the route options offer suitable foraging habitat for otter and some of the woodland adjacent to the Wye in particular provide potential undisturbed areas suitable for breeding and resting. Otter were seen twice in habitats adjacent to the River Wye during other survey types undertaken in 2017.
- 9.4.19. Otter surveys were undertaken in 2017 and detailed investigations are ongoing in 2018 to further assess potential resting places.

Water vole

- 9.4.20. The desk study returned no records of water voles within 2km of the route options from within the last 10 years; however there were two historic records returned from 1990 and 2003. The sections of the River Wye and the Yazor Brook within and adjacent to the route options offer suitable habitat to support water voles.
- 9.4.21. Water vole surveys were largely completed in 2017 and no evidence of water vole was recorded. In general, habitats were sub-optimal for this species. In addition, American mink *Neovison vison* was observed on the River Wye during the survey. This species is an effective predator of water vole and considered partly responsible for its national decline.

Bats

- 9.4.22. The desk study returned 2,270 records of bats within 10km of the route options since 2006, with records for barbastelle *Barbastella barbastellus*, Brandt's bat *Myotis brandtii*, brown long-eared bat *Plecotus auritus*, common pipistrelles *Pipistrellus pipistrellus*, Daubenton's bat *Myotis daubentonii*, Leisler's bat *Nyctalus leisleri*, Nathusius' pipistrelles *Pipistrellus nathusii*, natterer's bat *Myotis nattereri*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus*, soprano pipistrelles *Pipistrellus pygmaeus* and whiskered bat *Myotis mystacinus*. There were also records for unidentified bats, pipistrelle bat species, long-eared bat species and horseshoe bat species.
- 9.4.23. These records included 549 records of bat roosts from eight species comprising: brown long-eared bat, common pipistrelle, lesser horseshoe bat, natterer's bat, noctule, soprano pipistrelles and whiskered bat. Roosts were also recorded for unidentified bat species, long-eared bat species and pipistrelle species. The closest record was from within the Core Strategy Corridor.
- 9.4.24. Suitable roosting, commuting and foraging habitats for bats occurred throughout the study area. The Core Strategy Corridor includes several buildings, structures, trees and woodlands with potential for use by bats as roosting sites. Suitable commuting and foraging routes for bats occurred throughout the study area including linear features of watercourses and hedgerows which may provide a broad range of invertebrate prey.
- 9.4.25. Bat surveys were undertaken in 2017 and are ongoing into 2018. Bat foraging and commuting activity has so far been recorded for common pipistrelle, soprano pipistrelle, barbastelle, greater horseshoe bat, lesser horseshoe bat, brown long-eared bat, noctule, Leisler's, serotine, and *Myotis* species (likely several species within this genus). Bat roosting activity has so far been recorded within several buildings and two trees.

Birds

- 9.4.26. The desk study returned more than 3,500 records of 100 species of birds within 2km of the route options, consisting of 26 species listed under Schedule 1 of the Wildlife and Countryside Act 1981, 16 species listed under Section 41 of the Natural Environment and Rural Communities Act (NERC) 2006, 24 red-listed species and 61 amber-listed species (as defined by the UK Birds of Conservation Concern (BoCC) 2015). Protected and notable bird species records returned in the desk study search were primarily associated with wetland, farmland and woodland habitats.
- 9.4.27. Winter bird surveys were completed winter 2016/2017 and breeding bird surveys were completed spring 2017.

Winter birds

- 9.4.28. A total of 67 species were recorded on or over the study area (Core Strategy Corridor + 250m radius) during the wintering bird surveys. Of these, 30 species are considered to be species of conservation concern, which includes four species listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), 12 Species of Principal Importance (SPI) under the Natural Environment and Rural Communities (NERC) Act

2006, 13 Birds of Conservation Concern (BoCC) red list species and 14 BoCC amber list species. Two were also identified as species listed with the Herefordshire Biodiversity Action Plan (HBAP).

- 9.4.29. The bird community within the study area during the winter period was varied. The majority of the assemblage was typical of lowland farmland habitats, with the field boundaries and margins of farmland supporting yellowhammer *Emberiza citrinella*, linnet *Linaria cannabina*, dunnoek *Prunella modularis*, kestrel *Falco tinnunculus*, starling *Sturnus vulgaris* and song thrush *Turdus philomelos*. Orchards within the farmland landscape supported moderate to large flocks of fieldfare *Turdus pilaris* (maximum size 80 birds) and redwing *Turdus iliacus* (maximum size 130 birds). Mistle thrush *Turdus viscivorus* and bullfinch *Pyrrhula pyrrhula* were also considered to be utilising orchards for foraging. House sparrows *Passer domesticus* were recorded where lowland farmland habitats adjoined urban areas or rural residential properties.
- 9.4.30. Pastoral and arable farmland fields within the Survey Area supported skylark *Alauda arvensis* and meadow pipit *Anthus pratensis* as well flocks of loafing and foraging gulls (lesser black-backed gull *Larus fuscus*, great black-backed gull *Larus marinus*, herring gull *Larus argentatus* and common gull *Larus canus*). Golden plover *Pluvialis apricaria* were found foraging and loafing in and around fields within the north-western section of the Survey Area on five survey visits, with a maximum flock count of 100 individuals. A single lapwing *Vanellus vanellus* was recorded calling from a field in the north-western section of the Survey Area in December 2016.
- 9.4.31. Marsh tit *Poecile palustris* was identified within woodland in two separate areas of the Survey Area. Other birds of conservation concern recorded within woodland habitats were stock dove *Columba oenas*, song thrush and mistle thrush all of which were also present within farmland habitats.
- 9.4.32. Mallard *Anas platyrhynchos* were frequently recorded on waterbodies within the Survey Area and the River Wye. The River Wye was also found to support goosander *Mergus merganser* (maximum flock count of six) and kingfisher *Alcedo atthis*, with grey wagtail *Motacilla cinerea* and reed bunting *Emberiza schoeniclus* recorded within close proximity to its margins. All four species are listed under the SSSI citation for the River Wye, as part of the breeding bird assemblage.
- 9.4.33. Two barnacle geese *Branta leucopsis* and one greylag goose *Anser anser* were recorded in October; however, both species are considered likely to be part of a feral population within Herefordshire. Mute swan *Cygnus olor*, red kite *Milvus milvus* and shelduck *Tadorna tadorna* were all recorded flying over the Survey Area only; therefore, it could not be confirmed whether or not these species were using the study area during winter.

Breeding birds

- 9.4.34. A total of 78 species were recorded on or over the Survey Area (Core Strategy Corridor + 100m radius) during the breeding bird survey, of these 61 are considered to breed within the Survey Area; or to breed immediately adjacent to the Survey Area, with the Survey Area considered integral to the breeding success of those birds. Thirty-four species of the 78 identified are legally protected or species of conservation concern, including five Schedule 1 species, twelve Species of Principal Importance (SPI) (listed in accordance with the Natural Environment and Rural Communities (NERC) Act 2006), 15 Birds of Conservation Concern (BoCC) red list species and 16 BoCC amber list species. Three species listed under the Herefordshire Biodiversity Action Plan (HBAP) were also identified within the Survey Area. In total, 24 of the 34 legally protected or species of conservation concern are considered to breed within the Survey Area; with the remainder present on passage or as non-breeding individuals.
- 9.4.35. Of the five species recorded within the Survey Area listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), both barn owl *Tyto alba* and kingfisher *Alcedo atthis* were considered to be breeding within the Survey Area. Although birds were recorded, evidence of peregrine *Falco peregrinus* and red kite *Milvus milvus* breeding within the Survey Area was not identified. Fieldfare *Turdus pilaris* was also recorded; however, fieldfare is a species that only winters in the UK. Given the Survey Area's suitability to support breeding barn owl and kingfisher; and the limitations of breeding bird survey methodology to accurately determine the breeding status of both species; species-specific surveys will be undertaken for both barn owl and kingfisher in 2018.
- 9.4.36. The habitats within the Survey Area are varied and include improved grassland and arable fields with associated farm buildings, scrub, hedgerows, woodland, standing and flowing waterbodies, and residential houses with amenity grassland. The breeding bird community reflects this varied character.
- 9.4.37. Farmland habitat across the Survey Area was found to support skylark *Alauda arvensis*, grey partridge *Perdix perdix*, reed bunting *Emberiza schoeniclus*, yellowhammer, dunnoek, linnet, song thrush *Turdus philomelos*,

bullfinch *Pyrrhula pyrrhula*, willow warbler *Phylloscopus trochilus* and redstart *Phoenicurus phoenicurus*. Cuckoo *Cuculus canorus* were also recorded within areas of lowland farmland. Dunnock were also associated with amenity planting within the more urban sections of the Survey Area.

- 9.4.38. House sparrow *Passer domesticus* and starling *Sturnus vulgaris* were recorded more frequently within the more urban and semi-urban areas. Swift *Apus apus* was recorded entering a building within the grounds at Belmont Abbey, which is an indication of active nesting for this species.
- 9.4.39. Orchards within the Survey Area were found to support redstart, bullfinch, mistle-thrush *Turdus viscivorus*, song thrush; and stock dove *Columba oenas*. Woodlands within the Survey Area were also found to support redstart, mistle-thrush, song thrush; stock dove; as well as marsh tit *Poecile palustris*.
- 9.4.40. Mallard *Anas platyrhynchos* were recorded on standing waterbodies across the Survey Area; whilst marginal vegetation of the water bodies to the south of Hereford Cattle Market (north-western section of the Survey Area) were also found to support reed bunting, with grasshopper warbler *Locustella naevia* also being recorded in the vicinity in surrounding farmland.
- 9.4.41. The River Wye was found to support mute swan *Cygnus olor*, mallard and goosander *Mergus merganser* with reed bunting within the vegetation at its edges. All four of these species are listed under the SSSI designation for the River Wye, as part of the breeding bird assemblage.

Reptiles

- 9.4.42. The desk study return 79 records of reptiles within 2km of the route options. Records were for common lizard *Zootoca vivipara*, slow-worm *Anguis fragilis* and grass snake *Natrix Helvetica* (formerly *Natrix natrix*).
- 9.4.43. The study area contained large areas of habitat which was considered to be suitable for foraging, resting and breeding reptiles, such as scrub habitats and areas of ruderal vegetation, amongst others.
- 9.4.44. Field surveys for reptiles will be completed in 2018.

Amphibians

- 9.4.45. The desk study returned 97 records of five species of amphibians including 22 records of great crested newts (GCN) from within 2km of the route options, including eight records from within the route options. More than 50 water bodies have been identified within 500m of the route options, most of which have some potential to support GCN.
- 9.4.46. Field surveys for GCN were undertaken in 2017 and are continuing into 2018. To date, several breeding ponds have been recorded (containing low and medium sized populations), some of which are within or immediately adjacent to the route options.

Fish

- 9.4.47. Fish surveys were completed in 2017. The survey area encompassed stretches of the River Wye, Yazor Brook and smaller tributaries.
- 9.4.48. The 2017 fish surveys confirmed a diverse assemblage and the presence of several fish species of conservation concern. All of the EU Habitats Directive Annex II fish species that are listed as reasons for the designation of the River Wye SAC were recorded during the 2017 surveys i.e. Twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, bullhead *Cottus gobio*, river lamprey *Lampetra fluviatilis*, brook lamprey *Lampetra planeri*, and sea lamprey *Petromyzon marinus*. Twaite shad, river lamprey, sea lamprey and Atlantic salmon are also UK Biodiversity Action Plan (BAP) species, alongside European eel *Anguilla anguilla* and brown/sea trout *Salmo trutta* which were also recorded.
- 9.4.49. The River Wye was found to contain in-stream habitats suitable for critical spawning and nursery life-stages, for a number of conservation species including Atlantic salmon, lamprey and shad. Furthermore, there was evidence that these habitats were being actively used by these species throughout the survey reaches. The presence of eggs of shad, sea lamprey and bullhead within the River Wye (together with suspected sea lamprey redds) provides evidence of active spawning within the survey reach. In addition, the presence of juvenile salmonids and juvenile lamprey highlights the presence of suitable nursery habitat for these species.
- 9.4.50. Bullhead was the only protected fish species identified in Yazor Brook. Although the habitat survey of the Yazor Brook identified a general absence of suitable salmonid habitat, resident brown trout were caught within this watercourse. Atlantic salmon (which were present in the Wye) were not observed in Yazor Brook.

Terrestrial invertebrates

- 9.4.51. Terrestrial invertebrate surveys were undertaken in 2017, involving three visits covering late spring, high summer and autumn. Further flight interception trapping is planned for 2018 to further investigate the importance of individual trees for saproxylic (wood-decay specialist) invertebrates.
- 9.4.52. A total of 461 species were identified, including 42 currently with conservation status, and these include 6 British Red List species. Two of these species are listed under Section 41 of the 2006 Natural Environment & Rural Communities (NERC) Act as Species of Principal Importance for the conservation of biodiversity. The two species are:
- Noble Chafer *Gnorimus nobilis*; and,
 - Red-winged click beetle *Ampedus rufipennis*.
- 9.4.53. The majority of these 42 species with conservation status are saproxylic, associated with dead and decaying wood in trees, and especially veteran trees. This was emphasised by Natural England's ISIS analytical tool which highlighted three high quality invertebrate assemblages as represented within the 461 species:
- Wood decay broad invertebrate assemblage;
 - Arboreal canopy broad invertebrate assemblage; and,
 - Unshaded early successional mosaic broad invertebrate assemblage.
- 9.4.54. The notably rich wood-decay fauna is associated with three main features:
- 9.4.55. The Belmont House Unregistered Park and Garden which is the richest area for wood-decay fauna, and where the Section 41 species click beetle *Athous haemorrhoidalis* was found as well as the Red List false click beetle *Eucnemis capucina*;
- 9.4.56. The traditional orchards support a population of the other Section 41 species, Noble Chafer. Larval activity was apparent in two of the orchards surveyed, and an adult was found in a third; therefore it seems reasonable to assume that the chafer was using all five orchards surveyed for breeding.
- 9.4.57. Individual veteran trees in the hedgerow network are rich in wood-decay fauna as well as supporting arboreal invertebrates of significant interest, including a Red List ladybird. These trees form part of the veteran tree landscape which has been demonstrated to be of significant importance for wood-decay invertebrates.
- 9.4.58. The ancient woodlands surveyed also contribute to the wood-decay interest but also support a wide range of invertebrate interests. The Red List hazel bark beetle *Lymantria coryli* was a key feature.
- 9.4.59. St Mary's Park, Burghill appears to be relatively recently established – the oak standards are all relatively young (approximately 100 to 150 years old), with girths around 2m. Nonetheless areas of open-grown mature oaks such as this have become increasingly scarce, and any concentration of open-grown trees with more than 100 years of growth is valuable.
- 9.4.60. The hedgerows themselves are mostly too severely and too regularly trimmed, and the hedge bottoms generally too nutrient-enriched to support invertebrate assemblages of any significance. Exceptions were noted however:
- 9.4.61. Sections left to grow taller were found to be richer in invertebrates, with one scarce barkfly species *Caecilius fuscopterus* being a significant feature of the one hedgerow; and,
- 9.4.62. The Vulnerable ladybird *Nephus quadrimaculatus* was found in two hedgerows, and the Nationally Scarce weevil *Polydrusus formosus* in one hedgerow.
- 9.4.63. These finds demonstrate the potential of the local hedgerows were they to be managed more sensitively.

Aquatic invertebrates

- 9.4.64. Aquatic invertebrate surveys were undertaken in summer 2017; spring and autumn sampling will be undertaken in 2018. The survey area encompassed stretches of the River Wye, Yazor Brook and smaller tributaries.
- 9.4.65. The aquatic macroinvertebrate communities were relatively diverse, comprising many species of conservation concern; many of which were locally abundant. The yellow mayfly *Potamanthus luteus* was collected at all five River Wye sampling sites. This species has a status of IUCN Red List- Endangered. Two locations on Yazor Brook (mid and downstream) also supported a diverse macroinvertebrate community and a number of nationally rare and uncommon species.

Higher plants

- 9.4.66. The botanical surveys undertaken in 2017 focussed on habitat assessments (e.g. National Vegetation Classification, River Corridor Surveys, Habitats of Principal Importance assessments). Further botanical survey work will be undertaken in 2018 based on the findings of the 2017 assessments.
- 9.4.67. During the work undertaken to date, no protected (considered for the purposes of this report to be those fully protected under Schedule 8 of the Wildlife and Countryside Act 1981) or notable plants were recorded in any of the land parcels surveyed.
- 9.4.68. Several species of invasive non-native plants listed on Schedule 9 of the WCA 1981 were recorded during various surveys undertaken to date, including Japanese knotweed *Fallopia japonica*, giant hogweed *Heracleum mantegazzianum* and Himalayan balsam *Impatiens glandulifera*.

Bryophytes (liverworts, hornworts and mosses)

- 9.4.69. Bryophyte surveys are due for completion in 2018. Based on the habitat survey work undertaken in 2017 these will be focussed on woodland habitats as these were assessed as containing the greatest potential to support notable bryophytes.
- 9.4.70. During the River Corridor Survey undertaken in 2017, the lower parts of willows along the River Wye were noted to be covered in a specialised community of inundation zone bryophytes, including the nationally scarce moss *Orthotrichum sprucei*.

Fungi

- 9.4.71. A fungus survey was undertaken late autumn 2017 and further survey is planned for early autumn 2018.
- 9.4.72. Most of the species that were recorded during the 2017 survey are widespread and commonly encountered across much of Britain. Of the less commonly reported ones (fewer than 100 records on the Fungal records Database of the British Isles), *Agaricus phaeolepidotus* (found in Orchard grassland), *Conocybe juniana* var. *juniana* (better known to many British mycologists as *Conocybe magnicapitata*, found in parkland) and *Pluteus satur* (often recorded as *Pluteus pallescens* (found in grass by stump base in parkland) are all previously reported from Herefordshire.
- 9.4.73. Four of the species recorded during the survey appear not to have been previously reported from Herefordshire. Three of this number are *Conocybe rickenii* (found on dung in orchard grassland), *Coprinellus callinus* (found on damp soil and woodland litter) and *Coprinellus ellisii* (found on woody debris), all three of which species have been recorded from the adjacent county of Gloucestershire and, being rather nondescript, are likely to be overlooked unless examined closely. The fourth taxon is the collection provisionally determined as *Hebeloma nigellum* (observed growing with willow adjacent to the Yazor Brook). This taxon appears to have been previously recorded only twice from Britain, one record being from Scotland and the other from Oxfordshire. It is difficult to determine the true rarity of this species in Britain on the basis of present information because *Hebeloma* is a taxonomically difficult. The present collection has been assigned to *H. nigellum* particularly on account of the presence of a cortina, the spore characteristics combined and the conspicuously dark cigar brown or umber cap.
- 9.4.74. The presence of a small number of species that may be new to the county is not unexpected. Careful study of any reasonably large area of mixed habitats is likely to throw up such records since fungi are generally under-recorded in comparison with more 'popular' groups such as vascular plants and the total number of species is very large. New species are routinely being added to the British list and species new to science are still described from Britain and Europe.
- 9.4.75. None of the species recorded during the survey are BAP priority species, or featured on the British 'Red List', Schedule 8 of the Wildlife & Countryside Act 1981 (as amended) or Section 41 of the NERC Act (2006).

9.5 ASSESSMENT METHODOLOGY

- 9.5.1. The methodology for this EAR is in accordance with the guidance for Environmental Assessment from DMRB Volume 11 Section 2, Section 3 (Part 4) and Section 4; and IANs 130/10 and 125/15. It should be noted that this assessment will be refined as survey data is gathered, with the full assessment on the preferred route in the form of an Environmental Impact Assessment Report (Environmental Statement). As ecological surveys are ongoing it is not possible at this stage to evaluate the importance of ecological features with certainty. However, it is possible to identify the likely important ecological features and potential impacts, and to make

comparisons between routes based on habitat suitability and desk study information. This is considered suitable for the stage of the project and the purpose of this report.

- 9.5.2. A Detailed Assessment is required for schemes where potential significant effects are identified above the agreed value and magnitude thresholds. The method for Detailed Assessment will involve the following key stages.

BASELINE STUDIES AND EVALUATION OF ECOLOGICAL RECEPTORS

- 9.5.3. Baseline information regarding ecological features, including designated sites, species populations, species assemblages and habitats, has been obtained from the following principle sources:

- Desk study of existing data from published sources, databases and local recorders; and,
- Ecological field surveys (ongoing).
- Ecological field surveys are being undertaken in accordance with the Hereford Bypass Ecological Field Survey Standards.

RESOURCE VALUATION

- 9.5.4. Sites, species populations, species assemblages and habitats will be evaluated using the following geographical scales:

- International or European;
- UK or National;
- Regional;
- County; and
- Local.

- 9.5.5. The valuation of sites makes use of established value systems (e.g. SSSIs are all of national importance and Local Wildlife Sites (LWSs) are of county importance) as well as professional judgement for those of local value.

- 9.5.6. Habitats and species which may be affected by the route options are considered to be within the ZOI. It is impractical and inappropriate for an assessment of the ecological effects of a proposed development to consider every species and habitat that may be affected. Instead, it focuses on those receptors valued at the local scale or above (and as such of sufficiently high value that certain levels of impact upon them could be considered to be significant).

- 9.5.7. It is considered that no significant effect can occur to features of lesser importance. However, due consideration has also been given to those nature conservation sites, species and habitats below local importance throughout the construction period, in particular with regard to legislative protection and local, regional and national conservation initiatives.

IDENTIFICATION AND CHARACTERISATION OF POTENTIAL IMPACTS

- 9.5.8. A preliminary assessment of the likely impacts of the proposed route options during construction and operation, and the potential ecological effects arising from them have been identified and characterised, taking into consideration the following parameters:

- Positive or negative – whether the impact would result in net loss or degradation or whether it would enhance or improve a receptor;
- Size/Complexity – the size or intensity of the impact measured in relevant terms, e.g. number of individuals lost or gained, area of habitat lost or created or the degree of change to existing conditions (e.g. noise or lighting levels);
- Extent – the spatial scope of the impact, for example the physical area affected or the geographical pattern of the impact;
- Duration – this assessment is not possible at this stage as no information is currently available regarding construction timescales;
- Reversibility – the extent to which impacts are reversible either spontaneously or through active mitigation; and
- Timing and frequency – This assessment is not possible at this stage as no information is currently available regarding construction timescales.

- 9.5.9. Ecological features/receptors are usually nature conservation sites, habitats, species assemblages or communities, or populations or groups of a species. Impacts can be permanent or temporary, direct or indirect, and can be cumulative. These factors will be brought together to assess the magnitude of the impact on particular ecological receptors and, wherever possible, the magnitude of the impact will be quantified.
- 9.5.10. Potential impacts have been initially characterised in the absence of any mitigation, except where this is integral to the design of the route options. Provisional additional mitigation or compensation has been identified based on the survey data gathered to date.

DEFINING SIGNIFICANCE OF EFFECTS

- 9.5.11. Significance of effects will be deduced from assessing the value of the receptors against any residual impact (taking into account mitigation).
- 9.5.12. In line with the guidelines set out within the DMRB, significance will be assessed as neutral, slight, moderate, large or very large (Table 3 of IAN 130/10). However, as the ecological survey work is ongoing and it is not possible at this stage to evaluate the importance of ecological features with certainty, it has not been possible to assign significance of effects.

9.6 DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

DESIGN, MITIGATION AND ENHANCEMENT MEASURES

- 9.6.1. This section provisionally identifies mitigation and enhancement measures that may be appropriate for each route option. At this stage of the assessment process, without full information from detailed surveys or detailed design, only broad recommendations of likely mitigation requirements are possible.
- 9.6.2. Generic mitigation measures are described below. These measures are considered to be applicable to all route options. The measures described are those likely to be most appropriate given the identified constraints.
- 9.6.3. Key mitigation measures that are likely to be included within the design are broadly as follows:
- Measures that avoid the adverse impact (for example, the re-siting of construction compounds, or adjustments in road alignment etc.);
 - Where the adverse impact cannot be avoided or reduced fully, measures that compensate for the loss of the particular ecological resource that is affected (for example, at least like-for-like replacement of lost habitats, etc.); and
 - Enhancement by habitat creation, improved management and long-term monitoring.
- 9.6.4. Other general mitigation measures which may help to reduce the magnitude and significance of the construction and operational impacts could include:
- Correct timing of works to avoid key periods for particular species, such as avoidance of the bird breeding season for habitat clearance;
 - Habitat creation/enhancement: either through the translocation of existing habitats or seed banks; the enhancement of existing habitat; and / or the planting of new habitat.
 - Translocation and/or exclusion of species (under appropriate licences / agreements) where required from the works footprint to pre-prepared receptor sites to minimise impacts of habitat loss and species mortality;
 - Appropriate design and use of lighting to minimise impacts on bats and other light sensitive species;
 - Re-establishing connectivity between habitats affected by road construction and incorporation of features within the detailed design which would restore connectivity for protected species whose habitat has been fragmented by the road;
 - The use of screening during construction to minimise the spread of noise, dust, lighting etc. and potentially the use of fencing to temporarily exclude species by restricting access into particular areas (such as reptile exclusion fencing);
 - Appropriate landscaping and re-landscaping of all new roadside verges and disturbed habitat specifically for species known to be present in the area (where suitable for network and safety priorities). All landscaping should use species of local provenance;
 - Installation of surface water run-off attenuation and treatment features to ensure water discharged to watercourses would not compromise the conservation value of the watercourse or the species that live within it; and

- Implementation of general construction environmental best practice. This could include, but is not limited to, providing tool box talks for construction staff informing them of key ecological constraints within the area, the damping of haul routes to minimise the spread of dust, the use of drip trays and spill kits when refuelling vehicles and ensuring that open trenches are not left over night without safe means of egress for animals that may fall into them.

Element 1

- 9.6.5. Element 1 would encompass the most important ecological features of the three elements i.e. the River Wye SAC, SSSI, ancient woodland, and Belmont Parkland HPI.
- 9.6.6. The River Wye SAC and SSSI would be crossed by all route options. The structure is likely to take the form of a viaduct and no elements of the structure (e.g. piers) would be within the river channel. Initial consultations with Natural England and the Environment Agency have indicated that a horizontal clearance of approximately 10m from the channel would be expected, both to allow for maintenance access and to reduce construction impacts, such as piling vibration. This 10m clearance would also avoid direct losses to habitats within the boundary of the SAC/SSSI. Mitigation measures may include timing restrictions of construction works to avoid sensitive seasons for fish species, altering piling techniques to minimise vibration, minimising / avoiding lighting, and using silt barriers to prevent any run-off of sediments from the construction site into the river. Construction haul roads and compounds would also need to be sited as far from the river as possible.
- 9.6.7. All route options would be in proximity to ancient woodlands to the north of the River Wye and measures would be required to avoid damage and disturbance to the woodlands. Mitigation measures will depend on the route option, but could include:
- putting up screening barriers to protect woodland or veteran trees from dust and pollution;
 - noise reduction measures;
 - leaving an appropriate buffer zone of semi-natural habitat between the development and the ancient woodland or tree;
 - leaving a buffer zone at least 15 times larger than the diameter of a veteran tree or 5m from the edge of its canopy, whichever is greater;
 - protecting veteran trees by designing open space around them; and
 - identifying and protecting trees that could become veteran trees in the future.
- 9.6.8. All route options would cross Belmont Parkland Habitat of Principal Importance in cutting. The route alignment designs should be modified to minimise habitat losses within this area and to avoid important trees, such as ancient/veteran trees. This could be achieved by steepening the cut slopes for example and siting construction compounds outside of this habitat.
- 9.6.9. To the north of the River Wye within Warham, a number of bat roosts are known to be present within various residential properties. The design should avoid fragmenting roosts from foraging habitats and other roosting areas, which may require wildlife underpasses or green bridges.

Element 2

- 9.6.10. Element 2 would encompass the habitats between Breinton and Burghill, and all route options would cross the Yazor Brook. The Yazor Brook is a tributary of the River Wye and as such is likely to have a supporting function to the designating features of the River Wye SSSI and SAC. The crossing will therefore need to maintain a functioning corridor for otter, fish and other aquatic fauna. Other species groups are also likely to use the Yazor Brook as a wildlife corridor, such as bats, badger, reptiles and amphibians and the design should also seek to maintain this corridor. A clear-span bridge structure with sufficient clearance to maintain some bankside vegetation connectivity is likely to be the most favourable crossing option for biodiversity.
- 9.6.11. Should the Yazor Brook require diversion (e.g. for engineering / flood alleviation reasons), the diverted brook should be designed to achieve ecological gains through diversifying the channel substrate, course and vegetation structure. Any flood alleviation schemes should also be designed to maximise benefits for biodiversity.
- 9.6.12. Several important trees are present within Element 2 (e.g. ancient / veteran oak trees within hedgerows). The route alignment designs should be modified to avoid important trees. This could be achieved by steepening slopes/embankments for example and siting construction compounds and haul roads away from important trees.

- 9.6.13. Similar to Element 1, the maintenance of terrestrial habitat connectivity for several species groups is likely to be required in Element 2, for example important bat and badger commuting routes, which may entail the provision of wildlife underpasses or green bridges.

Element 3

- 9.6.14. Element 3 encompasses mostly arable and improved/poor semi-improved pasture separated by hedgerows. Ecologically this is the least important of the three elements, although maintenance of wildlife crossing points will still likely be required in some locations.

MONITORING AND MANAGEMENT POST-CONSTRUCTION

- 9.6.15. A post-construction monitoring programme would be carried out. This is likely to be undertaken during the first five years after construction (the initial standard aftercare period) to assess establishment of the ecological mitigation measures, help inform future management and, if necessary, allow for the implementation of remedial measures.
- 9.6.16. An ecology monitoring and management plan would be developed based on the mitigation, compensation and enhancement provided during the construction stage and the long-term objectives of the mitigation. This plan would be developed during the detailed design stage and finalised during the construction stage. It would provide an auditable record of the various mitigation commitments identified, and the requirements for regular maintenance of the mitigation features to ensure that their goals are achieved.
- 9.6.17. Monitoring mitigation measures are essential to identify appropriate habitat creation, management and monitoring methods to employ on other projects, and to serve as a database and benchmark from which future road developments can benefit. Furthermore, should any ecological mitigation be identified as failing by the monitoring surveys, undertaking remedial works to ensure that the mitigation achieves its objectives may be necessary.

9.7 POTENTIAL IMPACTS

ELEMENT 1

- 9.7.1. There are several potential impacts which are common to all route options within Element 1. Potential impacts (in the absence of mitigation) within this Element may include:
- Habitat loss and damage of Parkland Habitat of Principal Importance;
 - Habitat damage of River Wye SSSI/SAC, e.g. construction phase impacts such as sedimentation, lighting, noise, vibration and operation phase impacts such as nitrogen deposition;
 - Habitat damage of ancient woodlands, e.g. construction phase impacts such as dust deposition, runoff, and operation phase impacts such as nitrogen deposition;
 - Habitat loss and damage of Special Wildlife Site woodland;
 - Habitat loss and damage of hedgerows;
 - Habitat damage of traditional orchards;
 - Fragmentation of wildlife corridors, such as hedgerows;
 - Killing / injury / disturbance of protected and notable species.

Orange

- 9.7.2. The Orange, Cyan and Yellow route options would result in the least habitat loss within Belmont Parkland due to the route footprint, with the loss of parkland trees (the main interest feature of the parkland) avoided.
- 9.7.3. Moving north, the Orange, Cyan, Yellow and Red route options would be in proximity to ancient woodland habitat. Habitat damage during construction and operation is possible.
- 9.7.4. Double hedgerows along lanes near to Warham House and Warham Farm would be bisected by the Orange Route, with some of the hedgerows containing mature/veteran trees. Several of the residential buildings in these areas are confirmed bat roosts and fragmentation of habitat linking roosts and foraging habitat is possible.
- 9.7.5. The Orange route would be located within 10m of woodland habitat to the north east of Warham Farm. This is not an ancient woodland but is a Habitat of Principal Importance, and damage to the woodland during construction and operation is possible. Fragmentation of badger pathways is also possible near this location. A confirmed bat roost (currently uncharacterised) has been found within a tree at this location and disturbance to roosting bats is possible.

Cyan / Yellow

- 9.7.6. The Orange, Cyan and Yellow route options would result in the least habitat loss within Belmont Parkland due to the route footprint, with the loss of parkland trees (the main interest feature of the parkland) avoided.
- 9.7.7. Moving north, the Orange, Cyan, Yellow and Red route options would be in proximity to ancient woodland habitat. Habitat damage during construction and operation is possible.
- 9.7.8. Double hedgerows along lanes near to Warham House and Warham Farm would be bisected by the Cyan / Yellow Route, with some of the hedgerows containing mature/veteran trees with high bat roosting potential. Several of the residential buildings in these areas are confirmed bat roosts and fragmentation of habitat linking roosts and foraging habitat is possible. The Cyan / Yellow route may directly affect farm buildings at Warham Farm, some of which have moderate bat roosting potential.

Red / Black 2

- 9.7.9. The Red/ Black 2 routes would result in more habitat loss within Belmont Parkland as it would take a less direct route through the parkland. Scattered parkland trees would also be lost as a result of the construction of this route.
- 9.7.10. Moving north, the Orange, Cyan/ Yellow and Red/ Black 2 route options would be in proximity to ancient woodland habitat. Habitat damage during construction and operation is possible.
- 9.7.11. Double hedgerows along lanes near to Warham House and Warham Farm would be bisected by the Red / Black 2 routes. Several of the residential buildings in these areas are confirmed bat roosts and fragmentation between roosts and foraging habitat is possible. A mature / veteran tree with high bat roosting potential within an arable field to the north east of Warham Farm would be lost. The Red / Black 2 routes may directly affect farm buildings at Warham Farm, some of which have moderate bat roosting potential.

Olive / Black 1

- 9.7.12. The Olive/ Black 1 routes would result in the most habitat loss within Belmont Parkland due to the size of the cutting. Scattered parkland trees would also be lost as a result of the construction of this route.
- 9.7.13. The Olive/ Black 1 routes would result in more habitat loss of mixed semi-natural woodland south of the River Wye as the viaduct abutment would be located within the woodland. This woodland is locally designated a Special Wildlife Site. Impacts to badgers and otters may be greater as a result.
- 9.7.14. Moving north, the Olive/ Black 1 route option would be in proximity to ancient woodland habitat. Habitat damage during construction and operation is possible. This route option could also lead to some habitat fragmentation of the ancient woodland belt in this location (as the route option takes advantage of an existing break in the woodland, and the presence of a road is likely to exacerbate the extent of fragmentation already present). Bat static detectors located in this location recorded the highest numbers of bat passes compared to any of the other 14 locations sampled.
- 9.7.15. Double hedgerows along lanes near to Warham Farm would be bisected by the Olive/ Black 1 route. Several of the residential buildings in these areas are confirmed bat roosts and roost-roost, roost-foraging habitat fragmentation is possible.
- 9.7.16. The Olive/ Black 1 route would be located within 10m of woodland habitat to the north east of Warham Farm. This is not an ancient woodland but is a Habitat of Principal Importance, and damage to the woodland during construction and operation is possible. Disturbance to badgers is possible near this location. A confirmed bat roost (currently uncharacterised) has been identified within a tree at this location and disturbance to roosting bats is possible.

ELEMENT 2

- 9.7.17. Route options within Element 2 have variable ecological impacts as described below. However, there are some commonalities with all route options:
- 9.7.18. Habitat loss and damage within Yazor Brook, e.g. construction phase impacts such as damage to the stream bed and disturbance of aquatic fauna due to diversions and construction of a culvert or bridge, and operation phase impacts such as shading from the probable low clearance of such a structure;
- 9.7.19. Fragmentation of aquatic and riparian habitats along the Yazor Brook and the wildlife corridor provided by these;

- Habitat loss and damage of hedgerows;
- Fragmentation of wildlife corridors, such as hedgerows, and in particular the Green Lane (Bridleway BT4) to the south of Drovers Wood, Wyevale Wood and between the Pippin Trust orchards; and
- Killing / injury / disturbance of protected and notable species.

Orange

- 9.7.20. Moving north towards Kings Acre Road, the Orange route would bisect several hedgerows some of which contain mature/ veteran trees. Some of these hedgerows are used by commuting and foraging bats and habitat fragmentation is possible. Greater horseshoe bat has been recorded on the static detector located on Green Lane (Bridleway BT4) to the south east of Drovers Wood. The Orange route would cross Kings Acre Road in an area containing residential properties with low bat roosting potential.
- 9.7.21. The current design shows the Yazor Brook being culverted underneath the Orange route. This could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream. The junction with Roman Road would take the form of a roundabout which would result in the loss of an area of scrub containing a pond with potential to support great crested newts. The fungus *Hebeloma nigellum* was recorded in this area.

Cyan

- 9.7.22. Moving north towards Kings Acre Road, the Cyan route would bisect several hedgerows. Some of these hedgerows are used by commuting and foraging bats and habitat fragmentation is possible. Greater horseshoe bat has been recorded on the static detector located on Green Lane (Bridleway BT4) to the south east of Drovers Wood. The Cyan route crosses Kings Acre Road in an area containing residential properties with low bat roosting potential.
- 9.7.23. The current design shows the Yazor Brook being culverted underneath the Cyan route. This could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream.
- 9.7.24. Moving north, the Cyan route may directly affect a house with moderate bat roosting potential.

Yellow

- 9.7.25. Moving north towards Kings Acre Road, the Yellow route would bisect several hedgerows. Some of these hedgerows are used by commuting and foraging bats and habitat fragmentation is possible. Greater horseshoe bat has been recorded on the static detector located on the Green Lane (Bridleway BT4) to the south east of Drovers Wood. The Yellow route would cross Kings Acre Road in an area containing residential properties with low bat roosting potential and would result in the loss of a single tree with moderate bat roosting potential.
- 9.7.26. The current design shows the Yazor Brook being culverted underneath the Yellow route. This could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream. The junction with Roman Road would take the form of a roundabout which would result in the loss of an area of scrub containing a pond with potential to support GCN. The fungus *Hebeloma nigellum* was recorded in this area.

Red

- 9.7.27. The Red route would result in the loss of a very small area of Traditional Orchard Habitat of Principal Importance, due to the re-grading of a lane to form an overbridge. The Red route would also result in habitat losses within newly planted (less than 10 years old) heritage orchards, created by the Pippin Trust. Greater horseshoe bat has been recorded on the static detector located on Green Lane (Bridleway BT4) to the south east of Drovers Wood.
- 9.7.28. The Red route crosses Kings Acre Road in an area where the residential buildings have been assessed as having relatively low suitability for roosting bats.
- 9.7.29. The current design shows the Yazor Brook being culverted underneath the Red route. This could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream. The junction with Roman Road would take the form of a roundabout which would result in the loss of an area of scrub containing a pond with potential to support GCN. The fungus *Hebeloma nigellum* was recorded in this area.
- 9.7.30. The Red route would likely result in the loss of a GCN breeding pond and the fragmentation of a wildlife corridor for bats and GCN north of Hospital Farm.

Olive

- 9.7.31. The Olive route would result in the loss of a section of Traditional Orchard Habitat of Principal Importance, due to the re-grading of a lane to form an overbridge. The Olive route would also result in habitat losses within newly planted (less than 10 years old) heritage orchards, created by the Pippin Trust. Greater horseshoe bats have been recorded on the static detector located on Green Lane (Bridleway BT4) to the south east of Drovers Wood.
- 9.7.32. The Olive route would cross Kings Acre Road in an area where the residential buildings have been assessed as being of relatively low suitability for roosting bats.
- 9.7.33. The current design shows the Yazor Brook being culverted underneath the Olive route. This could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream. The junction with Roman Road would take the form of a roundabout, which would result in the loss of an area of scrub containing a pond with potential to support GCN. The fungus *Hebeloma nigellum* was recorded in this area.
- 9.7.34. The Olive route would likely result in the loss of a GCN breeding pond and the fragmentation of a wildlife corridor for bats and GCN north of Hospital Farm.

Black 1

- 9.7.35. The Black 1 route would result in the loss of a section of Traditional Orchard Habitat of Principal Importance, due to the re-grading of a lane to form an overbridge. The Black 1 route would also result in habitat losses within newly planted (less than 10 years old) heritage orchards, created by the Pippin Trust. Greater horseshoe bat has been recorded on the static detector located on Green Lane (Bridleway BT4) to the south east of Drovers Wood.
- 9.7.36. The Black 1 route would traverse Drovers Wood, a Woodland Trust community woodland purchased in the 1980s.
- 9.7.37. Moving north, the Black 1 route would bisect several hedgerows, some containing mature/veteran trees with high bat roosting potential, and then cross Kings Acre Road in an area containing residential buildings with low, moderate and high bat roosting potential.
- 9.7.38. The Black 1 route would then traverse habitats within Hereford Cattle Market and within 50m of SINC_01. A relatively high level of *Myotis* and lesser horseshoe bat activity was recorded in this area; this is a hotspot of activity for both species, relative to the other 14 static sampling sites.
- 9.7.39. The Black 1 route would cross Yazor Brook with a bridge structure. This may lead to the retention of stream bed habitats, although the probable low clearance above these waterbodies is likely to result in shading impacts. The pond adjacent to the Yazor Brook would be part infilled. This pond is stocked with coarse fish. Several otter spraints were found at this location and the pond may be a foraging resource (albeit fencing is in place which may be some deterrent to foraging otter).
- 9.7.40. The Black 1 route would likely result in the loss of a GCN breeding pond and the fragmentation of a wildlife corridor for bats and GCN north of Hospital Farm.

Black 2

- 9.7.41. The Black 2 route would result in the loss of a very small area of Traditional Orchard Habitat of Principal Importance, due to the re-grading of a lane to form an overbridge. The Black 1 route would also result in habitat losses within newly planted (less than 10 years old) heritage orchards, created by the Pippin Trust. Greater horseshoe bat has been recorded on the static detector located on Green Lane (Bridleway BT4) to the south east of Drovers Wood.
- 9.7.42. The Black 2 route would traverse Drovers Wood, a Woodland Trust community woodland purchased in the 1980s. Moving north, the Black 2 route would follow the same alignment as Black 1.

ELEMENT 3

- 9.7.43. All route options follow the same alignment within Element 3. This Element is less ecologically important than the other two Elements. Element 3 would result in losses within arable, improved pasture, and poor semi-improved pasture and several hedgerows would also be bisected. These are generally heavily managed; however, some are likely to be used as wildlife corridors and habitat fragmentation impacts are possible.

9.8 SUMMARY

Table 9-2 below summarises the impacts of the proposed route options.

Table 9-2: Summary of biodiversity impacts

Element	Orange/Cyan/Yellow			Red/Black 2		Olive/Black 2	
Element 1	- Would result in the least habitat loss within Belmont Parkland due to the route footprint, with the loss of parkland trees (the main interest feature of the parkland) avoided. - Within c.20m of ancient woodland habitat and habitat damage during construction and operation is possible. - Double hedgerows containing mature/veteran trees along lanes near to Warham House and Warham Farm would be bisected. - Buildings and trees in these areas are confirmed bat roosts and fragmentation of habitat linking roosts and foraging habitat is possible. - Within 10 m of woodland habitat to the north east of Warham Farm, an HPI, damage to the woodland during construction and operation is possible. - Fragmentation of badger pathways is also possible near this location.			- Would result in more habitat loss within Belmont Parkland due to the less direct route through the parkland. Scattered parkland trees would also be lost as a result of the construction of this route. - Within c.20m of ancient woodland habitat and habitat damage during construction and operation is possible. - Double hedgerows with mature/veteran trees along lanes near to Warham House and Warham Farm would be bisected. - Buildings and trees in these areas are confirmed bat roosts and fragmentation of habitat linking roosts and foraging habitat is possible. - A mature / veteran tree with high bat roosting potential within an arable field to the north east of Warham Farm would be lost. The Red / Black 2 route may directly affect farm buildings at Warham Farm, some of which have moderate bat roosting potential.		- Would result the most habitat loss, including scattered parkland trees) within Belmont Parkland due to the size of the cutting. - Results in more habitat loss of mixed semi-natural woodland south of the River Wye as the viaduct abutment would be located within the woodland (locally designated a Special Wildlife Site). Impacts to badgers and otters may be greater as a result. - Within c.20m of ancient woodland habitat and habitat damage during construction and operation is possible. Could also lead to some habitat fragmentation of the ancient woodland belt in this location (as the route option takes advantage of an existing break in the woodland, and the presence of a road is likely to exacerbate the extent of fragmentation already present). - Bat static detectors located in this location recorded the highest numbers of bat passes compared to any of the other 14 locations sampled. - Double hedgerows with mature/veteran trees along lanes near to Warham Farm would be bisected. - Buildings and trees in these areas are confirmed bat roosts and fragmentation of habitat linking roosts and foraging habitat is possible. - The Olive/ Black 1 route is located within 10 m of woodland habitat to the north east of Warham Farm. This is not an ancient woodland but is a Habitat of Principal Importance, and damage to the woodland during construction and operation is possible. - Disturbance to badgers is possible. A confirmed bat roost (currently uncharacterised) has been identified within a tree at this location and disturbance to roosting bats is possible.	
	Orange	Cyan	Yellow	Red	Olive	Black1	Black2
Element 2	- Double hedgerows containing mature/veteran trees along lanes near to Kings Acre Road would be bisected, some of which are used by commuting and foraging bats and habitat fragmentation is possible. - Greater Horseshoe bat has been recorded on the static detector located on the Green Lane (Bridleway BT4) to the south east of Drovers Wood, although the option would cross Kings Acre Road in an area	- Double hedgerows containing mature/veteran trees along lanes near to Kings Acre Road would be bisected, some of which are used by commuting and foraging bats and habitat fragmentation is possible. - Greater Horseshoe bat has been recorded on the static detector located on the Green Lane (Bridleway BT4) to the south east of Drovers Wood, although the option would cross Kings Acre Road in an area	- Double hedgerows containing mature/veteran trees along lanes near to Kings Acre Road would be bisected, some of which are used by commuting and foraging bats and habitat fragmentation is possible. - Greater Horseshoe bat has been recorded on the static detector located on the Green Lane (Bridleway BT4) to the south east of Drovers Wood, although the option would cross Kings Acre Road in an area	- Would result in the loss of a very small area of Traditional Orchard Habitat of Principal Importance, due to the re-grading of a lane to form an overbridge. Would also result in habitat losses within newly planted (<c.10yo) heritage orchards (created by the Pippin Trust). - Greater Horseshoe bat has been recorded on the static detector located on the Green Lane (Bridleway BT4) to the south east of	- Would result in the loss of a very small area of Traditional Orchard Habitat of Principal Importance, due to the re-grading of a lane to form an overbridge. Would also result in habitat losses within newly planted (<c.10yo) heritage orchards (created by the Pippin Trust). - Greater Horseshoe bat has been recorded on the static detector located on the Green Lane (Bridleway BT4) to the south east of	- Would result in the loss of a very small area of Traditional Orchard Habitat of Principal Importance, due to the re-grading of a lane to form an overbridge. Would also result in habitat losses within newly planted (<c.10yo) heritage orchards (created by the Pippin Trust). - Greater Horseshoe bat has been recorded on the static detector located on the Green Lane (Bridleway BT4) to the	- Would result in the loss of a very small area of Traditional Orchard Habitat of Principal Importance, due to the re-grading of a lane to form an overbridge. Would also result in habitat losses within newly planted (<c.10yo) heritage orchards (created by the Pippin Trust). - Greater Horseshoe bat has been recorded on the static detector located on the Green Lane (Bridleway BT4) to the

	containing residential properties with low bat roosting potential. - Yazor Brook would be culverted underneath the option which could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream. - The junction with Roman Road would be a roundabout, which would result in the loss of an area of scrub containing a pond with potential to support GCN.	containing residential properties with low bat roosting potential. - Yazor Brook would be culverted underneath the option which could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream. - Cyan may directly affect a house with moderate bat roosting potential.	containing residential properties with low bat roosting potential and would result in the loss of a single tree with moderate bat roosting potential. - Yazor Brook would be culverted underneath the option which could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream. - The junction with Roman Road would be a roundabout, which would result in the loss of an area of scrub containing a pond with potential to support GCN.	Drovers Wood, although the option would cross Kings Acre Road in an area containing residential properties with low bat roosting potential. - Yazor Brook would be culverted underneath the option which could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream. - The junction with Roman Road would be a roundabout, which would result in the loss of an area of scrub containing a pond with potential to support GCN.	Drovers Wood, although the option would cross Kings Acre Road in an area containing residential properties with low bat roosting potential. - Yazor Brook would be culverted underneath the option which could lead to fragmentation of the aquatic habitats and of the wildlife corridor currently provided by the stream. - The junction with Roman Road would be a roundabout, which would result in the loss of an area of scrub containing a pond with potential to support GCN.	south east of Drovers Wood, - The option would cross Kings Acre Road in an area containing residential properties with low, moderate and high bat roosting potential. - The Black 1 route will traverse Drovers Wood, a Woodland Trust community woodland purchased in the 1980s. - Double hedgerows containing mature/veteran trees along lanes would be bisected, some of which are used by commuting and foraging bats and habitat fragmentation is possible. - The Black 1 route then traverses habitats within Hereford Cattle Market and is within 50 m of SINC_01. A relatively high level of <i>Myotis</i> and lesser horseshoe bat activity was recorded in this area; this is a hotspot of activity for both species relative to the other 14 static sampling sites. - The Black 1 route crosses Yazor Brook with a bridge structure. This may lead to the retention of stream bed habitats, although the probable low clearance above these waterbodies is likely to result in shading impacts. The pond adjacent to the Yazor Brook would be part infilled. Several otter spraints were found at this location and the pond may be a foraging resource (albeit fencing is in place which may be some deterrent to foraging otter). - The Black 1 route would likely result in the loss of	south east of Drovers Wood. - The Black 2 route would traverse Drovers Wood, a Woodland Trust community woodland purchased in the 1980s. - The Black 2 route would bisect several hedgerows, some containing mature/veteran trees with high bat roosting potential, and then cross Kings Acre Road in an area containing residential buildings with low, moderate and high bat roosting potential. - The Black 2 route would then traverse habitats within Hereford Cattle Market and within 50m of SINC_01. A relatively high level of <i>Myotis</i> and lesser horseshoe bat activity was recorded in this area; this is a hotspot of activity for both species, relative to the other 14 static sampling sites. - The Black 2 route crosses Yazor Brook with a bridge structure. This may lead to the retention of stream bed habitats, although the probable low clearance above these waterbodies is likely to result in shading impacts. The pond adjacent to the Yazor Brook would be part infilled. Several otter spraints were found at this location and the pond may be a foraging resource (albeit fencing is in place which may be some deterrent to foraging otter). - The Black 2 route would likely result in the loss of a GCN breeding pond and the fragmentation of a wildlife corridor for bats
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						a great crested newt breeding pond and the fragmentation of a wildlife corridor for bats and GCN north of Hospital Farm.	and GCN north of Hospital Farm.
	All route options						
Element 3	All route options follow the same alignment within Element 3. This Element is less ecologically important than the other two Elements. Element 3 would result in losses within arable, improved pasture, and poor semi-improved pasture. Several hedgerows will also be bisected. These are generally heavily managed; however some are likely to be used as wildlife corridors and habitat fragmentation impacts are possible.						

10 WATER AND DRAINAGE

10.1 INTRODUCTION

- 10.1.1. This chapter provides preliminary assessment of potential effects on road drainage and the surrounding water environment caused by the construction and operation of the proposed route options. The assessment has been undertaken in accordance with the methodology within DMRB Volume 11, Section 3, Part 10 (HD 45/09).
- 10.1.2. The aspects of the water environment considered in this chapter include the ecological, chemical and hydromorphological quality of surface water features, the chemical and quantitative quality of groundwater resources, and flood risk. Potential impacts to ecology, including sensitive and/or important aquatic species and habitats, are assessed in Chapter 9: Biodiversity.

10.2 LEGISLATION AND POLICY FRAMEWORK

- 10.2.1. The management of water resources is governed by a range of legislative guidance set out in international, national and regional policies and plans. This assessment has been prepared whilst taking these plans and policies into account.
- 10.2.2. The coordination of policies for the water environment is managed by the Department of Environment, Food and Rural Affairs (DEFRA). Many flood risk and water quality requirements are set at European level, which are then transposed into UK law. The enforcement of flood risk and water quality requirements in England is managed by the Environment Agency.

EUROPEAN POLICY

Water Framework Directive (2000/60/Ec)

- 10.2.3. The overall objective of the Water Framework Directive (WFD) is to bring about the effective co-ordination of water environment policy and regulation across Europe. The main aims of the legislation are to ensure that all surface water and groundwater reach 'good' status (in terms of ecological and chemical quality and water quantity, as appropriate), promote sustainable water use, reduce pollution and contribute to the mitigation of flood and drought.
- 10.2.4. The WFD also contains provisions for controlling discharges of dangerous substances to surface waters and groundwater and includes a 'List of Priority Substances'. Various substances are listed as either List I or List II substances, with List I substances considered the most harmful to human health and the aquatic environment. The purpose of the directive is to eliminate pollution from List I substances and reduce pollution from List II substances.

Groundwater Directive (2006/118/Ec)

- 10.2.5. This Groundwater Directive aims to set groundwater quality standards and introduce measures to prevent or limit pollution of groundwater. The directive has been developed in response to the requirements of Article 17 of the WFD, specifically the assessment of chemical status of groundwater and objectives to achieve 'good' status.

NATIONAL POLICY

National Planning Policy Framework

- 10.2.6. The National Planning Policy Framework⁴⁵ (NPPF) sets out the Government's planning policies for England and provides a framework within which local councils can produce their own plans that better reflect the specific needs of their communities. Planning Practice Guidance 'Flood Risk and Coastal Change'⁴⁶ has been

⁴⁵ Communities and Local Government (2012), available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf, accessed 01/05/2018.

⁴⁶ Ministry of Housing, Communities & Local Government (2014), Planning Practice Guidance 'Flood Risk and Coastal Change' available online at <https://www.gov.uk/guidance/flood-risk-and-coastal-change>, accessed 01/05/2018.

published alongside the NPPF to set out how certain policies, including those relating to flood risk, should be implemented.

- 10.2.7. The NPPF and Planning Practice Guidance 'Flood Risk and Coastal Change' identify how new developments must take into account flood risks, including making allowance for climate change impacts over the longer term. Paragraph 100 of the NPPF requires that inappropriate developments in areas of flood risk should be avoided by directing development away from high risk areas. When development is necessary, projects should look to make schemes safe without increasing flood risk elsewhere. The sequential test is used as the principal step to identify preferred locations, i.e. those not exposed to risk of flooding. Then, if development is deemed necessary in a flood zone, an exception test can be conducted through an appraisal of risk, and appropriate reduction and management measures can be implemented.
- 10.2.8. All applications in the following areas should be accompanied by a Flood Risk Assessment (FRA) – all projects in Flood Zones 2 and 3 (medium and high probability of river and tidal flooding); projects of 1ha or greater in Flood Zone 1 (low probability of river and tidal flooding); projects which may be at significant risk from other sources of flooding (local watercourses, surface water, groundwater or reservoirs); or where the Environment Agency has notified the local planning authority that there are critical drainage problems.
- 10.2.9. The NPPF also sets out the preferred hierarchy for surface water management, stating that surface water should be infiltrated to ground in the first instance. If infiltration is not a feasible means of managing surface water runoff, the preferences are (in order of priority) discharge to a watercourse, discharge to a surface water or highways drainage system, and discharge to the combined sewerage network.

Flood and Water Management Act 2010

- 10.2.10. The Flood and Water Management Act 2010 created the role of the Lead Local Flood Authority (LLFA) (typically the unitary authority or county council, as applicable) to take responsibility for leading the co-ordination of local flood risk management in their areas. The Act also guides the role of the LLFA in the review and approval of surface water management systems. This has led to a change that requires the LLFA to review and comment on significant development in regard to the recently published Non-Statutory Technical Standards for Sustainable Drainage Systems⁴⁷.

Environment Agency Groundwater Protection Guides

- 10.2.11. The Environment Agency is the statutory body responsible for the protection and management of groundwater resources in England. The groundwater protection guides published in March 2017 set out the framework for the Environment Agency regulation, and replaces Groundwater Protection: Principles and Practice GP3. Section C Infrastructure of the Environment Agency's approach to groundwater protection guidance document is of key importance to transport proposals. In summary, Section C sets out the Environment Agency's position statements and approach to managing and protecting groundwater in relation to infrastructure developments.

Environmental Permitting (England and Wales) Regulations 2010

- 10.2.12. The Environmental Permitting (England and Wales) Regulations 2010 replaced the Water Resources Act 1991 as the key legislation for water pollution in the UK. Under the Environmental Permitting Regulations it is an offence to cause or knowingly permit a water discharge activity, including the discharge of polluting materials to freshwater, coastal waters, relevant territorial waters or groundwater, unless complying with an exemption or an environmental permit. An environmental permit is obtained from the Environment Agency. The Environment Agency sets conditions which may control volumes and concentrations of particular substances or impose broader controls on the nature of the effluent, taking into account any relevant water quality standards from the relevant EU Directives.
- 10.2.13. The Environmental Permitting Regulations also assist in the management of flood risk and, as of 6 April 2016, any activity which has the potential to impact on a main river (which typically means any works in the vicinity of a main river, flood defence structure and sea defence, or in a floodplain) would require a Flood Risk Activities Permit (previously referred to as Flood Defence Consent) to be granted by the Environment Agency and specifies the appropriate conditions to ensure works do not increase flood risk or damage flood defences.

⁴⁷ Non-statutory technical standards for sustainable drainage systems, DEFRA, March 2015

Land Drainage Act 1991

- 10.2.14. The Land Drainage Act 1991 sets out rights and responsibilities for all parties in relation to land drainage, including responsibilities for maintenance and works in the vicinity of ordinary watercourses. The Act requires that an ordinary watercourse be maintained by its owner in such a condition that free flow of water is not impeded. The Act also states that any works in the vicinity of ordinary watercourses that have the potential to obstruct or alter the flow of water would require appropriate consent from the Local Authority or IDB. This is usually obtained as Land Drainage Consent or Ordinary Watercourse Consent.

LOCAL POLICY

Hereford Adopted Core Strategy

- 10.2.15. This planning policy relates to the management of the water environment and flood risk:
- 10.2.16. *Policy SD3* of this document – Sustainable water management and water resources recommends that: Measures for sustainable water management will be an integral element of new development in order to reduce flood risk; to avoid an adverse impact on water quantity; to protect and enhance groundwater resources and to provide opportunities to enhance biodiversity, health and recreation. This would be achieved by ensuring that:
- Development proposals are located in accordance with the Sequential Test and Exception Tests (where appropriate) and have regard to the Strategic Flood Risk Assessment (SFRA) 2009 for Herefordshire;
 - Development is designed to be safe, taking into account the lifetime of the development and the need to adapt to climate change by setting appropriate floor levels, providing safe pedestrian and vehicular access, where appropriate, implementing a flood evacuation management plan and avoiding areas identified as being subject to Rapid Inundation from a breach of a Flood Defence;
 - Where flooding is identified as an issue, new development should reduce flood risk through the inclusion of flood storage compensation measures, or provide similar betterment to enhance the local flood risk regime;
 - Development will not result in the loss of open watercourse and culverts should be opened up where possible to improve drainage and flood flows. Proposals involving the creation of new culverts (unless essential to the provision of access) will not be permitted; and
 - Development includes appropriate sustainable drainage systems (SuDS) to manage surface water appropriate to the hydrological setting of the site. Development should not result in an increase in runoff and should aim to achieve a reduction in the existing runoff rate and volumes, where possible.

10.3 STUDY AREA

- 10.3.1. The study area includes surface water features, such as watercourses and ponds, up to a minimum of 0.5km from the proposed Scheme. This distance is considered appropriate to assess the potential direct effects of the proposed Scheme, such as pollutants transported in surface water runoff, pollutants conveyed in drainage systems, and works within the river channel. Features that are in hydraulic connectivity with the study area, such as surface water abstractions and downstream watercourses, are also considered within the assessment. Based on the professional judgement of the assessor and current knowledge of the area, features located up to 1km from the options have been considered in the assessment. This distance is considered appropriate to assess the indirect effects of the route options.
- 10.3.2. The study area encompasses groundwater features within approximately 0.5km of the route options and groundwater abstractions up to a minimum of 1km from the options. These distances are considered appropriate to assess pollutants migrating to groundwater features.
- 10.3.3. The study area in regard to the assessment of flood risk encompasses identified floodplains and receptors that may be affected by an increase in flood risk associated with the proposed Scheme. The extent of the study area will therefore be defined by the extent of flood risk impacts, although based on professional judgement this is likely to be within a distance of approximately 1km from the proposed Scheme.

10.4 BASELINE CONDITIONS

- 10.4.1. Baseline information has been obtained from the following sources:
- Ordnance Survey mapping;
 - Environment Agency mapping available online for flood risk, groundwater and water abstractions;
 - Environment Agency Catchment Data Explorer;

- MAGIC geographical information portal;
- British Geological Survey (BGS) online map of geology;
- Envirocheck report, dated 16 December 2016;
- Observations made from site visit in March 2017 and February 2018;
- Environment Agency groundwater monitoring data;
- Environment Agency reports, specifically relating to the Yazor Numerical Model Construction Report (AMEC, 2014a) and WFD Stage 2 Investigation Yazor Brook (AMEC, 2014b);
- Review of drawings prepared by Halcrow to inform flood management works in the vicinity of Roman Road undertaken in 2004 (provided by Herefordshire Council in March 2018);
- Consultation undertaken with the Environment Agency, Natural England and Herefordshire Council in October 2017 and February 2018; and
- A combined 1D/2D hydraulic model of the Yazor Brook (including Widemarsh Brook and Eign Brook downstream) developed by Herefordshire Council to supplement the EA'S Flood Map for Planning.

10.4.2. The environmental constraints maps in Chapter 17 illustrates key water environment features are their proximity to the route options.

SURFACE WATER FEATURES

River Wye and Tributaries

- 10.4.3. The River Wye flows in an easterly direction through the study area. The river is bordered predominantly by agricultural land within and upstream of the study area, although immediately downstream of the study area the river enters the urban extent of Hereford and eventually flows through Hereford city centre. The River Wye is designated as a main river and is therefore under the jurisdiction of the Environment Agency.
- 10.4.4. The quality of the River Wye is assessed against the objectives of the WFD. The stretch 'Bredwardine Br to Hampton Bishop' is located within the study area. The watercourse is assessed to have an overall status of moderate, with an ecological status of moderate and a chemical status of good (2016 Cycle 2 results). The watercourse is described as being substantially natural in character.
- 10.4.5. The River Wye is designated as Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC) within the study area. The SAC designation is stated to be due to the presence of white clawed crayfish, sea lamprey, brook lamprey, river lamprey, twaite shad, Atlantic salmon, bullhead, and otters. The River Wye supports coarse fishing and is bordered by the Wye Valley Walk on the left bank of the watercourse. The watercourse is also popular for water sports such as canoeing.
- 10.4.6. Photograph of the River Wye within the study area are provided in Figure 10-1 and Figure 10-2, looking upstream from the north bank at Warham House and downstream from the south bank at Belmont Park respectively.



Figure 10-1: Photograph of the River Wye from the north bank looking upstream (March 2017)



Figure 10-2: Photograph of the River Wye from the south bank looking downstream (Feb 2018)

Belmont Stream

- 10.4.7. A small ordinary watercourse, known for the purpose of this report as Belmont Stream, flows in an easterly direction beneath Ruckhall Lane to the south of the River Wye. The watercourse confluent with the Newton Brook to the west of the study area at approximate NGR SO496388, and in turn discharges to the River Wye shortly downstream. The inlet into the culvert that conveys the watercourse beneath Ruckhall lane is shown in Figure 10-3.



Figure 10-3: Photograph of the Belmont Stream as it passes through Ruckhall Lane culvert at S0478383 (March 2017)

- 10.4.8. The downstream of extents of this watercourse are illustrated in Figure 10-4 and Figure 10-5, with Figure 10-5 illustrating a pipe culvert that conveys the watercourse beneath a field access track. The alignment of the culvert upstream of Ruckhall Lane is unclear, although review of OS mapping indicates that the watercourse may be culverted beneath the adjoining field and reappears as an open channel approximately 400m upstream.



Figure 10-4: Photograph of the Belmont Stream from the south bank looking upstream at SO482384 (Feb 2018)



Figure 10-5: Photograph of the Belmont Stream from the south bank looking upstream at SO483384 (March 2017)

Minor tributary

- 10.4.9. A minor watercourse flows in a southerly direction adjacent to Warham House to the north of the River Wye, discharging to the Wye at approximate NGR SO480389. Figure 10-6 and Figure 10-7 illustrate the alignment of the watercourse immediately downstream of Warham Lane (U73023). Figure 10-8 illustrates the watercourse's restricted passage beneath a farm access track a short distance upstream of its discharge to the Wye.



Figure 10-6: Photograph of minor watercourse at Warham House looking downstream from Warham Lane (U73023) (March 2017)



Figure 10-7: Photograph of minor watercourse at Warham House further downstream of Warham Lane (U73023) (Feb 2018)



Figure 10-8: Photograph of minor watercourse at Warham House upstream of River Wye (March 2017)

- 10.4.10. The upstream extents of this minor watercourse are uncertain, but review of OS mapping indicates that the source of this watercourse is to the north of Warham House at approximate NGR SO480399. The watercourse is aligned along a field boundary as illustrated in Figure 10-9. The watercourse enters a pipe culvert beneath the downstream access road, assumed to connect to the mapped alignment of the watercourse at Warham House approximately 200m downstream.



Figure 10-9: Photograph of minor watercourse at Warham House looking downstream from Warham Lane (U73023) (March 2017)

Yazor Brook and Tributaries

- 10.4.11. The Yazor Brook rises in Burton Hill to the north-west of Yarsop, approximately 9km to the north-west of the study area, and flows in a south-easterly direction towards Hereford. The watercourse is bordered predominantly by agricultural land within the study area, although is largely culverted as it flows through the centre of Hereford. The Yazor Brook confluences with the River Wye in the vicinity of Greyfriars Bridge (Victoria Street) at approximate NGR SO506395. The Yazor Brook is designated as an ordinary watercourse as is therefore under the jurisdiction of Herefordshire Council as LLFA.
- 10.4.12. The quality of the Yazor Brook is assessed against the objectives of the WFD. The watercourse is assessed to have an overall status of moderate, with an ecological status of moderate and a chemical status of good (2016 Cycle 2 results). The watercourse is described as being substantially natural in character, although downstream sections have been heavily modified within Hereford. The Yazor Brook is designated as a Site of Importance for Nature Conservation (SINC) within the study area. The watercourse is also considered likely to support, or have the potential to support, important species such as otter and eel.
- 10.4.13. Upstream of Roman Road, the Yazor Brook overflows into a manmade pond at Pinston House, illustrated in Figure 10-10. The pond is also understood to be stocked with coarse fish and used for private fishing.



Figure 10-10: Photograph of pond at Pinston House (Sep 2017)

- 10.4.14. The Yazor Brook continues south adjacent to this pond and flows through a 3.6m x 1.2m box culvert beneath Roman Road at NGR SO477423. From here the watercourse flows in an open channel to the south of The Bolts residential property. A small weir was observed adjacent to the garden of this property as illustrated in Figure 10-11. The Yazor Brook continues in an easterly direction adjacent to the southern side of Roman Road for approximately 200m before turning to the south-east.



Figure 10-11: Photograph of Yazor Brook to the south of The Bolts (Feb 2018)

- 10.4.15. Flood management and drainage works were completed in the area of Roman Road in 2004. These included the realignment of Yazor Brook from the north of Roman Road to approximately 200m east where the watercourse changes its course. The watercourse was offset from its current alignment as illustrated by the sketch provided in Figure 10-12. A detailed description of the flood management and drainage works is provided in the relevant Flood Risk and Drainage sections below.

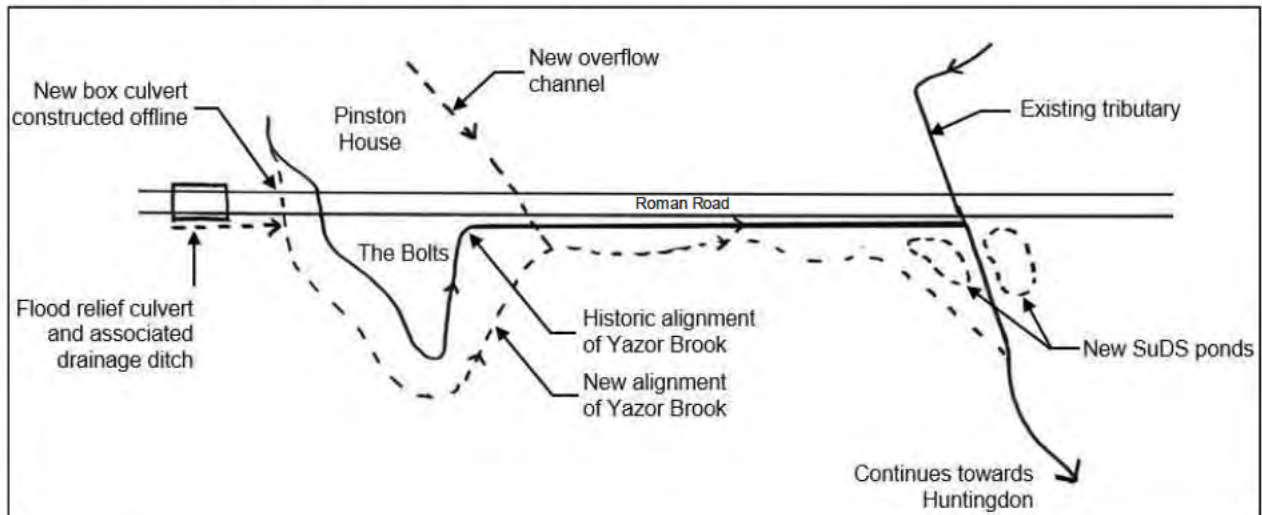


Figure 10-12: Sketch of Yazor Brook realignment

- 10.4.16. A minor tributary joins the Yazor Brook approximately 70m to the south of Roam Road at NGR SO481422, flowing along the alignment of the historic Yazor Brook channel as illustrated in Figure 10-12. The upstream extents of this tributary are discussed further below. On joining this minor tributary, the Yazor Brook continues south-east along its historic alignment and adjacent to a small public footpath towards Huntingdon as shown in Figure 10-13.



Figure 10-13: Photograph of Yazor Brook to the south of Roman Road looking downstream, downstream of confluence with minor tributary (March 2017)

- 10.4.17. Within Huntington the Yazor Brook spills into a 'natural' backwater pond as illustrated in Figure 10-14 and Figure 10-15 that in turn feeds into the more formal Huntington Court pond as illustrated in Figure 10-16. The ponds are considered likely to provide suitable habitat for GCN. The Yazor Brook flows adjacent to the south bank of the Huntington Court pond, with flow from the pond discharging back to Yazor Brook via a sluice gate.



Figure 10-14: Photograph of Yazor Brook alignment adjacent to backwater pond (March 2017)



Figure 10-15: Photograph of Yazor Brook alignment adjacent discharging into backwater pond (March 2017)



Figure 10-16: Photograph of Huntington Court Pond (March 2017)

- 10.4.18. The Huntington Lane Bridge separates the naturalised and formal ponds, comprising an attractive multi-span arched bridge.
- 10.4.19. Review of historic maps indicates that the general alignment of the Yazor Brook has not changed significantly since the 1880's with the exception of the realignment in 2004, with the earliest maps also showing the watercourse flowing beneath Roman Road, turning east to flow adjacent to Roman Road, and turning south-east to flow towards Huntington and the two ponds. It is unclear if the general alignment seen today is the natural alignment of the Yazor Brook. Historic maps also illustrate a second watercourse alignment that branches from the Yazor Brook as it passes beneath Roman Road, flowing south through agricultural fields before turning east to confluence with the current alignment of the Yazor Brook upstream of the Huntington ponds. It is likely that the natural alignment of the Yazor Brook followed a path similar to that presented in Figure 10-17. It appears that the second channel flowing due south of Roman Road was removed in the 1960's to 1970's and all flow diverted into the (approximate) current alignment of the Yazor Brook.

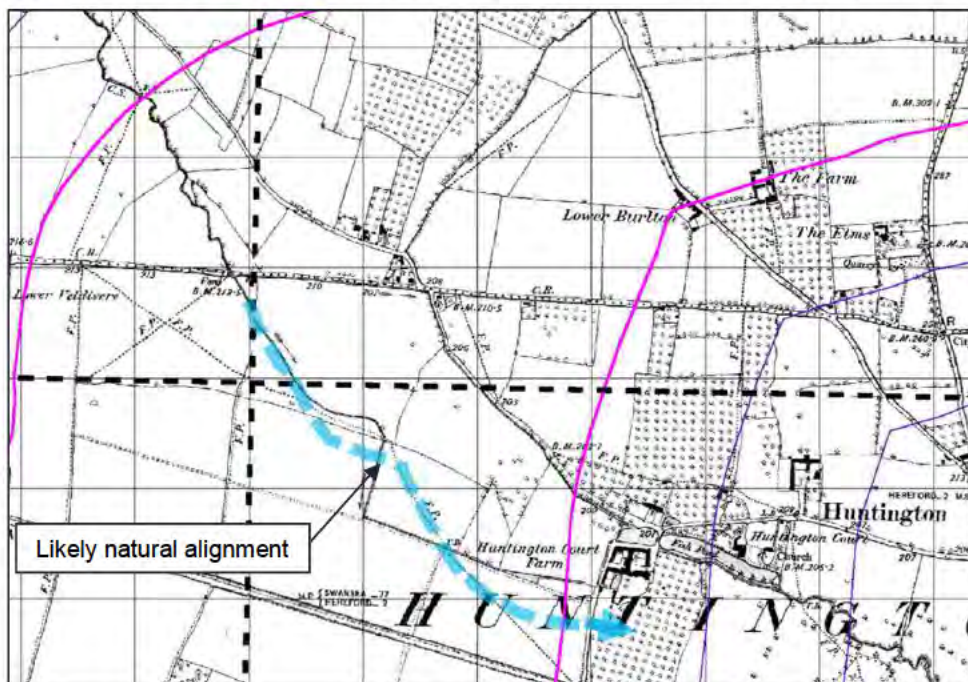


Figure 10-17: Likely historic alignment of Yazor Brook (Envirocheck, December 2016) Yazor Book Tributary

- 10.4.20. A tributary of the Yazor Brook flows in a south-westerly direction between Tillington Road and Towtree Road, passing beneath Roman Road at NGR SO481423 and joining the Yazor Brook approximately 70m to the south of Roam Road as discussed above. The watercourse follows a hedge line as illustrated in Figure 10-18. The value of the watercourse for aquatic ecology is likely to be low.



Figure 10-18: Photograph of Yazor Brook tributary looking downstream towards Towtree Road (March 2017)

AYLES BROOK

- 10.4.21. The source of the Ayles Brook is believed to be located immediately to the west of the A49 in the vicinity of The Orchard at approximate NGR SO505428. The watercourse flows south in a general south-westerly direction beneath Roman Road at NGR SO500421 to confluence with the Yazor Brook in the north-west of Hereford.
- 10.4.22. The Ayles Brook is designated as an ordinary watercourse as is therefore under the jurisdiction of Herefordshire Council as LLFA. The quality of the watercourse is not monitored against the objectives of the WFD.

OTHER SURFACE WATER FEATURES

- 10.4.23. An ordinary watercourse, which is under the jurisdiction of Herefordshire Council as LLFA, is located approximately 100m to the east of the A49 in the study area. The watercourse flows in a southerly direction towards Holmer, turning east to eventually flow through the Lugg Meadows. The quality of the watercourse is not monitored against the objectives of the WFD.
- 10.4.24. There are likely to be a number of smaller land drains that are located within the study area that have not been identified on OS mapping. These are likely to be associated with agricultural and highway drainage and discharge into the watercourses discussed above.
- 10.4.25. A series of ponds are located in the west of the study area between Kings Acre Road and Roman Road. These are associated with the garden centre and assumed to support irrigation, or within the cattle market to provide treatment of runoff. A number of smaller, isolated ponds are located throughout the study area. The features are identified on the Environmental Constraints Plan (Appendix 17-1) and a summary of their likely aquatic value provided in Chapter 9 Biodiversity.

SURFACE WATER ABSTRACTIONS

- 10.4.26. A review of the Environment Agency's Water Abstraction Licenses map identified several licensed surface water abstractions within 1km of the options. One is abstracted from the Yazor Brook just upstream of the options, and another is abstracted from an unnamed watercourse feeding a pond and located upstream of all options. Water abstracted from these abstractions is reported to be used for irrigation, and private-pond and lake through-flow.

GROUNDWATER

- 10.4.27. Review of BGS data (1:50,000 scale) indicates that bedrock geology across the whole of the study area comprises Raglan Mudstone Formation (interbedded siltstone and mudstone). The Raglan Mudstone Formation is classified as a Secondary A aquifer, described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and may also form an important source of base flow to streams and rivers. The mudstone occurs at outcrop in the southern and northern parts of the study area (Elements 1 and 3 respectively) and is not known to be a source of groundwater supply in this area.
- 10.4.28. Superficial deposits of glacial till and fluvio-glacial sands and gravels are located across the majority of the study area, with alluvium underlying the alignments of the River Wye and Yazor Brook and their current/historic floodplains. The fluvio-glacial gravels and alluvium are classified as Secondary A aquifers, whilst the glacial till is classified as a Secondary (undifferentiated) aquifer. The fluvio-glacial gravels comprise a locally important aquifer within the study area and support a number of groundwater abstractions. The gravels directly overlie the Ragan Mudstone Formation and are, in turn, overlain by a thin layer of glacial till which occurs at ground surface throughout the central part of the study area (Element 2).
- 10.4.29. Within and up gradient (west) of the study area, groundwater levels are below the bed of the Yazor Brook. Although the brook is directly underlain by glacial till, there is evidence from stream flow data that the brook loses water to the underlying alluvium or till under low flow conditions. As confirmed in consultations with the EA, the Yazor Brook is unlikely to be supported by groundwater baseflow within the study area.
- 10.4.30. Groundwater quality is monitored against the objectives of the WFD within the Secondary A aquifer (Wye Secondary Devonian ORS catchment) underlying the study area. The results indicate that the overall status is poor, with a current quantitative status of good and a current chemical of poor. The catchment is classified as a Drinking Water Protected Area, although there are no known drinking water abstractions within the study area. However, several large groundwater abstractions provide water for use in food and drinks production in Hereford.
- 10.4.31. Review of the Environment Agency's Water Abstraction Licenses map indicates that there are 12 licensed groundwater abstractions within the 1km study area. This includes three large abstractions (approx. 3 – 5Mld) that supply water to brewing and food processing industries in Hereford. The remaining licensed abstractions are relatively small (approx. 0.05 – 0.5Mld) and are associated with agriculture and irrigation within and to the west of the study area.
- 10.4.32. Review of the Environment Agency's Groundwater map identifies a groundwater Source Protection Zone (SPZ) within the study area to the west of Hereford. The SPZ is associated with a major abstraction from the shallow gravel aquifer that supports the Bulmers and Heineken cider breweries in Hereford. All proposed route options pass through either the total catchment zone (Zone 3) or the outer zone (Zone 2) of the SPZ. Several of the options would also pass within 200m of the inner zone (Zone 1).
- 10.4.33. An objection was made in December 2016 on behalf of Heineken in relation to the potential risks from the proposed Three Elms housing development site to the licensed groundwater sources that supply their cider production facility in Hereford ("The Cider Mills"). The development site lies within Zones 1, 2 and 3 of the SPZ referred to above.

FLOOD RISK

Fluvial Flood Risk

- 10.4.34. Review of the Environment Agency's Flood Map for Planning indicates that the most significant source of flood risk to the study area is associated with fluvial flooding from the Yazor Brook and the River Wye. All route options would cross the floodplains of the Yazor Brook and the River Wye as illustrated in the Environmental Constraints Plans in Appendix 17-1.

River Wye

- 10.4.35. Within the study area the floodplain of the River Wye is well defined by natural topography that defines the natural floodplain extent, with ground levels rising steeply from a floodplain level of approximately 50m AOD. There is little differentiation between the high risk Flood Zone 3 and medium risk Flood Zone 2, supporting the description of a well-defined floodplain. The vast majority of the River Wye floodplain is defined as functional floodplain Flood Zone 3b.
- 10.4.36. Downstream of the study area, the centre of Hereford is protected against flooding from the River Wye by the Hereford Flood Defence Scheme constructed in 2007 that comprises raised defences along the south bank of the River Wye, broadly between Belmont and St Martins. The scheme aimed to provide a 0.5% (1 in 200) annual probability standard of protection.

Yazor Brook

- 10.4.37. Within the study area the floodplain of the Yazor Brook is not as well defined by adjacent topography. Land on either side of the watercourse is indicated to be located in the high risk Flood Zone 3 and medium risk Flood Zone 2. The Yazor Brook also poses flood risk to urban areas of Hereford located downstream of the study area.
- 10.4.38. As discussed above, flood management works were completed at the crossing of the Yazor Brook with Roman Road in 2004. In summary the scheme comprised:
- An overflow channel from the Yazor Brook immediately upstream of the Pinston House pond. The channel measures approximately 1m wide at the base, 1m high and with side slopes of 1:1. Flood waters are diverted into the channel via a weir that conveys water south and beneath Roman Road through a 900mm diameter pipe culvert at NGR SO478423. The channel reconnects to the Yazor Brook immediately downstream of The Bolts.
 - A flood relief culvert beneath Roman Road at NGR SO476424. The culvert comprises a 2.4m by 0.9m box culvert that conveys overland flood flows from the Yazor Brook into a short ditch to the south side of Roman Road. The ditch subsequently conveys this water back into the Yazor Brook as it emerges from beneath Roman Road.
- 10.4.39. The Yazor Brook Flood Alleviation Scheme (FAS) was also constructed in 2012 and includes a weir offtake from the Yazor Brook at Credenhill upstream of the study area, with flows entering an approximate 1.4km culvert that discharges flow to the River Wye at The Old Weir. The FAS reduces flood risk within the study area and Hereford during smaller return period events, although land within the study area is still indicated to be at risk during the mapped 1% (1 in 100) and 0.1% (1 in 1000) annual probability events.
- 10.4.40. A combined 1D/2D hydraulic model of the Yazor Brook (including Widemarsh Brook and Eign Brook downstream) has been developed by Herefordshire Council to supplement the Environment Agency's Flood Map for Planning. Extracts from the model are presented in Figure 10-19 and Figure 10-20 indicating the 'without FAS' and 'with FAS' scenarios for the 1% (1 in 100) and 0.1% (1 in 1000) annual probability events.



Figure 10-19: Yazor Brook hydraulic modelling without FAS



Figure 10-20: Yazor Brook hydraulic modelling with FAS

- 10.4.41. Figure 10-19 and Figure 10-20 also indicate the restriction to flow caused by Three Elms Road to the east of the study area. Review of the hydraulic model shows that the Yazor Brook flows through a 3m x 2.5m box culvert at this location.

Surface Water Flood Risk

- 10.4.42. Review of the Environment Agency's Risk of Flooding from Surface Water Map indicates a risk of flooding from surface water sources within the study area. Flooding from surface water is typically associated with natural overland flow paths and local depressions in topography, where surface water runoff can accumulate during/following heavy rainfall events.
- 10.4.43. The most notable mapped surface water flood risks within the study area are associated with the alignment of the River Wye and Yazor Brook, and of the identified tributaries that discharge to the River Wye and Yazor Brook that have a catchment too small to include within the Environment Agency's Flood Map for Planning (typically less than 3km²).
- 10.4.44. Notable ponding of surface water is also indicated to the south of the A438 Kings Acre Road at Kings Acre and Fayre Oaks Caravan Park, and to the north of the A438 Kings Acre Road at Wyevale Business Park and the cattle market.
- 10.4.45. Notable overland flow paths are also identified in the east of the study area between Canon Pynon Road and the A49, particularly between Arundel Farm in the north and Roman Road to the south, with the overland flow indicated to discharge to the Ayles Brook.

DRAINAGE

- 10.4.46. A detailed review of the existing drainage systems serving roads crossed by the proposed Scheme has not been undertaken to inform this Stage 2 assessment, although it is considered likely that the majority of runoff would be conveyed to the watercourses discussed in this report.
- 10.4.47. Of particular note are the two SuDS ponds that were constructed in 2004 as part of the Yazor Brook flood management and drainage works. The ponds, which are illustrated in Figure 10-21, receive runoff from Roman Road and convey this to the adjacent Yazor Brook. A large SuDS pond is also located to the south of the flood relief culvert immediately west of Yazor Brook (although is not connected to the culvert). This pond receives runoff from the cattle market to the south. The pond has been partially full during site visits completed in March 2017 and February 2018 as can be seen in Figure 10-21.



Figure 10-21: Cattle market SuDS pond to south of Roman Road (March 2017)

VALUE (SENSITIVITY) OF RESOURCE

10.4.48. The water environment receptors that are most likely to be affected by the proposed Scheme include:

- The River Wye: A main river under the jurisdiction of the Environment Agency. Is a designated SSSI and SAC. Current WFD classification is moderate. Flows through an urban area downstream of the study area and is used for walking, fishing and boating. Value of this resource is considered to be Very High at this stage of the assessment.
- Belmont Stream: An ordinary watercourse and minor tributary of the River Wye. No designations and unlikely to have high ecological value, although may receive runoff from adjacent roads and provide water supply to livestock. Adjacent to public footpath. Value of this resource is considered to be Medium at this stage of the assessment.
- Minor watercourses upstream and adjacent to Warham House: Ordinary watercourses and minor tributaries of the River Wye. No designations and unlikely to have high ecological value, although may receive runoff from adjacent roads. Value of these resources is considered to be Low at this stage of the assessment.
- The Yazor Brook: An ordinary watercourse under the jurisdiction of Herefordshire Council. Is a designated SINC and may support species of importance. Current WFD status is moderate. Flows through an urban area downstream of the study area. Value of this resource is considered to be Very High at this stage of the assessment.
- Yazor Brook tributary: Ordinary watercourse and minor tributary of the Yazor Brook. No designations and unlikely to have high ecological value, although may receive runoff from adjacent roads. Value of this resource is considered to be Low at this stage of the assessment.
- Ayles Brook: An ordinary watercourse under the jurisdiction of Herefordshire Council and a moderately large tributary of the Yazor Brook, although culverted for significant distance upstream of confluence. Not monitored against WFD objectives. Value of this resource is considered to be Medium at this stage of the assessment.
- Smaller land drains within vicinity of the options: No known designations and likely to have low ecological value. Value of these resources is considered to be Low at this stage of the assessment.
- Ponds within vicinity of the options: No known designations although may be of ecological value, particularly as GCN ponds. May support local abstractions for non-potable uses. Value of these resources is considered to be Medium to High at this stage of the assessment.
- Groundwater: Majority of study area is underlain by a Secondary A Aquifer (fluvio-glacial gravels), parts of which are also designated as Zone 2 or Zone 3 of a SPZ. Current WFD classification of 'poor'. Supports major abstractions associated with local food and drinks industries, and minor abstractions for agriculture and irrigation. None of the known groundwater abstractions are licensed for potable water supply. Value of Zone 2 resources is considered to be High, and value of Zone 3 resources is considered to be Medium at this stage of the assessment.
- Floodplain associated with the River Wye: The floodplain is well defined by natural topography and is limited to largely rural areas within and upstream of the study area. Downstream of the study area, flood risk is managed by flood defences located along the banks of the river. Value of this resource is considered High at this stage of the assessment.
- Floodplain associated with the Yazor Brook: The floodplain is limited to largely rural areas within and upstream of the study area. The frequency of flood risk within the study area and downstream in the centre of Hereford is reduced by the Yazor Brook FAS. Value of this resource is considered to be High at this stage of the assessment.

10.5 ASSESSMENT METHODOLOGY

10.5.1. This chapter provides a high-level qualitative assessment of the potential impacts of the proposed options on the water environment. The assessment is based on limited information that is available for each of the options.

10.5.2. The assessment has been undertaken in accordance with the DMRB Volume 11, Section 3, Part 10 (HD 45/09). The DMRB promotes the following approach:

- Estimation of the importance of the attribute.
- Estimation of the magnitude of the impact.
- Assessment of the significance of the impact based on the importance of the attribute and the magnitude of the impact.

- 10.5.3. The assessment of impacts to water quality and hydromorphology has been undertaken as a qualitative assessment and the Highways England HAWRAT tool has not been applied at this stage.
- 10.5.4. The assessment of impacts to flood risk has been informed by high-level hydraulic analysis using the existing Yazor Brook 1D-2D hydraulic model. This analysis is presented as a standalone technical report in Appendix 10-1 and while the analysis focussed on Cyan, Olive and Black 1, the findings of this analysis used to better understand likely impacts associated with all seven of the route alignments and inform likely mitigation requirements.
- 10.5.5. The importance of the attributes is considered in terms of indicators such as quality, scale, rarity and substitutability. The following criteria have been developed following the general guidance of HD 45/09 as set out in Table 10-1.

Table 10-1: Criteria for estimating the importance of water environment attributes

Importance	Criteria	Example
Very High	Attribute has a high quality and rarity on regional or national scale	- Large or medium watercourses with pristine / near pristine water quality, i.e. WFD Class 'High'. - Site protected/designed under EU or UK habitat legislation (SAC), Special Protection Area (SPA), SSSI, Water Protection Zone (WPZ), Ramsar site, species protected by EU legislation. - Watercourses supporting a wide range of significant species and habitats sensitive to changes in suspended sediment concentrations and turbidity such as salmon or freshwater pearl mussels. Water dependent ecosystems of international/national biodiversity value. - Water feature sediment regime provides a diverse mosaic of habitat types. - Water feature includes varied morphological features (e.g. pools, riffles, bars, natural bank profiles) with no sign of channel modification. - A watercourse or groundwater body used for public water supply or private water supply serving >10 properties. - Principal aquifer providing a regionally important resource or supporting site protected under EC and UK habitat legislation. - SPZ1. - Water body of high amenity value, including areas of bathing and where water emersion sports are regularly practised. - Floodplain or defence protecting more than 100 residential properties from flooding. - Areas which are highly vulnerable. These can include essential infrastructure, emergency services and basement dwellings.
High	Attribute has a high quality and rarity on local scale	- Medium or small watercourses with minor degradation of water quality as a result of anthropogenic factors. Water body of good chemical and biological quality, i.e. WFD Class 'Good' - Species protected under UK legislation - Water dependent ecosystems of regional/county biodiversity value. Watercourses supporting some species and habitats sensitive to changes in suspended sediment concentrations and turbidity. - Water feature sediment regime provides habitats suitable for species sensitive to changes in sediment concentration and turbidity. - Water feature exhibiting a natural range of morphological features (e.g. pools, riffles, bars, varied natural river bank profiles), with limited signs of artificial modifications or morphological pressures. - A watercourse or groundwater body supporting minor/non-critical public drinking water supplies, or private water supply serving 2-10 properties. - Principal aquifer providing locally important resource or supporting river ecosystem. - SPZ2.

Importance	Criteria	Example
		- Water body of a moderate amenity value including public parks, boating, non-contact water sports, popular footpaths adjacent to watercourses, or watercourses running through housing developments/town centres. - Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding. - Areas which are more vulnerable. These can include hospitals, residential units, educational facilities and waste management sites.
Medium	Attribute has a medium quality and rarity on local scale	- Small watercourses with degradation of water quality as a result of anthropogenic factors. WFD Class of 'Moderate'. - Water dependent ecosystems of county/district biodiversity value. - Watercourses supporting limited species and habitats sensitive to changes in suspended sediment concentrations and turbidity. - Water feature sediment regime provides some habitat suitable for species sensitive to change in suspended sediment concentrations or turbidity. - Water feature exhibiting some morphological features (e.g. pools, riffles and depositional bars). The channel cross-section is partially modified in places, with obvious signs of modification to the channel morphology. - A watercourse or groundwater body supporting a private water supply serving a single property, or for agricultural/industrial use. - Aquifer with limited connection to surface water. - SPZ3. - Water body of particular local social/cultural/educational interest. Water body of low amenity value with only casual access, e.g. along a road or bridge in a rural area. - Floodplain or defence protecting 10 or fewer industrial properties from flooding. - Areas which are less vulnerable. These can include retail, commercial and general industrial units, agricultural/forestry sites and water/sewage treatment plants.
Low	Attribute has a low quality and rarity on local scale	- Small, heavily modified watercourses or drains with poor water quality as a result of anthropogenic factors. - Water of poor or bad chemical or biological quality, i.e. WFD Class of 'Poor' or 'Bad'. - Water dependent ecosystems of local/less than local biodiversity value. - Watercourses which do not support any significant species and habitats sensitive to changes in suspended sediment concentrations and turbidity. - Water feature sediment regime which provides very limited physical habitat for species sensitive to changes in suspended solids concentration or turbidity. - Water feature that has been extensively modified (e.g. by culverting, addition of bank protection or impoundments) and exhibits limited-to-no morphological diversity. The water feature is likely to have uniform flow, uniform banks and absence of bars. Insufficient energy for morphological change. - Watercourses not supporting water abstractions. - Non-Aquifer. - Water body of no amenity value, seldom used for amenity purposes, in a remote or inaccessible area. - Floodplain with limited constraints and a low probability of flooding of residential and industrial properties. - Areas which are considered to be water-compatible. These can include flood control infrastructure, docks/marinas, pumping stations and recreational/landscape areas.

10.5.6. The criteria for assessing the magnitude of a potential impact are summarised in Table 10-2, as developed from HD 45/09.

Table 10-2: Criteria for assessing the potential magnitude of an effect

Magnitude	Criteria	Example
Major Adverse	Results in loss of attribute and / or quality and integrity of the attribute	- High risk of pollution to surface water during construction, significant temporary or long-term change in water quality, resulting in a permanent change in WFD status - Failure of both soluble and sediment bound pollutants in HAWRAT and EQS routine runoff compliance failure - Risk of pollution from accidental spillage during operation > 2% annually. - Results in loss of feature(s) and failure of hydromorphological elements (morphology, quantity and dynamics of flow). Loss or damage to existing habitats. Significant/extensive alteration to channel planform and/or cross section. Replacement of natural bed and/or banks with artificial materials. Significant shift away from baseline conditions with potential to alter natural fluvial processes at the catchment scale. - Significant impacts on the water feature bed, banks and vegetated riparian corridor resulting in changes to sediment characteristics, transport processes, sediment load and turbidity. - Permanent loss of surface water supply - Loss of, or extensive change to, an aquifer / groundwater supported designated wetlands. - Changes to site resulting in an increase in discharge/runoff of > 75% with flood/sewerage exceedance potential. - Increase in peak flood level (1% annual probability event) > 100mm. - Loss of flood storage areas.
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute	- Moderate risk of pollution to surface water during construction, moderate temporary change in water quality, resulting in a temporary change of WFD status or preventing attainment of target overall status of 'Good' - Failure of both soluble and sediment bound pollutants in HAWRAT routine runoff but compliance with EQS limits - Risk of pollution from accidental spillage during operation > 1% annually. - Some changes and impacts on the water feature bed, banks and vegetated riparian corridor resulting in some changes to sediment characteristics, transport processes, sediment load and turbidity. - Some alteration to channel planform and/or cross section, including modification to bank profiles or the replacement of a natural bed. A shift away from baseline conditions with potential to alter natural fluvial processes. - Temporary loss of water supply. - Partial loss or change to an aquifer/ groundwater supported designated wetlands. - Changes to site resulting in an increase in discharge/runoff of > 50% with flood/sewerage exceedance potential. - Increase in peak flood level (1% annual probability event) > 50mm.
Minor Adverse	Results in some measurable change in attribute's quality or vulnerability	- Minor risk of pollution during construction to surface water, relatively minor temporary changes in water quality such that ecology is temporarily affected. Equivalent to a temporary minor, but measurable, change within WFD status class - Failure of either soluble or sediment bound pollutants in HAWRAT routine runoff but compliance with EQS limits - Risk of pollution from accidental spillage during operation > 0.5% annually. - Limited impacts on the water feature bed, banks and vegetated riparian corridor resulting in limited (but notable) changes to sediment characteristics, transport processes, sediment load and turbidity.

Magnitude	Criteria	Example
		- A small change or modification in the channel planform and/or cross section. Minimal shift away from natural fluvial baseline conditions with typically localised impacts. - Temporarily reduced quality of water supply - Changes to site resulting in an increase in discharge/runoff of > 25% with flood/sewerage exceedance potential. - Increase in peak flood level (1% annual probability event) > 10mm.
Negligible Adverse	Results in effect on attribute, but of insufficient magnitude to affect the use of integrity	- Negligible risk of pollution to surface water during construction, very slight temporary change in water quality with no discernible effect on watercourse ecology or water supply - All elements of HAWRAT and EQS routine runoff assessments passed - Risk of pollution from accidental spillage during operation < 0.5% annually - Minimal or no measurable change from baseline conditions in terms of sediment transport, channel morphology and natural fluvial processes. Any impacts are likely to be highly localised. - No measurable impact upon an aquifer. - Negligible change in peak flood level (1% annual probability event) < 10mm
No Change	Results in no change to the receptor	No predicted adverse or beneficial impact to the receptor.
Negligible Beneficial	Results in beneficial effect on attribute, but of insufficient magnitude to affect the use of integrity	- The route options may beneficially affect the integrity of the water environment, but this is not considered measurable. - No measurable impact upon an aquifer. - Negligible change in peak flood level (1% annual probability event) < 10mm
Minor Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	- Potential for slight reduction in pollution to a surface water or groundwater body, but insufficient to cause noticeable benefit in quality, fishery productivity or biodiversity. - Changes to site resulting in a decrease in discharge/runoff > 25%. - Reduction in peak flood level (1% annual probability event) > 10mm.
Moderate Beneficial	Results in moderate improvement of attribute quality	- Moderate improvement to a fishery / designated nature conservation site. Potential increase in the productivity of a fishery. - Reduced pollution of a receiving water body, but insufficient to change the environmental status/classification, including water quality classification. - Changes to site resulting in a decrease in discharge/runoff > 50%. - Reduction in peak flood level (1% annual probability event) > 50mm.
Major Beneficial	Results in major improvement of attribute quality	- Significant improvement to a fishery / designated nature conservation site. - Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring. - Change to the environmental status/classification of a water feature, including water quality classification. - Changes to site resulting in a decrease in discharge/runoff of > 75%. - Reduction in peak flood level (1% annual probability event) > 100mm.

- 10.5.7. The overall significance of potential impacts considers both the magnitude of the impact against the value of the receptor as demonstrated in Table 10-3.

Table 10-3: Criteria for assessing the significance of the effect

		MAGNITUDE OF IMPACT (DEGREE OF CHANGE)				
		No change	Negligible	Minor	Moderate	Major
ENVIRONMENTAL VALUE (SENSITIVITY)	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

- 10.5.8. Mitigation measures incorporated into the design and that are considered standard good practice have been considered prior to undertaking the assessment of effects. Any residual effects following these measures have been identified and the need for further mitigation will be outlined and considered further within the detailed design of the preferred option.

10.6 DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

CONSTRUCTION

- 10.6.1. At the construction stage it is possible that mobilised suspended solids or spillage of fuels, lubricants and hydraulic fluids from construction plant could migrate to identified water features either directly or via the highway drainage system. The construction works could also have a detrimental effect on the quality of surface water features associated with construction works within the watercourse channels, for example through earthworks in the channel that could increase sedimentation.
- 10.6.2. To mitigate these risks as far as practicable, a Construction Environmental Management Plan (CEMP) would be prepared and adopted during the construction stage to limit the risk of pollutants entering surface water features or discharging to ground. The CEMP will detail the procedures and methods that must be followed to minimise the potential environmental effects of construction activities. The CEMP will also describe the procedures to be followed in the event of an environmental emergency such as a fuel or chemical spillage.

OPERATION

- 10.6.3. It will be important to ensure that the proposed route options do not significantly increase the risk of flooding to people and property elsewhere, most notably through the reduction of floodplain storage, impacts to existing flood schemes, obstruction to flow conveyance, or an increase in the rate and volume of surface water runoff. The design of the route options should therefore strive to achieve the following key principles:
- No net loss of fluvial floodplain storage, most notably associated with the River Wye and the Yazor Brook. Impacts could be mitigated through limiting works within the identified floodplain, the provision of like-for-like floodplain compensation, or by limiting lost storage through the design of proposed structures.
 - No notable impact on flood flow conveyance, most notably associated with the River Wye and the Yazor Brook. Impacts could be mitigated through avoiding the construction of barriers that would impede the flow of water within the floodplain.
 - Provision of appropriate ecological mitigation measures for works within and in close proximity to watercourses, such as inclusion of a natural bed (if a culvert design is proposed) and inclusion of structures to maintain fish, eel and otter passage.

- Ensuring no reduction in the standard of protection served by existing flood defences and flood alleviation schemes, nor impact to the ability to maintain these defences.
- Providing a robust surface water drainage system that ensures discharge from the proposed Scheme does not increase flood risk elsewhere up to and including the 1 in 100 annual probability event. The need to provide attenuation and restrict the rate and volume of discharge will need to be agreed with Herefordshire Council as Lead Local Flood Authority.
- Consideration of the potential effects of climate change over the lifetime of the proposed Scheme and in accordance with EA guidance, noting that river flows are likely to increase by c.35-70% and rainfall intensity is likely to increase by c.20-40%.

- 10.6.4. The route options may offer an opportunity to provide betterment to flood risk associated with the Yazor Brook by attenuating fluvial flow upstream of the proposed Scheme. Further discussion will be held with the Environment Agency and Herefordshire Council to discuss options for improving betterment, whilst ensuring no increased flood risk to people and property elsewhere and no unacceptable impact to ecology. Both adverse and beneficial impacts are considered in this assessment.
- 10.6.5. It will also be important to ensure that the proposed route options do not have an adverse effect on water quality, which in turn could have an adverse effect on local surface water and groundwater abstractions. Consideration will need to be given to the treatment of runoff prior to discharge and the measures that will be required in the event of spillage. Multi-stage proposals that maximise passive treatment through the use of SUDS are recommended.
- 10.6.6. Measures specific to each of the proposed route options are discussed below.

10.7 POTENTIAL IMPACTS

ELEMENT 1

Orange

Impacts to surface water resources

- 10.7.1. The Orange route would cross the River Wye and Belmont Stream. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be implemented as identified in a CEMP. The bridge piers for the proposed crossing of the River Wye would be set back a minimum distance of 8m from the top of bank of the watercourse, with no structures proposed within the watercourse. As such there should be negligible residual risk to water quality in the River Wye. The proposed crossing of Belmont Stream will comprise a culvert that would require works to be undertaken in the watercourse. As such it is unlikely that all potential pollution risks can be mitigated (particularly increased sedimentation) with a likely residual impact magnitude of minor adverse.
- 10.7.2. The Orange route would pass east of Warham House and the minor watercourse that runs adjacent to this property. Impacts to water quality during construction of the main highway alignment are unlikely to pose risk to water quality, although the proposed link road to C1189 (Lower Breinton Road) would cross the assumed alignment of this watercourse between C1189 (Lower Breinton Road) and Warham Lane (U73023). The watercourse is assumed to be culverted at this location hence impacts are likely to be minimal, although some realignment of this watercourse may be required. The impact to water quality during construction is considered likely to be minor adverse at this stage of the assessment.
- 10.7.3. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the proposed Scheme. Infiltration to ground would be promoted in the first instance. If infiltration is not viable, runoff would be discharged to the Belmont Stream, River Wye and minor tributary of the Wye that flows adjacent to Warham House. Impacts to water quality will be assessed in accordance with the DMRB and appropriate pollution control measures will be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.
- 10.7.4. The proposed crossing of Belmont Stream approximately 360m downstream of its existing crossing beneath Ruckhall Lane would maintain hydraulic and ecological connectivity through the use of a culvert with a natural bed. There is likely to be a minor adverse impact to the hydromorphological quality of the stream at this location.

- 10.7.5. The proposed crossing of the River Wye would comprise a clear span structure with piers located a minimum of 8m from top of bank to mitigate potential adverse effect to the watercourse. The impact to hydromorphological quality is considered to be negligible.
- 10.7.6. As discussed above the proposed link road to C1189 (Lower Breinton Road) would cross the assumed alignment of the minor watercourse that flows adjacent to Warham House. The watercourse is assumed to be culverted at this location hence impacts to the hydromorphological quality of this watercourse are likely to be negligible, although some realignment of the watercourse may be required.

Impacts to groundwater resources

- 10.7.7. The Orange route in this area would cross minor outcrops of superficial fluvio-glacial gravels and glacial sheet deposits, and Raglan Mudstone Formation bedrock, none of which support licensed groundwater abstractions. Measures to prevent pollution of surface water resources during construction will be identified in a CEMP. The residual risk to groundwater resources from such measures is likely to be negligible.
- 10.7.8. During operation, runoff would be conveyed from a surface water drainage system to a number of vegetated attenuation ponds before allowing the runoff to either infiltrate to ground or be discharged to the Belmont Stream, the River Wye or a minor tributary of the Wye that flows adjacent to Warham house. The residual impact to groundwater resources from these discharges is likely to be negligible.

Impacts to flood risk

- 10.7.9. The culvert proposed for the crossing of Belmont Stream approximately 360m downstream of Ruckhall Lane would be sized in order to satisfy DMRB capacity requirements. The residual impact is considered to be negligible, with receptors likely to comprise adjacent agricultural land.
- 10.7.10. The Orange route would cross the River Wye and its associated floodplain. The floodplain measures approximately 200m at this location. A clear span structure is proposed across the River Wye with piers located a minimum of 8m from top of bank to mitigate potential adverse effect to the watercourse. A viaduct structure is proposed across the floodplain. Impacts to flood risk are likely to be minimal given the large, constrained floodplain in this area, although this will be assessed in detail for the preferred route and appropriate mitigation developed if required. The residual risk is considered to be negligible.

Cyan and Yellow

Impacts to surface water resources

- 10.7.11. The Cyan and Yellow routes would cross the River Wye and Belmont Stream. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be implemented, as identified in a CEMP. The bridge piers for the proposed crossing of the River Wye would be set back a minimum distance of 8m from the top of bank of the watercourse, with no structures proposed within the watercourse. As such there would be negligible residual risk to water quality in the River Wye. The proposed crossing of Belmont Stream would comprise a culvert that would require works to be undertaken in the watercourse. As such it is unlikely that all potential pollution risks could be mitigated (particularly increased sedimentation) with a likely residual impact magnitude of minor adverse.
- 10.7.12. The routes would pass east of Warham House and the minor watercourse that runs adjacent to this property. Impacts to water quality during construction of the main highway alignment are unlikely to pose risk to water quality, although the proposed link road to C1189 (Lower Breinton Road) would cross the assumed alignment of this watercourse between C1189 (Lower Breinton Road) and Warham Lane (U73023). The watercourse is assumed to be culverted at this location hence impacts are likely to be minimal, although some realignment of this watercourse may be required. The impact to water quality during construction is considered likely to be minor adverse at this stage of the assessment.
- 10.7.13. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the proposed Scheme. Infiltration to ground would be promoted in the first instance. If infiltration is not viable, runoff would be discharged to the Belmont Stream, River Wye and minor tributary of the Wye that flows adjacent to Warham House. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.
- 10.7.14. The proposed crossing of Belmont Stream approximately 360m downstream of its existing crossing beneath Ruckhall Lane would maintain hydraulic and ecological connectivity through the use of a culvert with a natural

bed. There is likely to be a minor adverse impact to the hydromorphological quality of the stream at this location.

- 10.7.15. The proposed crossing of the River Wye would comprise a clear span structure with piers located a minimum of 8m from top of bank to mitigate potential adverse effect to the watercourse. The impact to hydromorphological quality is considered to be negligible.
- 10.7.16. As discussed above the proposed link road to C1189 (Lower Breinton Road) would cross the assumed alignment of the minor watercourse that flows adjacent to Warham House. The watercourse is assumed to be culverted at this location hence impacts to the hydromorphological quality of this watercourse are likely to be negligible, although some realignment of the watercourse may be required.

Impacts to groundwater resources

- 10.7.17. The Cyan and Yellow routes in this area crosses minor outcrops of superficial fluvio-glacial gravels and glacial sheet deposits, and Raglan Mudstone Formation bedrock, none of which support licensed groundwater abstractions. Measures to prevent pollution of surface water resources during construction will be identified in a CEMP. The residual risk to groundwater resources from such measures is likely to be negligible.
- 10.7.18. During operation, runoff would be conveyed from a surface water drainage system to a number of vegetated attenuation ponds before either being infiltrated to ground or discharged to the Belmont Stream, the River Wye or a minor tributary of the Wye that flows adjacent to Warham house. The residual impact to groundwater resources from these discharges is likely to be negligible.

Impacts to flood risk

- 10.7.19. The culvert proposed for the crossing of Belmont Stream approximately 360m downstream of Ruckhall Lane would be sized in order to satisfy DMRB capacity requirements. The residual impact is considered to be negligible, with receptors likely to comprise adjacent agricultural land.
- 10.7.20. The Cyan and Yellow routes would cross the River Wye and its associated floodplain. The floodplain measures approximately 200m at this location. A clear span structure is proposed across the River Wye with piers located a minimum of 8m from top of bank to mitigate potential adverse effect to the watercourse. A viaduct structure is proposed across the floodplain. Impacts to flood risk are likely to be minimal given the large, constrained floodplain in this area, although this will be assessed in detail for the preferred route and appropriate mitigation developed if required. The residual risk is considered to be negligible.

Red and Black 2

- 10.7.21. The Red and Black 2 routes would cross the River Wye. In order to minimise the risk to water quality during construction, appropriate pollution control measures will be implemented as identified in a CEMP. The bridge piers for the proposed crossing of the River Wye would be set back a minimum distance of 8m from the top of bank of the watercourse, with no structures proposed within the watercourse. As such there should be negligible residual risk to water quality in the River Wye.
- 10.7.22. The Red and Black 2 routes would cross Belmont Stream approximately 80m downstream of the watercourse's crossing beneath Ruckhall Lane. It is proposed that the proposed Scheme would be in cutting at this location, hence realignment of the watercourse would be required as it would not be possible to pass the watercourse beneath the proposed Scheme on its current alignment. As such it is likely that the watercourse would be at risk of pollution during construction (particularly increased sedimentation) with a likely residual impact magnitude of moderate adverse.
- 10.7.23. The Red and Black 2 routes would pass east of Warham House and the minor watercourse that runs adjacent to this property. Impacts to water quality during construction of the main highway alignment are unlikely to pose risk to water quality, although the proposed link road to C1189 (Lower Breinton Road) would cross the assumed alignment of this watercourse between C1189 (Lower Breinton Road) and Warham Lane (U73023). The watercourse is assumed to be culverted at this location hence impacts are likely to be minimal, although some realignment of this watercourse may be required. The impact to water quality during construction is considered likely to be minor adverse at this stage of the assessment.
- 10.7.24. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the proposed Scheme. Infiltration to ground would be promoted in the first instance. If infiltration is not viable, runoff would be discharged to the Belmont Stream, River Wye and minor tributary of the Wye that flows adjacent to Warham House. Impacts to water quality would be assessed

in accordance with the DMRB and appropriate pollution control measures would be implemented to meet EA and LLFA requirements. The residual impact is considered to be negligible.

- 10.7.25. As discussed above, the construction of the Red and Black routes would affect the current alignment of Belmont Stream. Measures to mitigate this impact are currently uncertain, but are likely to require a significant diversion of the watercourse through a c.350m culvert to maintain hydraulic connectivity with the downstream extent of the watercourse. Alternatively the watercourse could be diverted towards the north and discharge directly to the River Wye. The downstream extents of Belmont Brook to the east of the proposed Scheme would therefore experience a significant reduction in flow. This would be a major adverse impact to the hydromorphological quality of the stream at this location.
- 10.7.26. The proposed crossing of the River Wye would comprise a clear span structure with piers located a minimum of 8m from top of bank to mitigate potential adverse effect to the watercourse. The impact to hydromorphological quality is considered to be negligible.
- 10.7.27. As discussed above the proposed link road to C1189 (Lower Breinton Road) would cross the assumed alignment of the minor watercourse that flows adjacent to Warham House. The watercourse is assumed to be culverted at this location hence impacts to the hydromorphological quality of this watercourse are likely to be negligible, although some realignment of the watercourse may be required.

Impacts to groundwater resources

- 10.7.28. The Red and Black routes alignments in this area crosses minor outcrops of superficial fluvio-glacial gravels and glacial sheet deposits, and Raglan Mudstone Formation bedrock, none of which support licensed groundwater abstractions. Measures to prevent pollution of surface water resources during construction will be identified in a CEMP. The residual risk to groundwater resources from such measures is likely to be negligible.
- 10.7.29. During operation, runoff would be conveyed from a surface water drainage system to a number of vegetated attenuation ponds before either being infiltrated to ground or discharged to the Belmont Stream, the River Wye or a minor tributary of the Wye that flows adjacent to Warham house. The residual impact to groundwater resources from these discharges is likely to be negligible.

Impacts to flood risk

- 10.7.30. The Red and Black 2 routes would cross approximately 80m downstream of the watercourse's crossing beneath Ruckhall Lane. As the Red and Black options would be in cutting at this location, the current alignment of this watercourse cannot be maintained. Review of the Environment Agency's Surface Water Flood Risk map indicates a relatively significant flow route associated with this watercourse that could pose flood risk to Ruckhall Lane and the proposed routes. Mitigation is likely to comprise a c.350m culvert to maintain hydraulic connectivity with the downstream extent of the watercourse, or diverting the watercourse to the north to discharge directly to the River Wye. Given the uncertainty regarding the management of this risk, the impact to the proposed Scheme and receptors elsewhere is considered to be major adverse at this stage of the assessment.
- 10.7.31. The Red and Black routes would cross the River Wye and its associated floodplain. The floodplain measures approximately 200m at this location. A clear span structure is proposed across the River Wye with piers located a minimum of 8m from top of bank to mitigate potential adverse effect to the watercourse. A viaduct structure is proposed across the floodplain. Impacts to flood risk are likely to be minimal given the large, constrained floodplain in this area, although this will be assessed in detail for the preferred route and appropriate mitigation developed if required. The residual risk is considered to be negligible.

Olive and Black 1

Impacts to surface water resources

- 10.7.32. The Olive and Black 1 routes would cross the River Wye. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be implemented as identified in a CEMP. The bridge piers for the proposed crossing of the River Wye would be set back a minimum distance of 8m from the top of bank of the watercourse, with no structures proposed within the watercourse. As such there would be negligible residual risk to water quality in the River Wye.
- 10.7.33. The Olive and Black 1 routes would cross Belmont Stream as it passes beneath Ruckhall Lane. It is proposed that the proposed Scheme would be in cutting at this location, hence significant construction works would be required to realign the watercourse. As such it is likely that the watercourse would be at risk of pollution during

construction (particularly increased sedimentation) with a likely residual impact magnitude of moderate adverse.

- 10.7.34. The Olive and Black 1 routes would pass west of Warham House and the minor watercourse that runs adjacent to this property. Impacts to water quality during construction of the main highway alignment are unlikely to pose risk to water quality, although the proposed link road to C1189 (Lower Breinton Road) would cross the alignment of this watercourse as it passes beneath C1189 (Lower Breinton Road). Some culverting of this watercourse would therefore be required, although it is assumed that the watercourse is culverted immediately south of C1189 (Lower Breinton Road). The impact to water quality during construction is considered likely to be minor adverse at this stage of the assessment.
- 10.7.35. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the proposed Scheme. Infiltration to ground would be promoted in the first instance. If infiltration is not viable, runoff would be discharged to the Belmont Stream, River Wye and minor tributary of the Wye that flows adjacent to Warham House. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.
- 10.7.36. As discussed above, the construction of the Olive and Black 1 routes at the crossing of Ruckhall Lane would sever the current alignment of Belmont Stream. Measures to mitigate this impact are currently uncertain, but are likely to require a significant diversion of the watercourse through a c.350m culvert to maintain hydraulic connectivity with the downstream extent of the watercourse. Alternatively the watercourse could be diverted towards the north and discharge directly to the River Wye. The downstream extents of Belmont Brook to the east of the proposed Scheme would therefore experience a significant reduction in flow. This would be a major adverse impact to the hydromorphological quality of the stream at this location.
- 10.7.37. The proposed crossing of the River Wye would comprise a clear span structure with piers located a minimum of 8m from top of bank to mitigate potential adverse effect to the watercourse. The impact to hydromorphological quality is considered to be negligible.
- 10.7.38. As discussed above the proposed link road to C1189 (Lower Breinton Road) would cross the alignment of the minor watercourse that flows adjacent to Warham House. The watercourse is assumed to be culverted immediately south of this location hence impacts to the hydromorphological quality of this watercourse are likely to be negligible.

Impacts to groundwater resources

- 10.7.39. The Olive and Black 1 routes in this area would cross minor outcrops of superficial fluvio-glacial gravels and glacial sheet deposits, and Raglan Mudstone Formation bedrock, none of which support licensed groundwater abstractions. Measures to prevent pollution of surface water resources during construction would be identified in a CEMP. The residual risk to groundwater resources from such measures is likely to be negligible.
- 10.7.40. During operation, runoff would be conveyed from a surface water drainage system to a number of vegetated attenuation ponds before either being infiltrated to ground or discharged to the Belmont Stream, the River Wye or a minor tributary of the Wye that flows adjacent to Warham house. The residual impact to groundwater resources from these discharges is likely to be negligible.

Impacts to flood risk

- 10.7.41. The Olive and Black 1 routes would cross Belmont Stream as it passes beneath Ruckhall Lane. As the proposed Scheme would be in cutting at this location they would effectively sever the current alignment of this watercourse. Review of the Environment Agency's Surface Water Flood Risk map indicates a relatively significant flow route associated with this watercourse that could pose flood risk to Ruckhall Lane and the proposed Scheme. Mitigation is likely to comprise a c.350m culvert to maintain hydraulic connectivity with the downstream extent of the watercourse, or diverting the watercourse to the north to discharge directly to the River Wye. Given the uncertainty regarding the management of this risk, the impact to the proposed Scheme and receptors elsewhere is considered to be major adverse at this stage of the assessment.
- 10.7.42. The Olive and Black 1 routes would cross the River Wye and its associated floodplain. The floodplain measures approximately 320m at this location. A clear span structure is proposed across the River Wye with piers located a minimum of 8m from top of bank to mitigate potential adverse effect to the watercourse. A viaduct structure is proposed across the floodplain. Impacts to flood risk are likely to be minimal given the

large, constrained floodplain in this area, although this will be assessed in detail for the preferred route and appropriate mitigation developed if required. The residual risk is considered to be negligible.

Table 10-4 - Summary of Element 1

Receptor	Option (s)	Impact	Magnitude	Significance
River Wye	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during construction	Negligible adverse	Slight adverse
	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during operation	Negligible adverse	Slight adverse
	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Impacts to hydromorphology	Negligible adverse	Slight adverse
Belmont Stream	Orange, Cyan, Yellow	Pollution risks during construction	Minor adverse	Slight adverse
	Red, Olive, Black 1, Black 2	Pollution risks during construction	Moderate adverse	Moderate adverse
	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during operation	Negligible adverse	Neutral
	Orange, Cyan, Yellow	Impacts to hydromorphology	Minor adverse	Slight adverse
	Red, Olive, Black 1, Black 2	Impacts to hydromorphology	Major adverse	Large adverse
Warham House Tributary	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during construction	Negligible adverse	Neutral
	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during operation	Negligible adverse	Neutral
	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Impacts to hydromorphology	Negligible adverse	Neutral
Groundwater resources	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during construction	Negligible adverse	Neutral
	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during operation	Negligible adverse	Neutral

Receptor	Option (s)	Impact	Magnitude	Significance
Flood risk receptors	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Impacts to floodplain of River Wye	Negligible adverse	Slight adverse
	Orange, Cyan, Yellow,	Impacts to floodplain of Belmont Stream	Negligible adverse	Neutral
	Red, Olive, Black 1, Black 2	Impacts to floodplain of Belmont Stream	Major adverse	Very large adverse

ELEMENT 2

Orange

Impacts to surface water resources

- 10.7.43. The proposed junction of the proposed Scheme alignment would cross the Yazor Brook and the tributary of the Yazor Brook flowing south from Towtree Lane. Realignment of both watercourses would be required to accommodate the proposed Scheme. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be implemented as identified in a CEMP. Due to the extent of works required to these watercourses, it is unlikely that all pollution risks can be mitigated (particularly increased sedimentation) with a likely residual impact magnitude of moderate adverse.
- 10.7.44. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the proposed Scheme. Infiltration to ground would be promoted in the first instance in areas not located within Zone 1 or Zone 2 of the underlying SPZ. If infiltration is not viable and in areas of SPZ 1 and SPZ 2, runoff would be discharged to the minor tributary of the Wye that flows adjacent to Warham House or Yazor Brook. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.
- 10.7.45. The Yazor Brook would, for the most part, be realigned with a natural channel to maintain hydraulic and ecological connectivity with the upstream and downstream extents of the watercourse. At the crossing with the proposed Scheme, the Yazor Brook would be conveyed beneath the road in a culvert that would also be designed to maintain connectivity and include a natural bed. Consideration would also be given to the provision of a low flow channel and measures to prevent an unacceptable increase in flow velocity. The residual impacts to the hydromorphological quality of the Yazor Brook is considered to be moderate adverse, although this is likely to reduce to minor adverse after a period of approximately 5 years once the new alignment of the watercourse has become established.
- 10.7.46. A bridge option is also being considered for the proposed crossing of the Yazor Brook. The watercourse would need to be moved approximately 150m south to provide a c.2m clearance to the bridge soffit. This would allow the natural bed and banks of the watercourse to be maintained, although reinforcement of the banks may be required. Ground reprofiling would also be required adjacent to the watercourse and (predominantly) upstream of the proposed Scheme to a depth of approximately 0.9m below ground level to create a naturalised floodplain. The new watercourse alignment would extend for approximately 120m downstream of the crossing with the proposed Scheme before re-joining its current alignment. The residual impacts to the hydromorphological quality of the Yazor Brook is still considered to be moderate adverse due to the extent of the works required, although this is likely to reduce to negligible after a period of approximately 5 years once the new alignment of the watercourse has become established.
- 10.7.47. The tributary of Yazor Brook would most likely be conveyed within a culvert beneath the proposed Scheme to outfall to the Yazor Brook to the south of Roman Road. The upstream extent of this watercourse already flows within a culvert, although the works would like increase this culvert by c.100m. The impact to the hydromorphological quality of this watercourse is considered to be moderate adverse.

Impacts to groundwater resources

- 10.7.48. The Orange route would be constructed over the outcrop of the glacial till. The till is underlain by fluvio-glacial gravels which are a locally important source of water supply to local food/drinks production industries and agriculture. The alignment is located approximately 150 – 200 m from Zone 1 of the SPZ for Heineken's King's Acre groundwater supply source, and crosses the Zone 2 and Zone 3 areas. The alignment would be on a minor embankment as it crosses the SPZ and hence there should be no excavation into the glacial till.
- 10.7.49. Pollution control measures would be implemented during construction as identified in a CEMP. The Yazor Brook is believed to lose water to ground under low flow (and possibly also high flow) conditions. Due to the proximity of the alignment to the SPZ Zone 1 area and because not all pollution risks can be mitigated during work on watercourses, the likely magnitude of residual impact risks is considered to be minor adverse.
- 10.7.50. During operation, a surface water drainage system would be installed to manage pollution risks. Infiltration to ground would be considered in the first instance, however within the SPZ Zone 2 and Zone 3 areas no infiltration would be promoted and runoff would be diverted to surface water courses (the Yazor Brook or the minor tributary of the Wye that flows adjacent to Warham House). Outside of the Zone 2 and Zone 3 areas, the vegetated attenuation ponds should be constructed so that they do not fully penetrate the glacial till. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The likely residual risk to groundwater resources at this stage of the assessment is moderate adverse.

Impacts to flood risk

- 10.7.51. The Orange route would cross the Yazor Brook and its associated overland flow path. The current design of the proposed Scheme includes a realigned channel for the Yazor Brook and a culvert to convey the Yazor Brook beneath the proposed Scheme. High-level hydraulic modelling was conducted for the 1 in 100 annual probability event with 35% allowance for climate change. This modelling showed that, prior to inclusion of appropriate mitigation, the proposed Scheme would increase flood extents to the north and west of the proposed Scheme. Some increase in flood risk to Roman Road and the properties adjacent to Towtree Lane was predicted, but this is not dissimilar to the existing flood risk experienced in these areas. The impact to these receptors is likely to be minor adverse. It should also be noted that the currently designed and modelled culvert to convey the Yazor Brook beneath the proposed Scheme does not meet the requirements of the Environment Agency and LLFA to retain a 600mm freeboard between the peak flood water level and the structure soffit.
- 10.7.52. Mitigation to address the identified flood risks associated with the crossing of the Yazor Brook is likely to include the following:
- Provision of flood compensation storage upstream of the proposed crossing of Yazor Brook to the west of the proposed Scheme alignment.
 - Provision of a flood relief culvert beneath Roman Road to the west of the proposed junction to reduce flood risk to the properties adjacent to Towtree Lane and overtopping Roman Road.
- 10.7.53. The risks and mitigation are likely to be the same for the culvert and bridge options, although less floodplain compensation storage would be required for the bridge option given the larger capacity of the structure for flood flow conveyance. The residual risk following the inclusion of mitigation is likely to be negligible.
- 10.7.54. Further details of the high-level analysis of flood risk associated with the Yazor Brook crossing and potential mitigation options are provided in the Flood Risk Analysis Technical Note in Appendix 10-1.
- 10.7.55. The Orange option alignment would also cross the minor tributary of Yazor Brook upstream of Towtree Lane. It is assumed that connectivity of the tributary would be maintained through the use of a culvert and that the culvert would be sized to meet DMRB capacity requirements and not increase flood risk elsewhere. The residual risk associated with this minor tributary is considered to be negligible.

Cyan

Impacts to surface water resources

- 10.7.56. The Cyan route would cross the Yazor Brook and the minor tributary to the north of Towtree Lane, with culverts proposed to convey these watercourses beneath the proposed Scheme. Realignment of the Yazor Brook would also be required to the south of Roman Road to accommodate the proposed junction. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be

implemented as identified in a CEMP. Due to the extent of works required in the watercourses, it is unlikely that all pollution risks could be mitigated (particularly increased sedimentation) with a likely residual impact magnitude of minor adverse to Yazor Brook and the minor tributary to the north of Towtree Lane.

- 10.7.57. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the proposed Scheme. Infiltration to ground would be promoted in the first instance in areas not located within Zone 1 or Zone 2 of the underlying SPZ. If infiltration is not viable and in areas of SPZ1 and SPZ 2, runoff would be discharged to the minor tributary of the Wye that flows adjacent to Warham House or Yazor Brook. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.
- 10.7.58. It is proposed that, for the most part, the Yazor Brook would remain in its current alignment and that the realigned section would be within a naturalised channel. At the crossing with the proposed Scheme, the Yazor Brook would be conveyed beneath the road in a culvert that would be designed to maintain connectivity and include a natural bed. Consideration will also be given to the provision of a low flow channel and measures to prevent an unacceptable increase in flow velocity. The residual impacts to the hydromorphological quality of the Yazor Brook is considered to be minor adverse.
- 10.7.59. If a bridge option were considered for this location, this would require the watercourse to be moved approximately 110m south to provide a c.2m clearance to the bridge soffit. This would allow the natural bed and banks of the watercourse to be maintained, although reinforcement of the banks may be required. A significant volume of ground reprofiling would also be required adjacent to the watercourse both upstream and downstream of the proposed Scheme to a depth of approximately 1.6m below ground level to create a naturalised floodplain. Providing a bridge crossing for the Cyan route is therefore unlikely to be viable. The residual impacts to the hydromorphological quality of the Yazor Brook is still considered to be major adverse due to the extent of the works required, although this is likely to reduce to negligible after a period of approximately 5 years once the new alignment of the watercourse has become established.
- 10.7.60. The tributary of Yazor Brook would be conveyed beneath the road in a culvert. The impact to the hydromorphological quality of this watercourse is considered to be minor adverse.

Impacts to groundwater resources

- 10.7.61. The Cyan route would be constructed over the outcrop of the glacial till. The till is underlain by fluvio-glacial gravels which are a locally important source of water supply to local food/drinks production industries and agriculture. The alignment is located approximately 500 m from Zone 1 of the SPZ for Heineken's King's Acre groundwater supply source, and crosses the Zone 2 and Zone 3 areas. The alignment would be on a minor embankment as it crosses the SPZ between Roman Road and King's Acre road and hence there should be no excavation into the glacial till.
- 10.7.62. Pollution control measures would be implemented during construction as identified in a CEMP. The Yazor Brook is believed to lose water to ground under low flow (and possibly also high flow) conditions. Due to the proximity of the alignment to the SPZ Zone 1 area and because not all pollution risks can be mitigated during work on water courses, the likely magnitude of residual impact risks is considered to be minor adverse
- 10.7.63. During operation, a surface water drainage system would be installed to manage pollution risks. Infiltration to ground would be considered in the first instance, however within the SPZ Zone 2 and Zone 3 areas no infiltration would be promoted and runoff would be diverted to surface water courses (the Yazor Brook or the minor tributary of the Wye that flows adjacent to Warham House). Outside of the Zone 2 and Zone 3 areas, the vegetated attenuation ponds should be constructed so that they do not fully penetrate the glacial till. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The likely residual risk to groundwater resources at this stage of the assessment is moderate adverse.

Impacts to flood risk

- 10.7.64. The Cyan route would cross the Yazor Brook approximately 90m downstream of the existing Yazor Brook, crossing beneath Roman Road, and the Yazor Brook flood relief channel and overland flow routes. The current design of the Cyan route includes a culvert to convey the Yazor Brook beneath the proposed Scheme. It is also assumed that the alignment of the existing flood relief channel can be maintained. High-level hydraulic modelling of this proposed crossing was conducted for the 1 in 100 annual probability event with

35% allowance for climate change. This modelling showed that, prior to inclusion of appropriate mitigation, the proposed Scheme would increase flood extents to the north and west of the proposed Scheme, leading to increased flood risk to Pinston House and The Bolts, as well as overtopping of Roman Road. This is considered a major adverse impact on flood risk.

- 10.7.65. Potential options to mitigate likely flood risk associated with the crossing of the Yazor Brook are likely to include the following:
- Installation of three flood relief channels and culverts to the north of Roman Road to convey overland flows beneath the proposed Scheme in a similar manner to the existing situation, coupled with a new flood relief culvert beneath Roman Road that conveys flood waters back into the Yazor Brook downstream of the proposed Scheme.
 - A flood defence bund to protect Pinston House and direct overland flows towards the new flood relief channels and culverts.
 - A flood storage area located to the south of Roman Road.
- 10.7.66. Blockage of the proposed flood relief culverts, channels and flood bund could pose residual risk to Pinston House and The Bolts. The full effectiveness of these mitigation measures will be tested as part of the detailed assessment for the preferred Scheme.
- 10.7.67. It should also be noted that the currently designed and modelled culvert to convey the Yazor Brook beneath the Cyan route does not meet the requirements of the Environment Agency and LLFA to retain a 600mm freeboard between the peak flood water level and the structure soffit.
- 10.7.68. Further details of the high-level analysis of flood risk associated with the Yazor Brook crossing and potential mitigation options are provided in the Flood Risk Analysis Technical Note in Appendix 10-1.
- 10.7.69. The Cyan route would also cross the minor tributary of Yazor Brook upstream of Towtree Lane. Connectivity of the tributary would be maintained through the use of a culvert. This culvert would be sized based on DMRB capacity requirements. The residual risk associated with this minor tributary is considered to be negligible.

Yellow

- 10.7.70. The Yellow route would be located immediately adjacent to the Yazor Brook and over the alignment of the tributary of the Yazor Brook flowing south from Towtree Lane. The current proposals suggest that realignment of the Yazor Brook would not be required, although a new online culvert is proposed to convey the watercourse beneath the proposed Scheme. Realignment and culverting of the tributary would be required to maintain hydraulic connectivity. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be implemented as identified in a CEMP. The works to the Yazor Brook are considered likely to have a minor adverse impact to water quality during construction. The works to the tributary are considered likely to have a moderate adverse impact to water quality during construction.
- 10.7.71. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the proposed Scheme. Infiltration to ground would be promoted in the first instance in areas not located within Zone 1 or Zone 2 of the underlying SPZ. If infiltration is not viable and in areas of SPZ 1 and SPZ 2, runoff would be discharged to the minor tributary of the Wye that flows adjacent to Warham House or Yazor Brook. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.
- 10.7.72. It is proposed that, for the most part, the Yazor Brook would remain in its current alignment. At the crossing with the Yellow route, the Yazor Brook would be conveyed beneath the road in a culvert that would be designed to maintain connectivity and include a natural bed. Consideration would also be given to the provision of a low flow channel and measures to prevent an unacceptable increase in flow velocity. The residual impact to the hydromorphological quality of the Yazor Brook is considered to be minor adverse.
- 10.7.73. A bridge is also being considered for the proposed crossing of the Yazor Brook. The watercourse would need to be moved approximately 70m south to provide a c.2m clearance to the bridge soffit. This would allow the natural bed and banks of the watercourse to be maintained, although reinforcement of the banks may be required. Some relatively minor ground reprofiling would also be required adjacent to the watercourse and upstream of the proposed Scheme to create a naturalised floodplain. The new watercourse alignment would extend for approximately 30m downstream of the crossing with the proposed Scheme before re-joining its

current alignment. The residual impacts to the hydromorphological quality of the Yazor Brook is still considered to be minor adverse due to the extent of the works required, although this is likely to reduce to negligible after a period of approximately 5 years once the new alignment of the watercourse has become established.

- 10.7.74. The tributary of Yazor Brook would most likely be conveyed within a culvert beneath the proposed Scheme to outfall to the Yazor Brook to the south of Roman Road. The upstream extent of this watercourse already flows within a culvert, although the works would like increase this culvert by c.100m. The impact to the hydromorphological quality of this watercourse is considered to be moderate adverse.

Impacts to groundwater resources

- 10.7.75. The Yellow route would be constructed over the outcrop of the glacial till. The till is underlain by fluvio-glacial gravels which are a locally important source of water supply to local food/drinks production industries and agriculture. The alignment is located approximately 200 m from Zone 1 of the SPZ for Heineken's King's Acre groundwater supply source, and crosses the Zone 2 and Zone 3 areas. The alignment would be on a minor embankment as it crosses the SPZ between Roman Road and King's Acre road and hence there should be no excavation into the glacial till.
- 10.7.76. Pollution control measures would be implemented during construction as identified in a CEMP. The Yazor Brook is believed to lose water to ground under low flow (and possibly also high flow) conditions. Due to the proximity of the alignment to the SPZ Zone 1 area and because not all pollution risks can be mitigated during work on water courses, the likely magnitude of residual impact risks is considered to be minor adverse
- 10.7.77. During operation, a surface water drainage system would be installed to manage pollution risks. Infiltration to ground would be considered in the first instance, however within the SPZ Zone 2 and Zone 3 areas no infiltration would be promoted and runoff would be diverted to surface water courses (the Yazor Brook or the minor tributary of the Wye that flows adjacent to Warham House). Outside of the Zone 2 and Zone 3 areas, the vegetated attenuation ponds should be constructed so that they do not fully penetrate the glacial till. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet EA and LLFA requirements. The likely residual risk to groundwater resources at this stage of the assessment is moderate adverse.

Impacts to flood risk

- 10.7.78. The Yellow route would cross the Yazor Brook and its associated overland flow path. The current design of the proposed Scheme includes a culvert to convey the Yazor Brook beneath the proposed Scheme. High-level hydraulic modelling was conducted for the 1 in 100 annual probability event with 35% allowance for climate change. This modelling showed that, prior to inclusion of appropriate mitigation, the proposed Scheme would increase flood extents to the north and west of the proposed Scheme. Some increase in flood risk to Roman Road and the properties adjacent to Towtree Lane was predicted, but this is not dissimilar to the existing flood risk experienced in these areas. The impact to these receptors is likely to be minor adverse. It should also be noted that the currently designed and modelled culvert to convey the Yazor Brook beneath the proposed Scheme does not meet the requirements of the Environment Agency and LLFA to retain a 600mm freeboard between the peak flood water level and the structure soffit.
- 10.7.79. Mitigation to address the identified flood risks associated with the crossing of the Yazor Brook is likely to include the following:
- Provision of flood compensation storage upstream of the proposed crossing of Yazor Brook to the west of the proposed Scheme alignment.
 - Provision of a flood relief culvert beneath Roman Road to the west of the proposed junction to reduce flood risk to the properties adjacent to Towtree Lane and overtopping Roman Road.
- 10.7.80. The risks and mitigation are likely to be the same for the culvert and bridge options, although less floodplain compensation storage would be required for the bridge option, given the larger capacity of the structure for flood flow conveyance. The residual risk following the inclusion of mitigation is likely to be negligible.
- 10.7.81. Further details of the high-level analysis of flood risk associated with the Yazor Brook crossing and potential mitigation options are provided in the Flood Risk Analysis Technical Note in Appendix 10-1.
- 10.7.82. The Yellow route would also cross the minor tributary of Yazor Brook upstream of Towtree Lane. It is assumed that connectivity of the tributary would be maintained through the use of a culvert and that the culvert would be sized to meet DMRB capacity requirements and not increase flood risk elsewhere. The residual risk associated with this minor tributary is considered to be negligible.

Red

- 10.7.83. The Red route is located immediately adjacent to the Yazor Brook and over the alignment of the tributary of the Yazor Brook flowing south from Towtree Lane. Realignment of both watercourses would be required. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be implemented as identified in a CEMP. Due to the extent of works required to these watercourses, it is unlikely that all pollution risks can be mitigated (particularly increased sedimentation) with a likely residual impact magnitude of moderate adverse.
- 10.7.84. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the Scheme. Infiltration to ground would be promoted in the first instance in areas not located within Zone 1 or Zone 2 of the underlying SPZ. If infiltration is not viable and in areas of SPZ 1 and SPZ 2, runoff would be discharged to the minor tributary of the Wye that flows adjacent to Warham House or Yazor Brook. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.
- 10.7.85. The Yazor Brook would, for the most part, be realigned with a natural channel to maintain hydraulic and ecological connectivity with the upstream and downstream extents of the watercourse. At the crossing with the proposed Scheme, the Yazor Brook would be conveyed beneath the road in a culvert that would also be designed to maintain connectivity and include a natural bed. Consideration would also be given to the provision of a low flow channel and measures to prevent an unacceptable increase in flow velocity. The residual impacts to the hydromorphological quality of the Yazor Brook is considered to be moderate adverse, although this is likely to reduce to minor adverse after a period of approximately 5 years once the new alignment of the watercourse has become established.
- 10.7.86. A bridge option is also being considered for the proposed crossing of the Yazor Brook. The watercourse would need to be moved approximately 100m south to provide a c.2m clearance to the bridge soffit. This would allow the natural bed and banks of the watercourse to be maintained, although reinforcement of the banks may be required. Some relatively minor ground reprofiling would also be required adjacent to the watercourse and upstream of the proposed Scheme to create a naturalised floodplain. The new watercourse alignment would extend for approximately 50m downstream of the crossing with the proposed Scheme before re-joining its current alignment. The residual impacts to the hydromorphological quality of the Yazor Brook is still considered to be moderate adverse due to the extent of the works required, although this is likely to reduce to negligible after a period of approximately 5 years once the new alignment of the watercourse has become established.
- 10.7.87. The tributary of Yazor Brook would most likely be conveyed within a culvert beneath the proposed Scheme to outfall to the Yazor Brook to the south of Roman Road. The upstream extent of this watercourse already flows within a culvert, although the works would like increase this culvert by c.100m. The impact to the hydromorphological quality of this watercourse is considered to be moderate adverse.

Impacts to groundwater resources

- 10.7.88. The Red route would be constructed over the outcrop of the glacial till. The till is underlain by fluvio-glacial gravels which are a locally important source of water supply to local food/drinks production industries and agriculture. The alignment is located approximately 450 – 500 m from Zone 1 of the SPZ for Heineken's King's Acre groundwater supply source, and crosses the Zone 2 and Zone 3 areas. The alignment would be on a minor embankment as it crosses the SPZ between Roman Road and King's Acre road and hence there should be no excavation into the glacial till.
- 10.7.89. Pollution control measures would be implemented during construction as identified in a CEMP. The Yazor Brook is believed to lose water to ground under low flow (and possibly also high flow) conditions. Due to the proximity of the alignment to the SPZ Zone 1 area and because not all pollution risks can be mitigated during work on water courses, the likely magnitude of residual impact risks is considered to be minor adverse.
- 10.7.90. During operation, a surface water drainage system would be installed to manage pollution risks. Infiltration to ground would be considered in the first instance, however within the SPZ Zone 2 and Zone 3 areas no infiltration would be promoted and runoff would be diverted to surface water courses (the Yazor Brook or the minor tributary of the Wye that flows adjacent to Warham House). Outside of the Zone 2 and Zone 3 areas, the vegetated attenuation ponds should be constructed so that they do not fully penetrate the glacial till. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control

measures would be implemented to meet Environment Agency and LLFA requirements. The likely residual risk to groundwater resources at this stage of the assessment is minor adverse.

Impacts to flood risk

- 10.7.91. The Red route would cross the Yazor Brook and its associated overland flow path. The current design of the proposed Scheme includes a realigned channel for the Yazor Brook and a culvert to convey the Yazor Brook beneath the proposed Scheme. High-level hydraulic modelling was conducted for the 1 in 100 annual probability event with 35% allowance for climate change. This modelling showed that, prior to inclusion of appropriate mitigation, the proposed Scheme would increase flood extents to the north and west of the proposed Scheme. Some increase in flood risk to Roman Road and the properties adjacent to Towtree Lane was predicted, but this is not dissimilar to the existing flood risk experienced in these areas. The impact to these receptors is likely to be minor adverse. It should also be noted that the currently designed and modelled culvert to convey the Yazor Brook beneath the proposed Scheme does not meet the requirements of the Environment Agency and LLFA to retain a 600mm freeboard between the peak flood water level and the structure soffit.
- 10.7.92. Mitigation to address the identified flood risks associated with the crossing of the Yazor Brook is likely to include the following:
- Provision of flood compensation storage upstream of the proposed crossing of Yazor Brook to the west of the proposed Scheme alignment.
 - Provision of a flood relief culvert beneath Roman Road to the west of the proposed junction to reduce flood risk to the properties adjacent to Towtree Lane and overtopping Roman Road.
- 10.7.93. The risks and mitigation are likely to be the same for the culvert and bridge options, although less floodplain compensation storage would be required for the bridge option given the larger capacity of the structure for flood flow conveyance. The residual risk following the inclusion of mitigation is likely to be negligible.
- 10.7.94. Further details of the high-level analysis of flood risk associated with the Yazor Brook crossing and potential mitigation options are provided in the Flood Risk Analysis Technical Note in Appendix 10-1.
- 10.7.95. The Red route would also cross the minor tributary of Yazor Brook upstream of Towtree Lane. It is assumed that connectivity of the tributary would be maintained through the use of a culvert and that the culvert would be sized to meet DMRB capacity requirements and not increase flood risk elsewhere. The residual risk associated with this minor tributary is considered to be negligible.

Olive

Impacts to surface water resources

- 10.7.96. The Olive route would be located immediately adjacent to the Yazor Brook and over the alignment of the tributary of the Yazor Brook flowing south from Towtree Lane. The current proposals suggest a relatively minor realignment of the Yazor Brook, although a more significant realignment is likely to be required to provide a smoother transition between the current and proposed watercourse alignments. A new culvert is proposed to convey the Yazor Brook beneath the proposed Scheme. Realignment and culverting of the tributary would also be required to maintain hydraulic connectivity. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be implemented as identified in a CEMP. The works to the Yazor Brook are considered likely to have a minor adverse impact to water quality during construction. The works to the tributary are considered likely to have a moderate adverse impact to water quality during construction.
- 10.7.97. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the Scheme. Infiltration to ground would be promoted in the first instance in areas not located within Zone 1 or Zone 2 of the underlying SPZ. If infiltration is not viable and in areas of SPZ 1 and SPZ 2, runoff would be discharged to the minor tributary of the Wye that flows adjacent to Warham House or Yazor Brook. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.
- 10.7.98. It is proposed that, for the most part, the Yazor Brook would remain in its current alignment. At the crossing with the proposed Scheme, the Yazor Brook would be realigned in a natural channel and conveyed beneath the road in a culvert that would be designed to maintain connectivity and include a natural bed. Consideration

would also be given to the provision of a low flow channel and measures to prevent an unacceptable increase in flow velocity. The residual impacts to the hydromorphological quality of the Yazor Brook is considered to be minor adverse.

- 10.7.99. A bridge option is also being considered for the proposed crossing of the Yazor Brook. The watercourse would need to be moved approximately 100m south to provide a c.2m clearance to the bridge soffit. This would allow the natural bed and banks of the watercourse to be maintained, although reinforcement of the banks may be required. Some relatively minor ground reprofiling would also be required adjacent to the watercourse and upstream of the proposed Scheme to create a naturalised floodplain. The new watercourse alignment would extend for approximately 50m downstream of the crossing with the Olive option before re-joining its current alignment. The residual impacts to the hydromorphological quality of the Yazor Brook is still considered to be minor adverse due to the extent of the works required, although this is likely to reduce to negligible after a period of approximately 5 years once the new alignment of the watercourse has become established.
- 10.7.100. The tributary of Yazor Brook would most likely be conveyed within a culvert beneath the proposed Scheme to outfall to the Yazor Brook to the south of Roman Road. The upstream extent of this watercourse already flows within a culvert, although the works would like increase this culvert by c.100m. The impact to the hydromorphological quality of this watercourse is considered to be moderate adverse.

Impacts to groundwater resources

- 10.7.101. The Olive route would be constructed over the outcrop of the glacial till. The till is underlain by fluvio-glacial gravels which are a locally important source of water supply to local food/drinks production industries and agriculture. The alignment is located approximately 450 – 500 m from Zone 1 of the SPZ for Heineken's King's Acre groundwater supply source, and crosses the Zone 2 and Zone 3 areas. The alignment would be on a minor embankment as it crosses the SPZ between Roman Road and King's Acre road and hence there should be no excavation into the glacial till.
- 10.7.102. Pollution control measures would be implemented during construction as identified in a CEMP. The Yazor Brook is believed to lose water to ground under low flow (and possibly also high flow) conditions. Due to the proximity of the alignment to the SPZ Zone 1 area and because not all pollution risks can be mitigated during work on water courses, the likely magnitude of residual impact risks is considered to be minor adverse
- 10.7.103. During operation, a surface water drainage system would be installed to manage pollution risks. Infiltration to ground would be considered in the first instance, however within the SPZ Zone 2 and Zone 3 areas no infiltration would be promoted and runoff would be diverted to surface water courses (the Yazor Brook or the minor tributary of the Wye that flows adjacent to Warham House). Outside of the Zone 2 and Zone 3 areas, the vegetated attenuation ponds should be constructed so that they do not fully penetrate the glacial till. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The likely residual risk to groundwater resources at this stage of the assessment is minor adverse.

Impacts to flood risk

- 10.7.104. The Olive route would cross the Yazor Brook and its associated overland flow path. The current design of the proposed Scheme includes a short realigned channel of the Yazor Brook and a culvert to convey the Yazor Brook beneath the proposed Scheme. High-level hydraulic modelling was conducted for the 1 in 100 annual probability event with 35% allowance for climate change. This modelling showed that, prior to inclusion of appropriate mitigation, the proposed Scheme would increase flood extents to the north and west of the proposed Scheme. Some increase in flood risk to Roman Road and the properties adjacent to Towtree Lane was predicted, but this is not dissimilar to the existing flood risk experienced in these areas. The impact to these receptors is likely to be minor adverse. It should also be noted that the currently designed and modelled culvert to convey the Yazor Brook beneath the proposed Scheme does not meet the requirements of the EA and LLFA to retain a 600mm freeboard between the peak flood water level and the structure soffit.
- 10.7.105. Mitigation to address the identified flood risks associated with the crossing of the Yazor Brook is likely to include the following:
- Provision of flood compensation storage upstream of the proposed crossing of Yazor Brook to the west of the proposed Scheme alignment.
 - Provision of a flood relief culvert beneath Roman Road to the west of the proposed junction to reduce flood risk to the properties adjacent to Towtree Lane and overtopping Roman Road.

- 10.7.106. The risks and mitigation are likely to be the same for the culvert and bridge options, although less floodplain compensation storage would be required for the bridge option given the larger capacity of the structure for flood flow conveyance. The residual risk following the inclusion of mitigation is likely to be negligible.
- 10.7.107. Further details of the high-level analysis of flood risk associated with the Yazor Brook crossing and potential mitigation options are provided in the Flood Risk Analysis Technical Note in Appendix 10-1.
- 10.7.108. The Olive route would also cross the minor tributary of Yazor Brook upstream of Towtree Lane. It is assumed that connectivity of the tributary would be maintained through the use of a culvert and that the culvert would be sized to meet DMRB capacity requirements and not increase flood risk elsewhere. The residual risk associated with this minor tributary is considered to be negligible.

Black 1

Impacts to surface water resources

- 10.7.109. The Black 1 route would cross the Yazor Brook and the minor tributary to the north of Towtree Lane. A bridge would be constructed over the current alignment of the Yazor Brook and would avoid works in the river channel, although the piers are likely to be in close proximity to the banks of the watercourse. Significant realignment of the tributary is proposed, along with a new culvert to convey the watercourse beneath the proposed Scheme. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be implemented as identified in a CEMP. Due to the nature of the proposed works it is unlikely that all pollution risks can be mitigated (particularly increased sedimentation) with a likely residual impact magnitude of minor adverse to Yazor Brook, and moderate adverse to the tributary to the north of Towtree Lane.
- 10.7.110. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the proposed Scheme. Infiltration to ground would be promoted in the first instance in areas not located within Zone 1 or Zone 2 of the underlying SPZ. If infiltration is not viable and in areas of SPZ1 and SPZ 2, runoff would be discharged to the minor tributary of the Wye that flows adjacent to Warham House or Yazor Brook. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.
- 10.7.111. Impacts to the hydromorphological quality of the Yazor Brook would be largely mitigated by the provision of a clear span structure that would maintain the natural bed and banks of the watercourse, although some bank reinforcement may be required. It is also likely that the clearance between ground level and the soffit of the bridge would be insufficient to support healthy plant growth therefore some impact to hydromorphological quality is expected. The impact magnitude is considered likely to be minor adverse at this stage of the assessment.
- 10.7.112. Approximately 140m of the tributary of Yazor Brook would require realignment within a new open channel and a new culvert constructed beneath the proposed Scheme. The impact to hydromorphological quality is considered to be minor adverse.

Impacts to groundwater resources

- 10.7.113. The Black1 route would be constructed over the outcrop of the glacial till. The till is underlain by fluvio-glacial gravels which are a locally important source of water supply to local food/drinks production industries and agriculture. The alignment is located approximately 800 – 900 m up gradient from Zone 1 of the SPZ for Heineken's King's Acre groundwater supply source, and is just outside of the Zone 2 area. The alignment crosses the Zone 3 area. The alignment would be on a minor embankment as it crosses the SPZ between Roman Road and King's Acre road and hence there should be no excavation into the glacial till.
- 10.7.114. Pollution control measures would be implemented during construction as identified in a CEMP. The Yazor Brook is believed to lose water to ground under low flow (and possibly also high flow) conditions. Due to the proximity of the alignment to the SPZ Zone 1 area and because not all pollution risks can be mitigated during work on water courses, the likely magnitude of residual impact risks is considered to be minor adverse.
- 10.7.115. During operation, a surface water drainage system would be installed to manage pollution risks. Infiltration to ground would be considered in the first instance, however within the SPZ Zone 2 and Zone 3 areas no infiltration would be promoted and runoff would be diverted to surface water courses (the Yazor Brook or the

minor tributary of the Wye that flows adjacent to Warham House). Outside of the Zone 2 and Zone 3 areas, the vegetated attenuation ponds should be constructed so that they do not fully penetrate the glacial till. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The likely residual risk to groundwater resources at this stage of the assessment is negligible adverse.

Impacts to flood risk

- 10.7.116. The Black 1 route would cross the Yazor Brook and its associated flood relief channel and overland flow routes upstream of Roman Road. The proposed junction is also located on top of the existing flood relief culvert located to the west of Yazor Brook. The current design of the Black 1 route includes a clear span bridge for the crossing of the Yazor Brook and it is assumed that the alignment of the existing flood relief channel to the east of Yazor Brook can be maintained.
- 10.7.117. High-level hydraulic modelling was conducted for the 1 in 100 annual probability event with 35% allowance for climate change. This modelling shows that, prior to inclusion of appropriate mitigation, the Scheme would increase the flood extent to the west of the proposed Scheme, notably increasing flood risk to the existing Wyevale Garden Centre and Cattle Market, as well as increasing flood risk to Pinston House. The concentration of flows through the existing flood relief channel and Yazor Brook culvert also leads to an increase in overland flows downstream of Roman Road. The magnitude of this impact is considered to be major adverse.
- 10.7.118. It should also be noted that the currently designed and modelled bridge over the Yazor Brook does not meet the requirements of the EA and LLFA to retain a 600mm freeboard between the peak flood water level and the structure soffit.
- 10.7.119. Mitigation to address the identified flood risks associated with the crossing of the Yazor Brook is likely to include the following:
- Increase the capacity of the existing flood relief channel to the east of Yazor Brook and the downstream 900mm diameter pipe culvert beneath Roman Road.
 - Relocation of the proposed SuDS pond to the north of Roman Road to allow flows that exceed the capacity of the flood relief channel to follow the existing overland flow route towards Towtree Lane.
 - Reinstatement of the blocked flood relief culvert beneath Roman Road (currently located to the west of Yazor Brook) by including new culverts beneath the proposed Scheme alignment that would convey flood flows to Yazor Brook.
 - Provision of flood compensation storage to the north of Roman Road.
- 10.7.120. The proposed mitigation measures present considerable residual risk in the event of blockage of the new flood relief culverts. Further details of the high-level analysis of flood risk associated with the Yazor Brook crossing and potential mitigation options are provided in the Flood Risk Analysis Technical Note in Appendix 10-1.
- 10.7.121. The Black 1 route would also cross the minor tributary of Yazor Brook upstream of Towtree Lane. It is assumed that connectivity of the tributary would be maintained through the use of a culvert and that the culvert would be sized to meet DMRB capacity requirements and not increase flood risk elsewhere. The residual risk associated with this minor tributary is considered to be negligible.

Black 2

Impacts to surface water resources

- 10.7.122. The Black 2 route would cross the Yazor Brook and the minor tributary to the north of Towtree Lane. A bridge would be constructed over the current alignment of the Yazor Brook and would avoid works in the river channel, although the piers are likely to be in close proximity to the banks of the watercourse. Significant realignment of the tributary is proposed, along with a new culvert to convey the watercourse beneath the proposed Scheme. In order to minimise the risk to water quality during construction, appropriate pollution control measures would be implemented as identified in a CEMP. Due to the nature of the proposed works it is unlikely that all pollution risks can be mitigated (particularly increased sedimentation) with a likely residual impact magnitude of minor adverse to Yazor Brook, and moderate adverse to the tributary to the north of Towtree Lane.
- 10.7.123. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the Scheme. Infiltration to ground would be promoted in the first

instance in areas not located within Zone 1 or Zone 2 of the underlying SPZ. If infiltration is not viable and in areas of SPZ1 and SPZ 2, runoff would be discharged to the minor tributary of the Wye that flows adjacent to Warham House or Yazor Brook. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.

10.7.124. Impacts to the hydromorphological quality of the Yazor Brook would be largely mitigated by the provision of a clear span structure that would maintain the natural bed and banks of the watercourse, although some bank reinforcement may be required. It is also likely that the clearance between ground level and the soffit of the bridge would be insufficient to support healthy plant growth therefore some impact to hydromorphological quality is expected. The impact magnitude is considered likely to be minor adverse at this stage of the assessment.

10.7.125. Approximately 140m of the tributary of Yazor Brook would require realignment within a new open channel and a new culvert constructed beneath the Black 2 route. The impact to hydromorphological quality is considered to be minor adverse.

Impacts to groundwater resources

10.7.126. The Black 2 route would be constructed over the outcrop of the glacial till. The till is underlain by fluvio-glacial gravels which are a locally important source of water supply to local food/drinks production industries and agriculture. The alignment is located approximately 800 – 900 m up gradient from Zone 1 of the SPZ for Heineken's King's Acre groundwater supply source, and is just outside of the Zone 2 area. The alignment crosses the Zone 3 area. The alignment would be on a minor embankment as it crosses the SPZ between Roman Road and King's Acre road and hence there should be no excavation into the glacial till.

10.7.127. Pollution control measures would be implemented during construction as identified in a CEMP. The Yazor Brook is believed to lose water to ground under low flow (and possibly also high flow) conditions. Due to the proximity of the alignment to the SPZ Zone 1 area and because not all pollution risks can be mitigated during work on water courses, the likely magnitude of residual impact risks is considered to be minor adverse.

10.7.128. During operation, a surface water drainage system would be installed to manage pollution risks. Infiltration to ground would be considered in the first instance, however within the SPZ Zone 2 and Zone 3 areas no infiltration would be promoted and runoff would be diverted to surface water courses (the Yazor Brook or the minor tributary of the Wye that flows adjacent to Warham House). Outside of the Zone 2 and Zone 3 areas, the vegetated attenuation ponds should be constructed so that they do not fully penetrate the glacial till. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control measures would be implemented to meet EA and LLFA requirements. The likely residual risk to groundwater resources at this stage of the assessment is negligible adverse.

Impacts to flood risk

10.7.129. The Black 2 route would cross the Yazor Brook and its associated flood relief channel and overland flow routes upstream of Roman Road. The proposed junction would be located on top of the existing flood relief culvert located to the west of Yazor Brook. The current design of the proposed Scheme includes a clear span bridge for the crossing of the Yazor Brook and it is assumed that the alignment of the existing flood relief channel to the east of Yazor Brook can be maintained.

10.7.130. High-level hydraulic modelling was conducted for the 1 in 100 annual probability event with 35% allowance for climate change. This modelling shows that, prior to inclusion of appropriate mitigation, the Black 2 option would increase the flood extent to the west of the proposed Scheme, notably increasing flood risk to the existing Wyevalle Garden Centre and Cattle Market, as well as increasing flood risk to Pinston House. The concentration of flows through the existing flood relief channel and Yazor Brook culvert also leads to an increase in overland flows downstream of Roman Road. The magnitude of this impact is considered to be major adverse.

10.7.131. It should also be noted that the currently designed and modelled bridge over the Yazor Brook does not meet the requirements of the Environment Agency and LLFA to retain a 600mm freeboard between the peak flood water level and the structure soffit.

10.7.132. Mitigation to address the identified flood risks associated with the crossing of the Yazor Brook is likely to include the following:

- Increase the capacity of the existing flood relief channel to the east of Yazor Brook and the downstream 900mm diameter pipe culvert beneath Roman Road.
- Relocation of the proposed SuDS pond to the north of Roman Road to allow flows that exceed the capacity of the flood relief channel to follow the existing overland flow route towards Towtree Lane.
- Reinstatement of the blocked flood relief culvert beneath Roman Road (currently located to the west of Yazor Brook) by including new culverts beneath the proposed Scheme alignment that would convey flood flows to Yazor brook.
- Provision of flood compensation storage to the north of Roman Road.

10.7.133. The proposed mitigation measures present considerable residual risk in the event of blockage of the new flood relief culverts. Further details of the high-level analysis of flood risk associated with the Yazor Brook crossing and potential mitigation options are provided in the Flood Risk Analysis Technical Note in Appendix 10-1.

10.7.134. The Black 2 route would also cross the minor tributary of Yazor Brook upstream of Towtree Lane. It is assumed that connectivity of the tributary would be maintained through the use of a culvert and that the culvert would be sized to meet DMRB capacity requirements and not increase flood risk elsewhere. The residual risk associated with this minor tributary is considered to be negligible.

Table 10-5 – Summary of Element 2

Receptor	Option (s)	Impact	Magnitude	Significance
Yazor Brook	Orange, Red	Pollution risks during construction	Moderate adverse	Large adverse
	Cyan, Yellow, Olive, Black 1, Black 2	Pollution risks during construction	Minor adverse	Moderate adverse
	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during operation	Negligible adverse	Slight adverse
	Orange, Red	Impacts to hydromorphology – culvert option	Moderate to minor adverse	Very large to moderate adverse
	Cyan, Yellow, Olive	Impacts to hydromorphology – culvert option	Minor adverse	Moderate adverse
	Orange, Red	Impacts to hydromorphology – bridge option	Moderate to negligible adverse	Very large to slight adverse
	Cyan	Impacts to hydromorphology – bridge option	Major to negligible adverse	Very large to slight adverse
	Yellow, Olive	Impacts to hydromorphology – bridge option	Minor to negligible adverse	Moderate to slight adverse
	Black 1, Black 2	Impacts to hydromorphology – bridge option	Minor adverse	Moderate adverse
Yazor Brook Tributary	Orange, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during construction	Moderate adverse	Slight adverse

Receptor	Option (s)	Impact	Magnitude	Significance
	Cyan	Pollution risks during construction	Minor adverse	Neutral
	Orange, Yellow, Red, Olive	Impacts to hydromorphology	Moderate adverse	Slight adverse
	Cyan, Black 1, Black 2	Impacts to hydromorphology	Minor adverse	Neutral
Warham House Tributary	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during operation	Negligible adverse	Neutral
Groundwater resources	Orange, Cyan, Yellow, Red, Olive, Black 1, Black 2	Pollution risks during construction	Minor adverse	Slight adverse
	Orange, Yellow	Pollution risks during operation	Moderate adverse	Slight adverse
	Cyan, Red, Olive	Pollution risks during operation	Minor adverse	Slight adverse
	Black 1, Black 2	Pollution risks during operation	Negligible adverse	Neutral
Flood risk receptors	Orange, Yellow, Red, Olive	Impacts to floodplain of Yazor Brook	Minor adverse	Moderate adverse
	Cyan, Black 1, Black 2	Impacts to floodplain of Yazor Brook	Major adverse	Large adverse

ELEMENT 3

All Routes

Impacts to surface water resources

- 10.7.135. All routes would not cross any notable watercourses, although there are likely to be natural overland flow routes and land drains that convey runoff to the Yazor Brook and Ayles Brook. The works are also located within 50m of the minor tributary located to the east of the A49 that eventually flows through the Lugg Meadows. Risks would be minimised through the implementation of the CEMP. Residual risks to the minor tributary located to the east of the A49 are likely to be negligible, with no change expected to other watercourses in the catchment.
- 10.7.136. A surface water drainage system would be installed to manage pollution risks during operation. The system would collect surface water runoff from the proposed Scheme and convey this to a number of vegetated attenuation basins located adjacent to the Scheme. Infiltration to ground would be promoted in the first instance. If infiltration is not viable, runoff would be discharged to the minor tributary to the east of the A49. Impacts to water quality would be assessed in accordance with the DMRB and appropriate pollution control

measures would be implemented to meet Environment Agency and LLFA requirements. The residual impact is considered to be negligible.

Impacts to groundwater resources

- 10.7.137. Superficial deposits are largely absent within the Element 3 area, and the routes are directly underlain by bedrock (Raglan Mudstone Formation). There are no licensed groundwater abstractions within this part of the proposed Scheme area. The drainage measures described above in relation to surface water resources would include implementation of pollution control measures during construction and either infiltration to ground or diversion to a minor watercourse on the east side of the A49. The residual risk to groundwater is considered to be negligible.

Impacts to flood risk

- 10.7.138. All routes would cross an overland flow path flowing south from Arundel Farm towards Roman Road and the Ayles Brook that has the potential to pose flood risk to the proposed Scheme. Consideration has not yet been given to maintaining this overland flow path but it is assumed that an appropriate culvert and management system would be installed to manage risks to the proposed Scheme and not increase flood risk elsewhere. The residual impact is considered to be negligible.

Table 10-6 - Summary of Element 3

Receptor	Option (s)	Impact	Magnitude	Significance
Ayles Brook	All options	Pollution risks during construction and operation	No change	Neutral
Yazor Brook	All options	Pollution risks during construction and operation	No change	Neutral
Tributary to east of A49	All options	Pollution risks during construction and operation	Negligible	Neutral
Groundwater resources	All options	Pollution risks during construction and operation	Negligible	Neutral
Flood risk receptors	All options	Flood risk associated with overland flow	Negligible	Neutral

10.8 SUMMARY

- 10.8.1. The proposed routes all have the potential to have an effect on surface waters, groundwaters and flood risk. The most notable of these effects are as follows:

- A large adverse effect to the hydromorphological quality of Belmont Stream associated with the crossing of the watercourse by the Red, Olive, Black 1 and Black 2 routes, requiring significant realignment and/or culverting of this watercourse.
- A very large adverse effect to flood risk to the proposed Scheme associated with the crossing of Belmont Stream by the Red, Olive, Black 1 and Black 2 routes, requiring significant realignment and/or culverting of this watercourse.
- A very large to moderate adverse effect to the hydromorphological quality of Yazor Brook associated with the proposed realignment and culverting of this watercourse beneath the Orange, Cyan, Yellow, Red and Olive routes.
- A moderate adverse effect to the hydromorphological quality of Yazor Brook associated with the proposed bridge crossing of this watercourse beneath the Black 1 and Black 2 routes.

- A moderate adverse effect to flood risk associated with the proposed crossing of Yazor Brook associated with the Orange, Yellow, Red and Olive routes; and a large adverse effect to flood risk associated with the proposed crossing of Yazor Brook associated with the Cyan, Black 1 and Black 2 routes.

- 10.8.2. Impacts to the hydromorphological quality of Yazor Brook associated with the proposed realignment and culverting of this watercourse beneath the Orange, Cyan, Yellow, Red and Olive routes could be reduced in the long term (once new channels have naturalised) by providing a clear span bridge in place of a culvert. This is likely to be most viable for the Yellow, Red and Olive routes that would not require as significant reprofiling of adjacent ground compared to that required for the Orange and Cyan routes.
- 10.8.3. Impacts to flood risk associated with the proposed crossing of Yazor Brook would be relatively easy to mitigate for the Orange, Yellow, Red and Olive routes with little residual risk. It would be more challenging to mitigate this risk for the Cyan, Black 1 and Black 2 routes, with significant residual risk of culvert blockage.
- 10.8.4. A summary of the most significant effect of each route is presented below.

Table 10-7 - Summary of the most significant effect of each option

Element 1	Element 2	Element 3
Orange Slight adverse	Orange Very large adverse	All options Neutral
Cyan and Yellow Slight adverse	Yellow Moderate adverse	
Red and Black 2 Slight adverse	Cyan Very large adverse	
Olive and Black 1 Slight adverse	Red Very large adverse	
	Olive Moderate adverse	
	Black 1 Large adverse	
	Black 2 Large adverse	

11 GEOLOGY AND SOILS

11.1 INTRODUCTION

- 11.1.1. This chapter provides an assessment of the potential effects of the proposed Scheme on geology and soils. The chapter describes the baseline condition of the study area and considers the potential for land to be affected by soil and geology which may impose constraints on the proposed options. In order to assess environmental impacts related to geology and soils, this chapter has considered land contamination; groundwater and surface water quality; geomorphology; and agricultural soils.
- 11.1.2. The proposed route options have been divided up into three Elements in which each route option has been assessed as described in Section 4.8. Where route options are the same in a particular element, the options have been considered together. The scope of this chapter excludes any assessment of effects on drainage and discharge (see Chapter 10: Water Drainage), the agricultural industry e.g. land severance (see Chapter 13: People and Communities), or waste and materials management (see Chapter 12: Materials).

11.2 LEGISLATION AND POLICY FRAMEWORK

- 11.2.1. The planning policy documents and the legislative context in relation to the assessment of the environmental effects on the geology and soils are set out below covering European, UK, national and local level policies. The list is not intended to be exhaustive, but includes the main documents relating to the protection, preservation and, where appropriate, enhancement of the geological environment.

LEGISLATION

- 11.2.2. The applicable legislation framework of particular relevance to the proposed Scheme with respect to geology and soils are listed below:
- HMSO Part 2A, Section 78 of the Environmental Protection Act 1990 (EPA) ;
 - HMSO The Contaminated Land (England) (Amendment) Regulations (2012) ;
 - HMSO The Water Environment (Water Framework Directive) (England & Wales) Regulation (2003) ;
 - Water Resources Act 1991 (SI57) (as amended by the Water Act 2003) ;
 - HMSO Construction (Design & Management) Regulations (2015) ; and
 - Highways Act 1980 Section 105A.

NATIONAL POLICY

- 11.2.3. The applicable policy framework of particular relevance to the proposed Scheme with respect to geology and soils are listed below:
- National Planning Policy Framework Department for Communities and Local Government (DCLG), March 2012 ; and
 - National Policy Statement for National Networks (NNNPS), Department for Transport, 2014.

LOCAL POLICY

- 11.2.4. The following policies within the Hereford Adopted Core Strategy⁴⁸ are relevant to the assessment of effects on geology and soils:
- *Policy SD1 – Sustainable design and energy efficiency: Development proposals should create safe, sustainable, well integrated environments for all members of the community. In conjunction with this, all development proposals should incorporate the following requirements:.... ensure new development does not contribute to, or suffer from, adverse impacts arising from noise, light or air contamination, land instability or cause ground water pollution;.... where contaminated land is present, undertake appropriate remediation where it can be demonstrated that this will be effective.*
 - *Policy SS6 - Environmental quality and local distinctiveness. Development proposals should be shaped through an integrated approach to planning the following environmental components from the outset, and based upon sufficient information to determine the effect upon each where they are relevant..... physical*

⁴⁸ https://www.herefordshire.gov.uk/downloads/file/1788/core_strategy_sections_combined

resources, including minerals, soils, management of waste, the water environment, renewable energy and energy conservation.

11.2.5. The following saved Unitary Development Plan⁴⁹ (UDP) policies are also relevant to the proposed Scheme:

- S9 – Minerals S9 Minerals: The sustainable and efficient use and management of minerals will be promoted by:
 - 1. conserving minerals as far as possible, whilst ensuring an adequate supply to meet identified needs;
 - 2. aiming to maintain the County's share of the regional production of aggregates and a landbank of permitted reserves, subject to environmental considerations;
 - 3. ensuring that the impact of proposals for the winning, working, storage and transportation of minerals are kept to an acceptable minimum and can be mitigated to an acceptable extent;
 - 4. ensuring the sensitive working, reclamation and after care of sites so as to protect or enhance the quality of the environment;
 - 5. protecting areas of landscape or nature conservation value from minerals development, other than in exceptional circumstances;
 - 6. preventing the unnecessary sterilisation of mineral resources; and
 - 7. minimising the production of waste and encouraging the efficient use of minerals by promoting design solutions and construction methods which minimise mineral use, including the appropriate use of high quality materials and recycling of waste materials.
- M5 – Safeguarding mineral reserves:
 - Proposals which could sterilise potential future mineral workings will be resisted in order to safeguard identified mineral resources. Where such development is proposed, the applicant may be required:
 - 1. to undertake a geological assessment of the site; and/or
 - 2. to protect the minerals in question; and/or
 - 3. to extract all or part of the mineral reserves as part of or before the other development is permitted.
 - In such cases mineral extraction will only be required when the need for the other development significantly outweighs the harm which extraction might cause to other matters of acknowledged importance.
- M6 – Secondary aggregates and recycling
 - S10- Waste: The sustainable and efficient management of waste will be sought by:
 - 1. basing waste management decisions on the Best Practicable Environmental Option (BPEO) Assessment results, the principles of the waste hierarchy (including reduction and minimisation, re-use, recovery, recycling and landfill), the proximity principle, and regional local self-sufficiency. The BPEO for the three controlled waste streams is as follows:
 - Municipal Solid Waste: based on a minimum 33% recycling/composting and a maximum of 22% landfilling with any balance required being managed through a form of thermal treatment;
 - Commercial and Industrial Waste: based on reducing landfill to 23%, increasing recycling to 73% and 4% dealt with by existing thermal treatment;
 - Construction and Demolition Wastes: based on reducing landfill to 24% and recycling increased to 76%.
 - An element of flexibility will be retained when considering applications for waste management facilities. Processes or technologies put forward as an alternative to those which comprise the BPEO for a particular waste stream will have to clearly demonstrate how the impact of that process or technology will be equal to or not significantly greater than those which have been modelled for the agreed BPEO;
 - 2. ensuring that the impact of proposals for the collection, storage, handling, treatment, disposal and transportation of waste can be mitigated to an acceptable extent, with particular attention paid to the impact on human health and the environment;

⁴⁹ Herefordshire Unitary Development Plan (23 March 2007), available online at https://www.herefordshire.gov.uk/info/200185/local_plan/150/unitary_development_plan/1, accessed 01/06/2018

- 3. ensuring that sites can be reclaimed to a state that meets the required standard for their proposed after use;
- 4. making use of sustainable technologies wherever possible; and
- 5. ensuring that all development proposals give due consideration to the waste they will generate, in accordance with the above principles.
- W3 – Waste transportation and handling: Development that is likely to give rise to the transportation and handling of waste materials will only be permitted where appropriate measures to protect the public and the environment can be implemented and enforced.
- W8 – Waste disposal for land improvements: Proposals to deposit waste for land improvements, landscaping, screening or engineering purposes will only be permitted where:
 - 1. the proposals represent the BPEO;
 - 2. only inert waste is to be deposited;
 - 3. only the minimal amount of waste necessary for the intended purpose is to be deposited;
 - 4. the material planning benefits of the proposed development outweigh any material planning objections;
 - 5. the proposals are comprehensive, detailed, practicable and adequate; and
 - 6. the proposals conform to the criteria laid down in policy W1.
- W11 – Development waste implications: Proposals which could generate significant volumes of waste will be required to submit a Waste Audit detailing:
 - 1. the types and volumes of waste the development will generate during the course of construction, occupation, use, decommissioning and for the after use of the site;
 - 2. the steps to be taken to ensure that the maximum amount of waste arising is incorporated within the development or through its use;
 - 3. the steps to be taken to manage, recycle, or treat waste that cannot be so incorporated; and
 - 4. if disposed of elsewhere, the means of transport and distance to be travelled.
 - This policy will apply to:
 - developments of more than 50 dwellings, even where these are developed piecemeal; or
 - the development, redevelopment or refurbishment of sites where the floor space of the existing or proposed development amounts to 500 m² or more; or
 - major transport, leisure, recreation, tourist or community facilities; or
 - developments which could attract a significant increase in the number of people visiting a site.

ADDITIONAL GUIDANCE

- DMRB Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects, August 2008;
- DMRB Volume 11, Section 3, Part 11 Geology and Soils, June 1993 ;
- DMRB Volume 11, Section 3, Part 6 Land Use Amendment No.1, 2001 ;
- Technical Guidance to the NPPF, DCLG, 2012 ; and,
- Contaminated Land Report (CLR) 11: Model Procedures for the Management of Land Contamination (Environment Agency and Defra 2004).

11.3 STUDY AREA

- 11.3.1. The study area comprises the maximum physical extent of the potential seven route options, and a buffer zone of 250m from the centre line of the route alignments, as referenced in Best Practice documents⁵⁰. This is extended to a 1km study area when considering abstraction wells within the vicinity of the proposed Scheme. Potential features outside of the study area that may be affected by or constrain the proposed Scheme are included in the assessment. It is noted that Volume 11 Section 3 Part 11 of the DMRB does not specify a minimum study area distance for the assessment of impacts to geology and soils.

⁵⁰ NHBC, 2008. Guidance For The Safe Development Of Housing On Land Affected By Contamination: R&D Publication 66

11.4 BASELINE CONDITIONS

11.4.1. Baseline information has been obtained from the following sources:

- British Geological Survey (BGS) 'Onshore GeoIndex'⁵¹;
- BGS 'Geology of Britain' viewer⁵²;
- Agricultural Land Classification of England and Wales 1985⁵³;
- Environment Agency 'What's In Your Backyard?' website⁵⁴;
- Natural England, 2010. Agricultural Land Classification map West Midlands Scale 1:250,000 (ALC004)⁵⁵;
- Defra online 'Magic' map application for Agricultural Land Classification of England and Wales: Post 1988⁵⁶;
- Envirocheck Report Hereford Relief Road, December 2016⁵⁷;
- BGS Mineral Resources Map, Herefordshire and Worcestershire, Scale 1:100,000, 1999⁵⁸;
- BGS Mineral Resources Information for Development Plans, Herefordshire and Worcestershire: Resources and Constraints, 1999; and
- Hereford Relief Road, Preliminary Sources Study Report (PSSR), WSP, March 2017⁵⁹.

GEOLOGY

Made Ground / Reworked Ground

11.4.2. The study area is predominantly rural and agricultural, therefore may contain only localised areas of Made Ground of unknown provenance. It is assumed that these are likely present in areas associated with historical or current developments such as within the location of the former railway line and the former Belmont Golf Course. Made Ground / reworked ground is anticipated to be present within the location of the A465, and other highways within the study area.

Superficial Deposits

11.4.3. The presence of superficial deposits is variable across the study area. The deposits are summarised within Table 11-1, and further defined within the PSSR.

- Alluvium is anticipated to be present within the vicinity of the River Wye, associated flood plains and other brooks within the study area;
- River Terrace Deposits of sand and gravel are anticipated to be within the location of Clehonger and thinning out towards Belmont;
- Head Deposits of clay, silt, sand and gravel are shown on mapping as narrow bands within study area;
- Glacialfluvial Deposits of sand and gravel are anticipated to be within the location of Warham;
- Hummocky Glacial Deposits of sand and gravel are anticipated to be within the majority of the southern extent; and
- Till is anticipated to be present under the majority of central and northern area.

Bedrock Geology

11.4.4. The bedrock geology across the study area comprises the Raglan Mudstone Formation, consisting of red mudstones and silty mudstones with calcretes and sandstones. It is anticipated to underlie the entire study

⁵¹ British Geological Survey (BGS) 'Onshore GeoIndex', available online at <http://mapapps2.bgs.ac.uk/geoindex/home.html>, accessed 01/12/2017.

⁵² BGS 'Geology of Britain' viewer, available online at <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>, accessed 01/12/2017.

⁵³ Agricultural Land Classification of England and Wales 1985; available online at <http://publications.naturalengland.org.uk/category/5954148537204736>, accessed 01/12/2017.

⁵⁴ Environment Agency 'What's In Your Backyard?' website; available at: <http://apps.environment-agency.gov.uk/wiyby/>, accessed 01/12/2017.

⁵⁵ Natural England, 2010. Agricultural Land Classification map West Midlands Scale 1:250,000 (ALC004) (<http://publications.naturalengland.org.uk/category/5954148537204736>)

⁵⁶ Defra online 'Magic' map application for Agricultural Land Classification of England and Wales: Post 1988; Available at: <http://magic.defra.gov.uk/MagicMap.aspx> (accessed 1st December 2017)

⁵⁷ Envirocheck Report Hereford Relief Road, Reference 107937436_1_1, December 2016

⁵⁸ British Geological Survey (BGS) Mineral Resources Map, Herefordshire and Worcestershire, Scale 1:100,000, 1999

⁵⁹ Hereford Relief Road, Preliminary Sources Study Report (PSSR), WSP, March 2017

area. BGS archived borehole logs are limited with depth to bedrock ranging from 1.6 to 4.0 m below ground level (bgl) down to 12 – 14 m bgl in the centre of the study area⁶⁰⁶¹.

Table 11-1: Anticipated Geological Sequence and Occurrence across the Study Area

Age	Name	Description
Superficial	Made Ground	Highly variable in composition, comprising a range of clast sizes with the high potential of comprising man-made material.
	Alluvium	Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel.
	River Terrace Deposits	Sand and gravel, locally with lenses of silt, clay and peat.
	Head Deposits	Polymict deposit: Comprises gravel sand and clay. Poorly sorted and poorly stratified deposits formed mostly by solifluction and/or hillwash and soil creep.
	Glacialfluvial Sheet Deposits	Clay, silt, sand and gravel - Polymict deposit: Comprises gravel, sand and clay depending on upslope source and distance from source. Poorly sorted and poorly stratified deposits formed mostly by solifluction and/or hillwash and soil creep. Essentially comprises sand and gravel, locally with lenses of silt, clay or peat and organic material. In the Bristol area: red or brown silt and stony clay with cobbles of hard rock, e.g. Carboniferous limestone or sandstone. Argillaceous frost-shattered rock debris either in-situ or soliflucted. Soliflucted deposits have variable sand/clay content.
	Hummocky Glacial Deposits	Highly variable, matrix and clast supported diamicton, stratified and unstratified silty boulder gravel and lenses of sand silt and clay. Lithologically diverse and complex glacial deposits that have characteristic mounded topographic form. Comprised of rock debris, clayey till and poorly – to well- stratified sand and gravel.
	Till	Poorly sorted mixture of clay, silt, sand, gravel, cobble and boulder-sized material. Diamicton.
Bedrock	Silurian	Raglan Mudstone Formation

MINERAL RESOURCES

- 11.4.5. The study area contains river sand and gravel resources that form the floors of the River Wye valley within the alluvium, as displayed in the figures within Appendix 11-1. Glacial sand and gravel resources are present in the southern part of the study area in the Belmont area associated with Hummocky Glacial Deposits, and to the north of the River Wye associated with the Glaciofluvial Sheet Deposits. The morainic deposits typical of the Wye valley west of Hereford contain one of the largest potential sources of sand and gravel in the area, with up to 20m of sand and gravel exposes in the former workings pits at Stretton Sugwas, which are now worked out.

⁶⁰ British Geological Survey (BGS) 'Onshore GeoIndex'. <http://mapapps2.bgs.ac.uk/geoindex/home.html> (accessed 1st December 2017)

⁶¹ BGS 'Geology of Britain' viewer. <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> (accessed 1st December 2017)

SOIL QUALITY

Agricultural Land Classification

- 11.4.6. The study area contains Grade 1 (excellent) and Grade 2 (very good) agricultural land as classified under the Agricultural Land Classification (ALC) system⁶². Using the dataset produced post-1988⁶³, small areas of Best and Most Versatile (BMV) agricultural land have been identified within the study area to the west of Hereford, although the majority of the study area has not been republished with post-1988 data and the land not currently classified has the potential to be BMV land therefore will require additional assessment for the Environmental Statement (ES) at Stage 3.

Leaching Potential

- 11.4.7. The leaching potential of the soil is intermediate⁶⁴. This classification by the Environment Agency is applied to soils which have a moderate ability to attenuate diffuse source pollutants or in which it is possible that some non-absorbed diffuse source pollutants and liquid discharges could penetrate the soil layer.
- 11.4.8. Two sub-classes are recognised:
- I1: Soils which can possibly transmit a wide range of pollutants: and
 - I2: Soils which can possibly transmit non-or weakly adsorbed pollutants and liquid discharges but are likely to transmit adsorbed pollutants.

HYDROGEOLOGY

Aquifer Designation

- 11.4.9. The geological units identified within the study area have the following aquifer designations from the Environment Agency⁶⁵, presented in Table 11-2.

Table 11-2: Aquifer Designations associated with Geological Units

Geology	Aquifer Designation	Definition
Alluvium Glacialfluvial Sheet Deposits River Terrace Deposits	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Glacial Till Deposits Head	Secondary (Undifferentiated)	Assigned in cases where it has not been possible to attribute either category A or B to a rock type.
Weathered bedrock (Raglan Mudstone Formation)	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

⁶² Natural England (2012) Technical Information Note TIN049: Agricultural Land Classification: protecting the best and most versatile agricultural land

⁶³ Defra online 'Magic' map application for Agricultural Land Classification of England and Wales: Post 1988. <http://magic.defra.gov.uk/MagicMap.aspx> (accessed 1st December 2017);

⁶⁴ Envirocheck Report Hereford Relief Road, Reference 107937436_1_1, December 2016;

⁶⁵ Environment Agency 'What's In Your Backyard?' website. <http://apps.environment-agency.gov.uk/wiyby/> (accessed 1st December 2017)

Source Protection Zones

- 11.4.10. Groundwater Source Protection Zones (SPZ) have been identified within the study area, these zones are presented in Figures 11-1 to 11-7 in Appendix 11-1. SPZs are defined as follows:
- Inner zone (Zone 1) - Defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres;
 - Inner zone - subsurface activity only (Zone 1c) Inner zone - subsurface activity only (Zone 1c) - extends Zone 1 where the aquifer is confined and may be impacted by deep drilling activities;
 - Outer zone (Zone 2) Outer zone (Zone 2) - Defined by a 400 day travel time from a point below the water table. The previous methodology gave an option to define SPZ2 as the minimum recharge area required to support 25 per cent of the protected yield. This option is no longer available in defining new SPZs and instead this zone has a minimum radius of 250 or 500 metres around the source, depending on the size of the abstraction;
 - Outer zone - subsurface activity only (Zone 2c) Outer zone - subsurface activity only (Zone 2c) - extends Zone 2 where the aquifer is confined and may be impacted by deep drilling;
 - Total catchment (Zone 3) Total catchment (Zone 3) - Defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifers, the final Source Catchment Protection Zone can be defined as the whole aquifer recharge area where the ratio of groundwater abstraction to aquifer recharge (average recharge multiplied by outcrop area) is >0.75 . There is still the need to define individual source protection areas to assist operators in catchment management; and
 - Total catchment - subsurface activity only (Zone 3c) Total catchment - subsurface activity only (Zone 3c) - extends Zone 3 where the aquifer is confined and may be impacted by deep drilling activities.
- 11.4.11. The Orange route would be predominantly located through SPZ2. The junction from the roundabout however encroaches slightly into land designated as a SPZ1. The route is at grade in this area. Five of the routes are located through a SPZ2, with Black 1 and Black 2 routes located predominantly within a SPZ3, only encroaching into the SPZ2 at grade at a roundabout junction. .
- 11.4.12. The aquifer unit associated with the SPZ is considered likely to be associated with the glacial fluvial sand and gravel deposits, classified as a Secondary A aquifer and supports a number of local groundwater abstractions. The SPZ is associated with the major abstraction from the Bulmers and Heineken breweries in Hereford.
- 11.4.13. An objection was made in December 2016 on behalf of Heineken in relation to the potential risks from the proposed Three Elms housing development site to the licensed groundwater sources that supply their cider production facility in Hereford ("The Cider Mills"). The development site lies within Zones 1, 2 and 3 of the SPZ referred to above.

Groundwater Quality

- 11.4.14. Groundwater quality for the Wye Secondary Devonian ORS catchment within the Secondary A aquifer is monitored against the Water Framework Directive (WFD). The current overall status is poor, with a current quantitative status of good and a current chemical status of poor. The catchment is classified as a Drinking Water Protected Area.

Groundwater Abstractions

- 11.4.15. There are 36 licenced water abstractions within 1km of the study area, a number of which are reported to have lapsed or cancelled licences. For the purpose of this assessment we have assumed all reported abstraction wells are currently active. Following the selection of the preferred route additional baseline information will be collected to further inform the Stage 3 Environmental Statement (ES).
- 11.4.16. The use of the abstraction water is detailed within Table 11-3. The location of the groundwater abstraction wells are presented in Figures 11-1 to 11-7 for each route. It has been assumed that there is unlikely to be an impact to abstraction wells where the route would be at grade on embankments. The assessment focuses on the abstraction wells within the vicinity of proposed cuttings along the route options.

Table 11-3: Licenced Groundwater Abstractions

No. of Water Abstractions	Purpose
20	General farming and domestic
1	Agricultural: Horticultural watering.
2	Horticulture & nurseries : Spray irrigation - direct
5	General agriculture: spray irrigation – direct
3	Breweries/wine: Process water; plus non-evaporative cooling;
1	Food & Drink: Spray irrigation - direct; plus general use with medium loss
1	General industrial
2	Private water undertaking – animal watering & general use
1	Hotels: Public houses & conference centres: drinking, cooking, sanitary, washing (small garden)

11.4.17. As Table 11-3 shows, the majority of abstractions are for farming or domestic use (which can include a private drinking water supplies), as well as food and drinks production within Hereford. Private, unlicensed abstractions have not been reviewed at this time but will be included within the Stage 3 ES.

HYDROLOGY

11.4.18. There are a number of watercourses located within the study area; the principal water course is the River Wye located within the southern section of the study area. The quality of the River Wye is assessed against the objectives of the WFD. The stretch 'Bredwardine Br to Hampton Bishop' is located within the study area. The watercourse is assessed to have an overall status of moderate, with an ecological status of moderate and a chemical status of good. The River Wye is classified by the Environment Agency as a Main River and is also designated as a Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC) within the study area.

11.4.19. Yazor Brook is classified as an ordinary watercourse and also designated as a Site of Importance for Nature Conservation (SINC) within the study area. The quality of the Yazor Brook is assessed against the objectives of the WFD. The watercourse is assessed to have an overall status of moderate, with an ecological status of moderate and a chemical status of good. There are also a number tributaries associated with these watercourses, as well as a number of unnamed watercourses / brooks.

ENVIRONMENTAL DESIGNATIONS

11.4.20. There are no geological SSSIs and there are no known Regionally Important Geological Sites (RIGS) within the study area.

HISTORICAL LAND USE

11.4.21. A detailed account of the historical land use across the study area is presented in the PSSR, but a brief summary of the uses of significance to geology, soils, contaminated land, and groundwater is provided below.

11.4.22. The study area has historically remained generally undeveloped, arable land with occasional residential houses, farm buildings, roads, woodlands and tracks.

- A well is identified in a dense area of woodland approximately 20m south of the River Wye. Between 1928 and 1972, a hydraulic ram, tank, and a pumping house are identified adjacent to the well. By 1977 a pump house was labelled north of the river, and well, tank and pump house to the south no longer identified.
- In 1991 the junction from the main road to Belmont Estate has been realigned a distance of 90m to the east.
- Tanks associated with housing are identified across the study area, including Wyevale Nurseries in 1991.
- Ponds are identified across the study area and surrounding area.

- North of the A438 two properties were built by 1904. A tank and well are identified on the historical mapping.
- A smithy is labelled immediately north of the A438 in 1904.
- By 1972 a garage and poultry house is identified in King's Acre, next to the A438 Kingsacre Road. No longer labelled by 2000.
- A railway line runs through the centre of the study area south east to north-west south of Huntingdon village, shown to be in a cutting for approximately 400m, at grade for 50m and on embankment for 217m. Between 1929 and 1973, the railway line was dismantled. By 1991 there is very little evidence of the dismantled railway line and associated earthworks.
- A fuel filling station is located on the junction between the A480 and A438 in 1970.
- The channel of Yazor Brook appears to have been changed by 1970, with four buildings being located in the same location.
- In 1993 a water tap and pumping station is identified on the junction between the A4103 and Towtree Lane.
- The former landfill at Belmont.

CURRENT LAND USE

- 11.4.23. The study area is predominately rural, agricultural land with occasional villages, farm houses and buildings and residential properties close to road infrastructure. A former golf course (no longer in use) and hotels are present in Belmont, south of the River Wye.
- 11.4.24. Existing A road highways include the A465 bounding the study area to the south, orientated in a south west to north east direction, joining with the A49 and entering Hereford from the south. The A438 (King's Acre Road) crosses the study area close to the centre, orientated in a north west to south east direction, entering Hereford to the north east. In the northern part of the study area, the A4103 (Roman Road) orientated east to west, is present, which runs north of Hereford.

POTENTIAL SOURCES OF CONTAMINATION

- 11.4.25. The following potential sources of contamination have been identified on-site from current or historical land use:
- Agricultural land including orchards, a nursery and golf course;
 - Historical hydraulic ram, tank and pumping house;
 - Identified historical tanks across study area;
 - Historical industries including a blacksmith, garage and fuel filling station;
 - Former railway line (now dismantled and no longer evident);
 - Pumping station; and
 - Made Ground associated with potentially infilled ponds, embankments of the former railway line, highways, and numerous demolished buildings.
- 11.4.26. The following potential sources of contamination have been identified off-site from current or historical land use:
- Agricultural land including orchards, and nurseries;
 - Identified historical tanks;
 - Former railway line (now dismantled and no longer evident);
 - Filter beds;
 - Gasworks / gasometer;
 - Historical landfills; and
 - Made Ground associated with potentially infilled ponds, quarries and gravel pits.

Potentially Contaminative Substances

- 11.4.27. The potential contaminants associated with agricultural land include pesticides, herbicides and hydrocarbons including fuels. There is also the potential for burial pits, and the potential for anthrax spores to be present. The location of the former railway line is potentially contaminated with hydrocarbons, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), solvents, ethylene glycol, creosote, herbicides, ferrous residues, metals, asbestos, ash and fill, and sulphates.
- 11.4.28. The road network is a potential source of heavy metals, and hydrocarbons discharged from vehicles. There is a potential for highway discharge to have impacted drainage routes, which may not be fully competent. There is also a potential for discharges to have occurred from fuel sites (historical garage and filling station); these will also be hydrocarbon based and as well as petrol and diesel fuels which may include solvents and lubricants.

- 11.4.29. The site of the former gasworks has a potential to contain contaminative substances including metals, cyanides, sulphur, sulphates, phenols, aromatic hydrocarbons and asbestos. The site of the filter beds is a possible source of metals, free cyanide, nitrates, sulphates, sulphides, oils and fuels, chlorinated hydrocarbons, PCBs and asbestos.
- 11.4.30. The historical landfills are potential sources of landfill gas (primarily methane and carbon dioxide, with possible traces of hydrogen sulphide, organosulphur compounds, and ethene), leachate containing ammonia, organics including phenols and PAHs, and inorganics e.g. cyanides, sulphates, and metals.

CONCEPTUAL SITE MODEL

- 11.4.31. On the basis of the PSSR, a preliminary Conceptual Site Model (CSM) has been developed. The preliminary CSM is presented in Table 11-4.

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including the potential for asbestos and fuels and oils attributed to spills from vehicles on the roads.		River Wye, Yazor Brook, network of streams, drains, ponds (on- and off-site)	Lateral migration of contaminated groundwater with discharge to surface watercourses as base flow.
			Discharge of contaminants in surface water run-off followed by overland flow and discharge.
	Property / services	Existing and future structures and services on site	Direct contact of contaminants in soil and/or groundwater
			Migration of volatile contaminants along strata and preferential pathways such as service routes or differentially permeable strata.
OFF-SITE Arable land including nurseries and orchards Potential contaminants include pesticides, herbicides and hydrocarbons including fuels, and anthrax spores if burial grounds are present.	Human health: On-site	Pedestrians / leisure walkers	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of contaminants in soil, soil-derived dust and vapours.
		Construction / maintenance workers	
	Controlled waters	Secondary A, B and Undifferentiated superficial aquifers, SPZ Zone 2 and 3	Leaching of contaminants in soil to groundwater in underlying aquifers.
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.
		River Wye, Yazor Brook, network of streams, drains, ponds (on- and off-site)	Lateral migration of contaminated groundwater with discharge to surface watercourses as base flow.
			Discharge of contaminants in surface water run-off followed by overland flow and discharge.
OFF-SITE Tanks Filter beds Railway Line Gasworks / Gasometer Historic Landfills (Belmont, Belmont Quarry Landfill, and Burghill Sewage Treatment Works) Made Ground associated with infilled ponds; quarries and gravel pits Potential contaminants include a range of organic and inorganic contaminants including fuels, oils, ash (often high in heavy metals), ground gas and the potential for asbestos.	Human health: On-site	Pedestrians / leisure walkers	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of contaminants in soil, soil-derived dust and vapours. Inhalation of asbestos fibres.
		Construction / maintenance workers	
	Controlled waters	Secondary A, B and Undifferentiated superficial aquifers, SPZ Zone 2 and 3	Leaching of contaminants in soil to groundwater in underlying aquifers.
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.
		River Wye, Yazor Brook, network of streams, drains, ponds (on- and off-site)	Lateral migration of contaminated groundwater with discharge to surface watercourses as base flow.
			Discharge of contaminants in surface water run-off followed by overland flow and discharge.
	Property services	Existing and future structures and services on site	Direct contact of contaminants in soil and/or groundwater
			Migration of volatile contaminants along strata and preferential pathways such as service routes or differentially permeable strata.

11.5 ASSESSMENT METHODOLOGY

Preliminary Sources Study Report (Including Preliminary Risk Appraisal)

- 11.5.1. A Phase 1 PSSR including preliminary risk appraisal was undertaken to establish baseline conditions within the study area and assess potential constraints relating to land contamination relevant to the construction and operation of the road. The preliminary risk appraisal methodology is presented within the PSSR⁶⁶, following the guidance set out in CIRIA C552⁶⁷.

ASSESSMENT CRITERIA AND METHODOLOGY

- 11.5.2. This assessment has been undertaken in accordance with the principles of:
- DMRB Volume 11, Section 2, Part 5: Assessment and Management of Environmental Effects; and,
 - DMRB Volume 11, Section 3, Part 11: Geology and Soils.
- 11.5.3. The objective is to identify possible impacts and constraints relevant to geology and soils, to be taken into account in the detailed design. The significance of any effects on environmental attributes and contaminated land receptors is a function of the environmental value (or sensitivity) of the attribute or receptor and the potential change (magnitude of impact). In order to determine the significance of environmental effects, a value is assigned to each relevant attribute or receptor.
- 11.5.4. The following attributes and receptors are considered in the assessment:
- Geology, geomorphology, and soils;
 - Controlled waters, including groundwater and surface water quality;
 - The built environment; and
 - Current and future end users.
- 11.5.5. The assessment considers potential constraints on the proposed Scheme design relating to designated sites and existing land contamination, including the potential aggressivity of chemical agents in the ground which are destructive to concrete.
- 11.5.6. Although construction workers are a sensitive receptor, relevant legislation, guidance and best practice are in place during construction to ensure that suitable health and safety controls would be in place during the works.
- 11.5.7. Where the mitigation of potential effects is considered standard practice, it will be assumed that this practice will be inherent in the design of the proposed road subject to assessment.

SENSITIVITY

- 11.5.8. A sensitivity has been assigned to each attribute or land contamination receptor in accordance with the principles established in DMRB Volume 11 Section 2 Part 5. Definitions of terms relating to the sensitivity of soil are provided in Table 11-5.

Table 11-5: Definition of Terms Relating to Sensitivity of Soils and Geology (Attributes)

Attribute / Receptor	Justification	Attribute Importance (Sensitivity)
Geology, Geomorphology and Mineral Resources	There are no geological SSSIs and there are no known RIGS (also known as Local Geological Sites) within the study area. Mineral resources are present, however permanent sterilisation will be limited.	Low
Soil	The study area contains grade 1 and grade 2 BMV agricultural land. Although the majority of the study area has the potential to	High

⁶⁶ Hereford Relief Road, Preliminary Sources Study Report (PSSR), WSP, March 2017

⁶⁷ CIRIA C552: Contaminated Land Risk Assessment – A Guide to Good Practice.

Attribute / Receptor	Justification	Attribute Importance (Sensitivity)
	be BMV land although has not been republished with post-1988 data.	
Groundwater	SP22 and SP23 are situated within the study area. There are numerous abstraction wells used for the food and drink industries (associated with the SPZ) as well as farming and domestic use. The Raglan Mudstone (bedrock), Glacialfluvial Deposits, Alluvium and River Terrace Gravels (superficial deposits) are Secondary A aquifers. The Glacial Till and Head Deposits are Secondary undifferentiated aquifer units	High
Surface Water	The River Wye is a Main River, designated as an SSSI and SAC which passes through the study area. Yazor Brook which also passes through the study area is designated as an SINC. There are a number of associated tributaries and other brooks within the study area.	High
Built Environment	The study area includes a number of existing roads and residential dwellings	Medium
End Users	The proposed future land use (i.e. a highway) is considered unlikely to expose end users to land contamination. All relevant legislation, guidance and best practice would be adhered to throughout the construction phase.	Low

MAGNITUDE OF IMPACT

- 11.5.9. The expected magnitude of impact to each identified attribute and receptor has been assigned in accordance with the principles established in DMRB Volume 11 Section 2 Part 5. The terms used to describe magnitude of impact are defined in Table 11-6.

Table 11-6: Definition of Terms Relating to Magnitude of Impact on Soils and Geology

Magnitude of Impact		Definition
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. The direct loss of less than 5 hectares of "best and most versatile agricultural land" (Grades 1 / 2)
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduce risk of negative impact occurring.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements; short-term exposure to contaminants with chronic (long-term) toxicity. The direct loss of between 5 and 20 hectares of "best and most versatile agricultural land" (Grades 1 / 2).

Magnitude of Impact		Definition
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements; exposure to acutely toxic contaminants. The direct loss of over 20 hectares of “best and most versatile agricultural land” (Grades 1 / 2 / 3a).
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.

SIGNIFICANCE OF EFFECT

- 11.5.10. The sensitivity and magnitude of impact are have been compared using the matrix shown in Table 11-7 to determine a significance category ranging from ‘neutral’ to ‘large or very large’. Effects that of moderate or above (adverse or beneficial) are considered to be significant.

Table 11-7: Matrix Used for Assessment of Significance of Effects

		Magnitude of Impact				
		No Change	Negligible	Minor	Moderate	Major
Sensitivity	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate

- 11.5.11. Mitigation measures incorporated into the design and that are considered standard good practice have been considered prior to undertaking the assessment of effects. Any resultant effects following these measures have been identified and the need for further mitigation will be outlined and considered further within the detailed design of the favoured option.

11.6 DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

- 11.6.1. Ground investigation work is required to characterise the existing ground conditions in relation to the CSM (to include consideration of soil, groundwater, ground gas, and geotechnical parameters). This work will be undertaken following confirmation of the preferred route to inform detailed design. The works should be completed in accordance with BS10175:2011, CLR11, and other relevant standards and guidance. Design work must utilise the information obtained, which should be implemented during the construction phase.
- 11.6.2. A Construction Environmental Management Plan (CEMP) will be required to outline the mitigation, control and monitoring measures to be put in place to minimise the impact of the proposed routes on ground conditions, land quality and water resources during the construction process.
- 11.6.3. There is some potential for soils to be retained and re-used, either as part of the proposed Scheme design, landscape works or elsewhere. The level of damage and deterioration in soil quality during storage and transit will depend on the types of earthworks machinery used, methods of handling and storage conditions.

11.7 POTENTIAL IMPACTS ELEMENT 1

- 11.7.1. The Orange, Cyan / Yellow, Red / Black 2, and Olive / Black 1 routes within Element 1 have been assessed and significance of effect has been discussed below. The magnitude of impact and significance of effect for each attribute / receptor is considered the same for each of the four route options, as summarised in Table 11-8.

Impacts to Geology, Geomorphology and Mineral Resources

- 11.7.2. Changes to existing ground levels would result in geological and geomorphological change. However, there are no geological SSSIs or RIGS (also known as Local Geological Sites) within the study area, so the impact on geological and geomorphology is likely to be negligible adverse. All route options are situated over areas of sand and gravel mineral resources which would lead to some sterilisation of the resource. Where cuttings are proposed within this strata (which involves the removal of this resource) this material should be re-used within the design, or utilised within other development schemes within the local area, where possible. This limited sterilisation of resource is likely to be a negligible adverse magnitude of impact. The significance of the effect on geology, geomorphology and mineral resources is therefore unlikely to exceed neutral or slight.

Impacts to Soil

- 11.7.3. The agricultural land within study area of Element 1 has not been classified with the post 1988 data, therefore has been considered of medium sensitivity with further assessment required. The impact to the soils during the construction phase which would include soil stripping, storage and placement, and the sterilisation of this agricultural land is considered minor adverse. The significance of effect on soils is considered slight.

Groundwater

- 11.7.4. The potential for the creation of new migratory pathways for contaminants during the construction process is dependent upon the presence of contaminative substances. The risk will be assessed following intrusive ground investigation. It is noted that groundwater is a utilised resource with licenced abstraction wells used for general farming and domestic use (high sensitivity). There is potential for adverse impact on water quantity on these abstraction wells (Well No. 31 and No. 35), or the loss of these abstraction wells (Well No. 32) from construction works. It is however assumed that construction would be undertaken in accordance with all relevant legislation, guidance and best practice, and that detailed design would minimise the risks to aquifers and abstraction wells. It is likely to be minor adverse magnitude of impact. The significance of effect on groundwater is therefore considered slight or moderate.

Surface Waters

- 11.7.5. The potential for the mobilisation of soil contamination during construction with possible impacts to surface water during construction is dependent upon the presence of contaminative substances. The risk from which would be assessed following intrusive ground investigation. The River Wye is a main river, as classified by the Environment Agency and also designated as an SSSI and SAC. It is however assumed that construction would be undertaken in accordance with all relevant legislation, guidance and best practice. There is a potential for minor adverse impacts to surface water associated with construction but the significance of the effect on surface water is unlikely to exceed slight or moderate. Risks from construction and operation activities to surface waters are provided within Chapter 10.

Built Environment

- 11.7.6. Substances which have the potential to degrade concrete have the potential to constrain the design of the proposed Scheme. It is assumed that laboratory data would be available to characterise the concentration of these determinands in soil and groundwater during detail design and that suitable construction materials which are resistant to any degrading chemicals would be used. There would therefore be no change to the built environment (the proposed Scheme) and the significance of effects would be neutral.

End Users

- 11.7.7. The proposed development comprises a highway which is considered unlikely to expose road users or users of adjacent land to contaminative substances. The impact to end users is therefore likely to be no change and the significance of effects is likely to be neutral.

Table 11-8: Predicted effects from Element 1, all options

Attribute / Receptor	Impact	Magnitude of Impact	Significance of Effect
Geology, Geomorphology and Mineral Resources	Sterilisation of glacial sand and gravel, and river sand and gravel resources (low sensitivity)	Negligible adverse	Neutral or slight adverse
Soil	Impact to soils from soil stripping, storage and placement, and / or sterilisation of agricultural soils not graded (medium sensitivity)	Minor adverse	Slight adverse
Groundwater	Risks to water quality of licenced abstraction wells from contaminated land and water quantity from construction works (loss of Well No. 32, potential impact to Well 31 and 35 approximately 250m from area of cut) used for general farming and domestic use (high sensitivity)	Minor adverse	Slight or moderate adverse
Surface Water	Risks to ecological, chemical and hydro-morphological quality from historical contaminated land users to surface water courses (River Wye - high sensitivity). Risks from construction and operation activities are provided within Chapter 10.	Minor adverse	Slight or moderate adverse
Built Environment	Risk to new infrastructure (low sensitivity)	No change	Neutral
End Users	Risks to human health end users including road users and users of adjacent land to contaminative substances (low sensitivity)	No change	Neutral

11.7.8. In summary, the significance of effect for each attribute / receptor is considered the same for all routes options. However, there is a slight difference when assessing the groundwater receptor. The Orange, and Cyan and Yellow routes are similar, both indicating a potential loss to Well No. 32, and potential impact to Well No. 31 and No. 35 located approximately 250m from an area of cut.

11.7.9. The Red and Black 2 routes indicates a potential loss to Well No. 32, and potential impact to Well No. 31 and No 35 located approximately 500m from an area of cut. The Olive and Black 1 routes are broadly similar; however a further well (No. 24) is located approximately 450m from an area of cut.

11.7.10. The Red and Black 2 routes is considered the favoured route within Element 1 as it would affect the least number of recorded, licenced abstraction wells.

ELEMENT 2

11.7.11. The seven routes within Element 2 have been assessed and significance of impact has been discussed below. Where there are differences between the magnitude of impact and significance of effect for each attribute / receptor these are detailed below for each route and summarised in Table 11-9.

Impacts to Geology, Geomorphology and Mineral Resources

11.7.12. Changes to existing ground levels would result in geological and geomorphological change. However, there are no geological SSSIs or RIGS (also known as Local Geological Sites) within the study area so the impact on geological and geomorphology is likely to be negligible adverse. All routes are situated over areas of sand and gravel mineral resources which would lead to some sterilisation of the resource. Where cuttings are proposed within this strata, which involves the removal of this resource, this material should be reused within the design

of the proposed Scheme, or utilised within other development schemes within the local area, where possible. This limited sterilisation of resource is likely to be a negligible adverse magnitude of impact. The significance of the effect on geology, geomorphology and mineral resources is therefore unlikely to exceed neutral or slight.

Impacts to Soil

- 11.7.13. Within the study area of Element 2 agricultural land has been classified as Grade 1 and Grade 2 BMV by the ALC, considered of high sensitivity. There are also areas of agricultural land which has not classified with the post 1988 data, therefore has been considered of medium sensitivity, with further assessment required. The impact to the soils during the construction phase which would include soil stripping, storage and placement, and the sterilisation of this agricultural land is considered minor adverse. The significance of effect on soils is considered slight or moderate.
- 11.7.14. The Black 1 and Black 2 route options are not situated over classified agricultural land, therefore are considered of medium sensitivity, with an associated minor adverse impact. The significance of effect is considered slight.

Groundwater

- 11.7.15. The potential for the creation of new migratory pathways for contaminants during the construction process is dependent upon the presence of contaminative substances. The risk will be assessed following intrusive ground investigation. It is noted that the groundwater is a utilised resource with licenced abstraction wells within the study area.
- 11.7.16. An SPZ2 and 3 is situated within Element 2 (high sensitivity), associated with the glacialfluvial deposits classified as a Secondary A aquifer. This aquifer (and associated SPZ) supports the large licenced abstraction associated with the Hereford breweries within the study area. The Orange, Cyan, Yellow, Red and Olive routes are situated within SPZ2 and 3 although designed to be predominately at grade or on an embankment through the SPZ. The Orange route also slightly encroaches into SPZ1 (at grade). The Cyan route includes a small area of cut in the south of SPZ2 which would require further assessment if taken forward as the preferred route within Stage 3. The Black 1 and Black 2 routes are located further west, situated within SPZ3, with a slight encroachment at grade into SPZ2.
- 11.7.17. Other licenced abstraction wells are used for general farming and domestic use (high sensitivity), as well as other industry and horticulture purposes (medium sensitivity). There is potential for adverse impact on water quantity of these abstraction wells from construction works. It is however assumed that construction would be undertaken in accordance with all relevant legislation, guidance and best practice, and that detailed design would minimise the risks to aquifers and abstraction wells. It is likely to be a minor adverse magnitude of impact to groundwater. The significance of effect on groundwater is therefore considered slight or moderate.

Surface Waters

- 11.7.18. The potential for the mobilisation of soil contamination during construction with possible impacts to surface water during construction is dependent upon the presence of contaminative substances; risks from which will be assessed following intrusive ground investigation. The Yazor Brook has been designated as a SINC (high sensitivity). It is however assumed that construction would be undertaken in accordance with all relevant legislation, guidance and best practice. There is a potential for minor adverse impacts to surface water associated with construction but the significance of the effect on surface water is unlikely to exceed slight or moderate. Risks from construction and operation activities to surface waters are provided within Chapter 10.

Built Environment

- 11.7.19. Substances which the potential to degrade concrete have the potential to constrain the design of the proposed Scheme. It is assumed that laboratory data will be available to characterise the concentration of these determinands in soil and groundwater during detail design and that suitable construction materials which are resistant to any degrading chemicals would be used. There would therefore be no change to the built environment (the proposed Scheme) and the significance of effects would be neutral.

End Users

- 11.7.20. The proposed development comprises a highway which is considered unlikely to expose road users or users of adjacent land to contaminative substances. The impact to end users is therefore likely to be no change and the significance of effects is likely to be neutral.

Table 11-9: Predicted effects from Element 2, all options

Attribute / Receptor	Impact	Magnitude of Impact	Significance of Effect
Geology, Geomorphology & Mineral Resources	Sterilisation of glacial sand and gravel, and river sand and gravel resources (low sensitivity)	Negligible adverse	Neutral or slight adverse
Soil	Orange, Cyan, Yellow, Red and Olive routes: Impact to soils from soil stripping, storage and placement, and / or sterilisation of agricultural soils (less than 5ha of Grade 1 and 2 BMV) (high sensitivity)	Minor adverse	Slight or moderate adverse
Soil	Black 1 and Black 2 routes: Impact to soils from soil stripping, storage and placement, and / or sterilisation of agricultural soils (not graded) (medium sensitivity)	Minor adverse	Slight adverse
Groundwater	Risks to water quality of licenced abstraction wells from contaminated land and water quantity from construction works (potential impact to numerous wells within 1km of study area) used for general farming and domestic use (high sensitivity), and industry and horticulture (medium sensitivity). Risks to water quality and quantity of SPZ2 and 3 (with slight encroachment into SPZ1) (high sensitivity) but predominantly at grade or embankment.	Minor adverse	Slight or moderate adverse
Surface Water	Risks to ecological, chemical and hydro-morphological quality from historical contaminated land users to surface water courses (Yazor Brook - high sensitivity). Risks from construction and operation activities are provided within Chapter 10	Minor adverse	Slight or moderate adverse
Built Environment	Risk to new infrastructure (low sensitivity)	No change	Neutral
End Users	Risks to human health end users including road users and users of adjacent land to contaminative substances (low sensitivity)	No change	Neutral

- 11.7.21. In summary, the significance of impact for each attribute / receptor is considered the same for each of the route options. However, there is a slight difference when assessing the groundwater receptor and soils attribute.
- 11.7.22. The outcome of significance of impact is the same for each route when considering the groundwater receptor due to high sensitivity abstraction wells within 1km of all route options. Within the SPZ area all routes are predominately at grade or embankment, however, when considering the SPZ in isolation, the favoured routes would be Black 1 or Black 2. These two routes only pass over the SPZ3 with only a slight encroachment into SPZ2, whereas the other routes all pass over the SPZ2 with Cyan, Red and Olive route options including a cut within the SPZ.

- 11.7.23. The Black 1 and Black 2 routes are also the favoured routes when considering the soils attribute. The significance of impact for these routes is considered Slight adverse as the routes pass through ungraded agricultural land. Orange, Cyan, Yellow, Red and Olive routes have been determined as Slight to Moderate adverse as pass through Grade 1 and 2 BMV agricultural land.

ELEMENT 3

- 11.7.24. The routes within Element 3 follow the same alignment, therefore the seven routes have been assessed as one option, and significance of impact has been discussed below. Where there are differences between the magnitude of impact and significance of effect for each attribute / receptor these are detailed below for each route option and summarised in Table 11-10.

Impacts to Geology, Geomorphology and Mineral Resources

- 11.7.25. Changes to existing ground levels would result in geological and geomorphological change; however, there are no geological SSSIs or RIGS (also known as Local Geological Sites) within the study area so the impact on geological and geomorphology is likely to be negligible adverse. All route are situated over small areas of sand and gravel mineral resources which would lead to some sterilisation of the resource. This limited sterilisation of resource is likely to be a negligible adverse magnitude of impact. The significance of the effect on geology, geomorphology and mineral resources is therefore unlikely to exceed neutral or slight.

Impacts to Soil

- 11.7.26. The agricultural land within study area of Element 3 has not classified with the post 1988 data, therefore has been considered of medium sensitivity with further assessment required. The impact to the soils during the construction phase which would include soil stripping, storage and placement, and the sterilisation of this agricultural land is considered minor adverse. The significance of effect on soils is considered slight.

Groundwater

- 11.7.27. The potential for the creation of new migratory pathways for contaminants during the construction process is dependent upon the presence of contaminative substances, risk from which will be assessed following intrusive ground investigation. It is noted that the groundwater is a utilised resource with licenced abstraction wells within 1km of the study area.
- 11.7.28. The routes within Element 3 is situated on a Secondary A aquifer associated with the Raglan Formation (bedrock geology). Licenced abstraction wells are situated within 1km of the study area, used for general farming and domestic use (high sensitivity). There is potential for adverse impact on water quantity of these abstraction wells from construction works. It is however assumed that construction would be undertaken in accordance with all relevant legislation, guidance and best practice, and that detailed design will minimise the risks to aquifers and abstraction wells. It is likely to be a minor adverse magnitude of impact to groundwater. The significance of effect on groundwater is therefore considered slight or moderate.

Surface Waters

- 11.7.29. The potential for the mobilisation of soil contamination during construction with possible impacts to surface water during construction is dependent upon the presence of contaminative substances; risks from which will be assessed following intrusive ground investigation. There are no designated surface water courses within Element 3 therefore considered of low sensitivity. It is assumed that construction would be undertaken in accordance with all relevant legislation, guidance and best practice. It is considered there would be a negligible adverse impact to surface water associated with construction, and the significance of the effect on surface water is unlikely to exceed neutral or slight. Risks from construction and operation activities to surface waters are provided within Chapter 10.

Built Environment

- 11.7.30. Substances which the potential to degrade concrete have the potential to constrain the design of the proposed Scheme. It is assumed that laboratory data will be available to characterise the concentration of these determinands in soil and groundwater during detail design and that suitable construction materials which are resistant to any degrading chemicals would be used. There would therefore be no change to the built environment (the proposed Scheme) and the significance of effects would be neutral.

End Users

- 11.7.31. The proposed development comprises a highway which is considered unlikely to expose road users or users of adjacent land to contaminative substances. The impact to end users is therefore likely to be no change and the significance of effects is likely to be neutral.

Table 11-10: Predicted effects from Element 3, all options

Attribute / Receptor	Impact	Magnitude of Impact	Significance of Effect
Geology, Geomorphology & Mineral Resources	Sterilisation of glacial sand and gravel, and river sand and gravel resources (low sensitivity)	Negligible adverse	Neutral or Slight adverse
Soil	Impact to soils from soil stripping, storage and placement, and / or sterilisation of agricultural soils not graded (medium sensitivity)	Minor adverse	Slight adverse
Groundwater	Risks to water quality of licenced abstraction wells from contaminated land and water quantity from construction works (potential impact to numerous wells within 1km of study area) used for general farming and domestic use (high sensitivity).	Minor adverse	Slight or moderate adverse
Surface Water	Risks to ecological, chemical and hydro-morphological quality from historical contaminated land users to not designated surface water courses (low sensitivity). Risks from construction and operation activities is covered within Chapter 10	Negligible adverse	Neutral or Slight adverse
Built Environment	Risk to new infrastructure (low sensitivity)	No change	Neutral
End Users	Risks to human health end users including road users and users of adjacent land to contaminative substances (low sensitivity)	No change	Neutral

11.8 SUMMARY

- 11.8.1. The proposed route options all have the potential to have an effect on mineral resources, soils, groundwater and surface water receptors. The most notable of these effects is the slight or moderate adverse effect to groundwater associated with the abstraction wells and surface water courses with all route options.
- 11.8.2. Based on the baseline information available to date, the best performing route for Geology and Soils in Element 1 is considered the Red and Black 2 routes. The best performing routes Geology & Soils in Element 2 is considered either the Black 1 or Black 2 routes.

12 MATERIALS

12.1 INTRODUCTION

- 12.1.1. DMRB Volume 11⁶⁸ requires the assessment of materials. Interim Advice Note⁶⁹ provides further guidance on the environmental assessment of material resources. The Interim Advice Note requires that effects of a scheme on material assets be identified and assessed for all projects over £300,000.

LEGISLATION AND POLICY FRAMEWORK

National Policy Statement for National Networks

- 12.1.2. The National Policy Statement for National Networks⁷⁰ (NNNPS) requires that if a project is categorised as a National Significant Infrastructure Project (NSIP), evidence of appropriate mitigation measures (incorporating engineering plans on configuration and layout, and use of materials) during both design and construction need to be presented together with the arrangements for managing any wastes that are produced.
- 12.1.3. The proposed Scheme is likely to be considered as NSIP and will therefore be required to be compliant with the NNNPS.

Waste Management Plan for England

- 12.1.4. The Waste Management Plan for England⁷¹ is a high level document which is non-site specific and provides an analysis of the current waste management situation in England. It provides planning framework to enable local authorities to put forward strategies that identify sites and areas suitable for new or enhanced waste management facilities to meet growing demand, through local waste management plans.

National Planning Policy for Waste (October 2014)

- 12.1.5. The National Planning Policy for Waste⁷² is document sets out detailed waste planning policies and states that all local authorities should have regard to its policies when discharging their responsibilities. The document provides guidance to local authorities on the following:
- Using a proportionate evidence base when preparing waste plans;
 - Identifying the need for waste management facilities;
 - Identifying suitable sites and areas for facilities; and
 - How to determine waste planning applications.

Waste Framework Directive

- 12.1.6. The Waste Framework Directive⁷³ (2008/98/EC) provides the overarching legislative framework for the collection, transport, recovery and disposal of waste in the EU. The Directive explicitly sets a target for recycling/reuse of 70% for construction and demolition wastes by 2020. This requirement has been implemented at the national level through the Waste (England and Wales) Regulations 2011⁷⁴. The Directive sets out the Waste Hierarchy, shown below in Figure 12-1, against which action to reduce the production and

⁶⁸ Section 3, Part 6 of DMRB Volume 11 Land Use

⁶⁹ Interim Advice Note 153/11 Guidance on the Environmental Impact Assessment of Materials

⁷⁰ Department for Transport (2014), National Policy Statement for National Networks, available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf, accessed 01/05/2018.

⁷¹ Defra (2013), Waste Management Plan for England, available online https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/265810/pb14100-waste-management-plan-20131213.pdf, accessed 09/05/2018.

⁷² Department for Communities and Local Government (2014), Waste Management Plan for England, available online https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/364759/141015_National_Planning_Policy_for_Waste.pdf, accessed 09/05/2018.

disposal of waste shall be taken. The Waste Hierarchy is enshrined in law through the Waste (England and Wales) Regulations 2011.



Figure 12-1 - The waste hierarchy

12.1.7. The main principles of the waste hierarchy are as follows:

- Prevention - waste should be prevented (or reduced) at source as far as possible;
- Preparing for re-use - where waste cannot be prevented. Waste materials or products should be re-used directly or refurbished and then re-used;
- Recycling - waste materials should be recycled or reprocessed into a form that allows them to be reclaimed as a secondary raw material;
- (Other types of) Recovery - where useful secondary raw materials cannot be reclaimed, the energy content of the waste should be recovered and used as a substitute for non-renewable energy resources; and
- Disposal - only if waste cannot be prevented, reclaimed, or recovered, should it be disposed of into the environment. If this occurs, then disposal should be conducted in a controlled manner.

12.1.8. There are a number of primary legislative instruments in the UK on waste listed below which enact a wide range of secondary legislation that governs the storage, collection, treatment and disposal of waste:

- The Control of Pollution Act 1974; this act relates to waste disposal, water pollution, noise atmospheric pollution and public health:
- The Control of Pollution Act 1974; this act relates to waste disposal, water pollution, noise atmospheric pollution and public health:
- The Control of Pollution (Amendment) Act 1989; this act makes it a criminal offence for a person who is not a registered carrier to transport controlled waste to or from any place in the UK:
- Environmental Protection Act 1990 (EPA); this outlines the waste to land requirements and management of contaminated land:
- Waste Minimisation Act 1998; this act gives power to certain local authorities to take steps to minimise household, commercial or industrial waste:
- The Waste and Emissions Trading Act 2003: This act aims to reduce the amount of biodegradable waste going to landfills:
- The EU Waste Framework Directive 2008/98/EC: This legislation provides the guidance on what is waste and the disposal options available:
- The Waste (England and Wales) Regulations 2011: This sets out the waste hierarchy to identify how to deal with waste material: and
- The Waste (England and Wales) (Amendment) Regulations 2012 and 2014.

LOCAL POLICY DOCUMENTS

Herefordshire Local Plan Core Strategy 2011-2031

- 12.1.9. Following the Herefordshire Local Plan Core Strategy⁷⁵ adopted in October 2015, Herefordshire Council is now preparing a Minerals and Waste Local Plan to cover the period up to 2031. This will replace the saved minerals and waste policies contained within the Herefordshire Unitary Development Plan. The plan will establish targets and planning policies relating to minerals and waste activities and associated and associated development in Herefordshire to cover the plan period to 2031. Until the plan is adopted, the minerals and waste sections of the Herefordshire Unitary development Plan will be 'saved' and remain in force until replaced by the Minerals and Waste Local Plan.

12.2 STUDY AREA

- 12.2.1. The study area encompasses the seven route options under consideration within Stage 2. The proposed Scheme has the potential to utilise large quantities of raw materials and generate large quantities of raw and treated waste material. It is anticipated that some material resources would originate off site which includes some construction products and associated packaging, and some of the material would arise on site during the construction phase which may include excavated soil and rock, or the recycled elements of existing surfaces.
- 12.2.2. It is expected that not all materials required will be sourced locally to the scheme, and therefore there is the potential some impacts will occur off site or possibly outside of the UK. This includes the depletion of non-renewable resources, production of waste at the point of extraction of minerals or during the manufacturing process and transport. At this stage these impacts will not be assessed in detail as this will be completed for the Environmental Statement (ES) to be produced at Stage 3. The assessment will concentrate on the impacts and effects resulting from the use of those materials within the proposed route options.

12.3 BASELINE CONDITIONS

- 12.3.1. The proposed Scheme would require the consumption of some materials, and would generate some arisings that may need to be disposed of as waste. Material resource use and its associated environmental impact is identified within the extraction and transport of primary raw materials and the manufacture of products and their subsequent transport to construction sites. It is anticipated that the proposed Scheme would consume moderate quantities of both virgin materials with lower levels of secondary and recycled materials generated.
- 12.3.2. The project is likely to result in surplus matter which would require disposal as waste. This usually arises from two sources comprising;
- Existing site waste such as concrete from demolition of an existing structure and excavation of materials from earthworks;
 - Materials brought on to the site, but not used for their intended purpose e.g. damaged goods; and
 - Materials which can not be reused such as plastic or foam packaging.
- 12.3.3. A summary of waste types likely to be generated by the proposed Scheme is identified within Table 12-1, which identifies the construction stage they are generated in and the potential for re-use onsite.

Table 12-1: Summary of materials and waste that have the potential to generate significant effects

Scheme Stage	Type	Potential Use	Potential Waste	Potential Re-use
Site Clearance	Concrete		✓	
	Bricks		✓	
	Concrete/Bricks Mix		✓	
	Wood		✓	

⁷⁵ Herefordshire Local Plan Core Strategy (2015). Available online at <https://www.herefordshire.gov.uk/ldf>, accessed 01/05/2018.

Scheme Stage	Type	Potential Use	Potential Waste	Potential Re-use
	Bitmac (road planings)		✓	✓
	Iron and Steel		✓	
	Mixed metals		✓	
	Plastics		✓	
	Soil and Stone		✓	✓
	Type 5 A (topsoil/turf)		✓	✓
	Type 2 (general excavation/fill)		✓	✓
	Type 4 (landscaping/topsoil)		✓	✓
	Type 6F1 & 2 (aggregates)		✓	
	Vegetation		✓	
Site Construction	Concrete	✓	✓	
	Bricks	✓	✓	
	Bitmac			
	Base, binder and wearing courses	✓	✓	
	SLX tack coat	✓		
	Iron and Steel	✓	✓	
	Mixed Metals	✓	✓	
	Plastic	✓	✓	
	Soil and Stone			✓
	Type 1 (803 sub-base/capping)	✓	✓	✓
	Type 503 (pipe bedding)	✓	✓	✓
	Type 505 (pipe filter material)	✓	✓	✓
	Reclaimed Hedging Stone	✓		✓
	Type 5 A (topsoil/turf)	✓	✓	
	Type 2 (general excavation/fill)	✓	✓	✓
	Type 4 (landscaping/topsoil)	✓	✓	✓
	Vegetation	✓		
Site Operation/ Maintenance	Concrete	✓	✓	
	Bricks	✓	✓	
	Bitmac			
	Base, binder and wearing courses	✓	✓	
	SLX tack coat	✓	✓	
	Iron and Steel	✓	✓	
	Mixed Metals	✓	✓	
	Plastic	✓	✓	

Scheme Stage	Type	Potential Use	Potential Waste	Potential Re-use
	Soil and Stone			
	Type 5 A (topsoil/turf)	✓	✓	✓
	Type 2 (general excavation/fill)	✓	✓	✓
	Type 4 (landscaping/topsoil)	✓	✓	✓
	Type 6F1 & 2 Aggregates	✓	✓	✓
	Type 1 (803 sub-base / capping)	✓	✓	✓
	Type 503 (pipe bedding)	✓	✓	✓
	Type 505 (pipe filter material)	✓	✓	✓
	Vegetation	✓	✓	

LANDFILL SITES

12.3.4. Landfill sites are classed according to the type of waste they are licenced to receive:

- **Hazardous waste** - This is waste that may be harmful to human health or the environment e.g. asbestos, chemicals, healthcare waste, electrical equipment, lead-acid batteries, oily sludges and pesticides.
- **Non-hazardous waste** - This may include municipal waste, general office waste and catering waste.
- **Inert waste** - This is waste that does not undergo and significant physical, chemical or biological transformation such as construction and demolition waste.

12.3.5. Table 12-2 below shows the location of licences landfill sites within the vicinity of the proposed Scheme.

Table 12-2: Landfill Sites for Construction Waste within Close Proximity to the proposed Scheme

Name of Landfill Site	Distance from the HTP site
Worcestershire	
Penny Hill Quarry Landfill	25miles north east of the site.
Hartlebury Landfill (ppc Permit Zp3232sf)	31 miles north east of the site.
Waresley Landfill Site	33 miles north east of the site.
Hill & More Landfill Site	34 miles north east of the site.
Landfill Site At Throckmorton Rd (Permit ZP3933LD)	34 miles north east of the site
Doddingtree Farm Landfill	32 miles north east of the site
Lye Forge Landfill	32 miles north east of the site
Stourhill Quarry Landfill	32 miles north east of the site
Summerway Landfill	32 miles north east of the site
Gloucestershire	
Former Sand Quarry	20 miles south east of the site
Shropshire	
Aldon Landfill Site	26 miles north of the site

MATERIALS

- 12.3.6. The existing land within the highway boundary is predominately agricultural with several minor roads between the smaller villages outside of Hereford and therefore the current consumption of construction and other materials within the proposed Scheme boundary is minimum, apart from the small amount of raw materials which may be required to maintain the roads, no significant amounts of materials are expected to be used in this area.
- 12.3.7. Construction All route options would require the consumption of materials in order to facilitate construction, however the preferred route will be designed to ensure that all material generated by the scheme, during excavation, will be re-used within the scheme if the material is suitable and will therefore reduce the amount of raw materials required from outside the site boundary.
- 12.3.8. Table 12-3 below provides a summary of the availability of the main construction materials in England, as required to deliver typical highways schemes. The overview provides a context in which the assessment of impacts and significant effects from material consumption on the proposed Scheme can be undertaken.

Table 12-3: Materials Availability in the UK

Material Type	Availability (2015 Unless otherwise stated)
	UK
Sand and gravel (production in million m3)	52.5Mt
Permitted crushed rock *	99.3Mt
Concrete blocks (stocks, in million tonnes)	5.4Mm3 (2014)
Primary aggregate (sales)	183Mt
Recycled and secondary aggregate (sales)	63Mt
Ready-mix concrete (production in million m3)	25.2Mm3
Steel (production in million m3)	7.6Mt
Asphalt (sales)	26.3Mt

Source information:^{76, 77, 78, 79, 80}

Operation and Maintenance

- 12.3.9. The operation and maintenance of the proposed Scheme would require some specialist components which would require maintenance during the lifespan of the road, such as light bulbs, signage, and replacement VRS, paint and some bulk material, including cement, concrete, sand and gravel which would be required for minor works and repairs of the highway.

⁷⁶ Department for Business Innovation & Skills, Monthly Bulletin of Building Materials and Components - January 2016. [\[link\]](#)

⁷⁷ Department for Business Innovation & Skills, Monthly Bulletin of Building Materials and Components - January 2016. [\[link\]](#)

⁷⁸ British Geological Society, Minerals produced in the UK, 2014 [\[link\]](#)

⁷⁹ Mineral Products Association, The Mineral Products Industry at a Glance (2016) [\[link\]](#)

⁸⁰ World Steel Association, Crude Steel Production Statistics [\[link\]](#)

SITE ARISING

Construction

- 12.3.10. All route options would generate site arisings that could potentially be diverted from landfill. Figure 12-2 shows that rates of material recovery within the West Midlands have remained steady since 2001. Metal recycling shows an inconsistent profile. Transfer data are, however, more variable, and no clear profile is discernible. Data provided include all waste types in the south east and hence will include, but are not specific to, Construction Demolition Excavation (CDE) arisings.

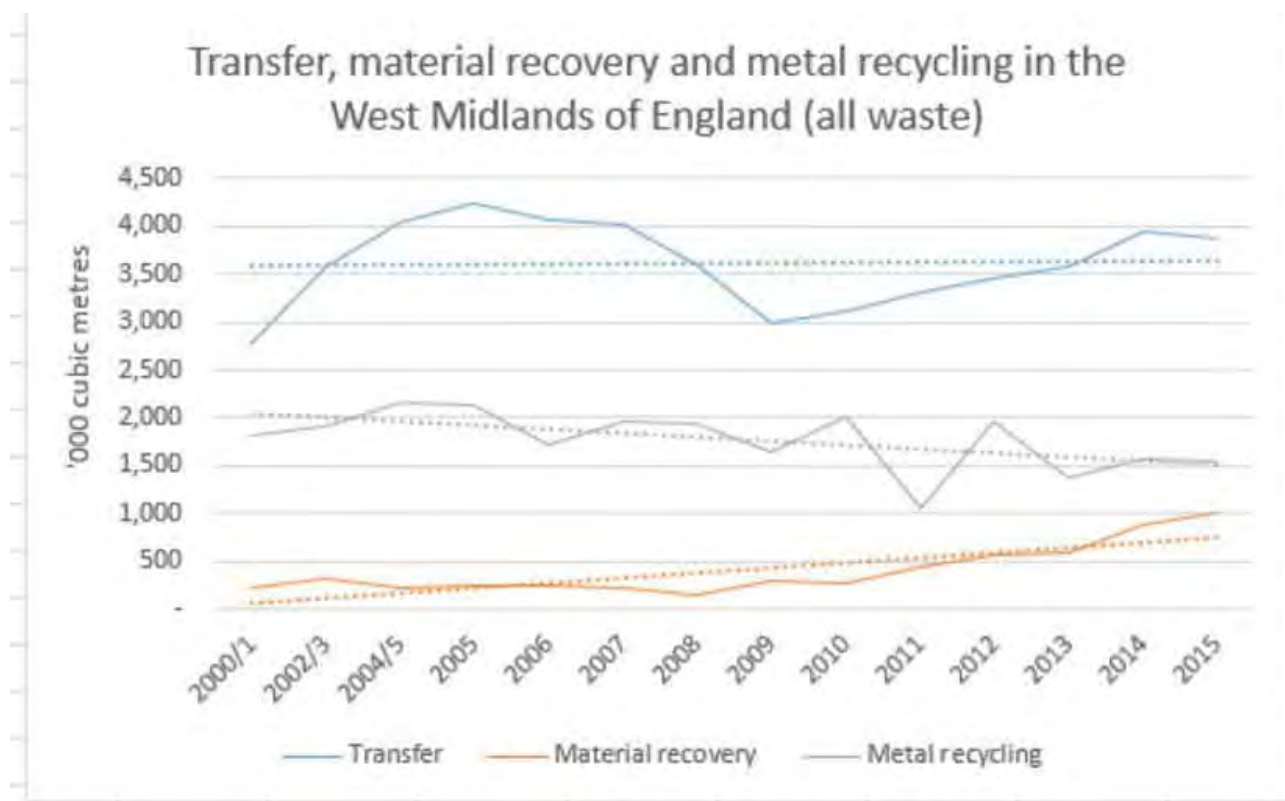


Figure 12-2 - Transfer, material recovery and metal recycling in the West Midlands⁸¹

Operation and Maintenance

- 12.3.11. It is expected that to operate and manage the proposed Scheme, the generation of site arisings (for example, vegetation clearance) would be negligible / Minor.

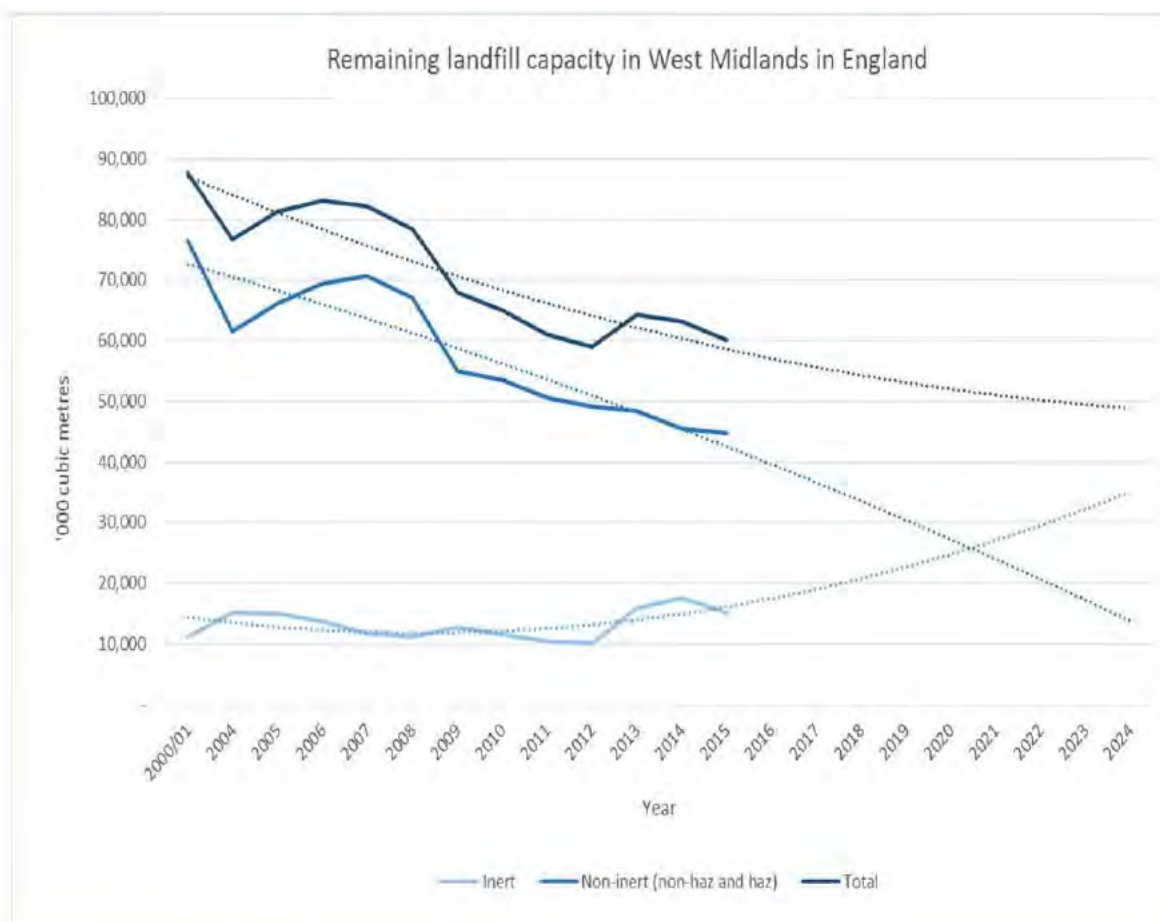
WASTE GENERATION AND DISPOSAL

- 12.3.12. During construction, the generation of volumes of arisings that may need to be disposed of as waste has the potential to adversely impact on landfill capacity. Table 12-4 shows the remaining landfill capacity in the West Midlands in 2015. Figure 12-3 provides a forecast of potential landfill capacity up to 2024 in the absence of future recovery provision.

⁸¹ Environment Agency, Waste Management and Remaining Landfill Capacity 2016 in England: Data Table [\[link\]](#)

Table 12-3: Remaining Landfill Capacity, West Midlands

Landfill Type	Remaining Capacity Cubic Metres (2015)
Hazardous (merchant and restricted)	535
Inert	14559
Non-hazardous (including stable hazardous waste cells)	31922

Figure 12-3 - Landfill capacity trends in the West Midlands⁸²

12.4 ASSESSMENT METHODOLOGY

12.4.1. In accordance with Interim Advice Note 153/11⁸³, a scoping assessment is required for all projects over £300,000 and should include the following:

⁸² Environment Agency, Waste Management and Remaining Landfill Capacity 2016 in England: Data Table [\[link\]](#)

⁸³ Highways England (2011), Interim Advice Note 153/11 Guidance on the Environmental Impact Assessment of Materials, available online <http://www.standardsforhighways.co.uk/ha/standards/ians/index.htm>, accessed 09/05/2018.

- The materials to be used and waste generated by the project that have the potential to generate significant environmental impacts. Significant environmental impacts are likely to arise from those materials which are used in the largest quantities, waste which arise in the largest quantities, which have hazardous properties or comprise a large proportion of the value of the project;
- A definition of a set of receptors which the impacts will effect;
- The materials and wastes which have been identified as having potential to give rise to environmental impacts will be the areas that a simple or detailed assessment will consider;
- The method of assessment;
- The strategy for consulting on the assessment; and
- A recommendation about whether a simple or detailed level of assessment should be made.

12.4.2. The guidance in IAN 153/11 states that a 'Simple Assessment' should be undertaken before detailed design. The simple assessment assembles data and information that is readily available to address potential effects identified before detailed design information is available. This approach is limited in scope due to the lack of information at this design stage.

12.4.3. The sensitivity of the waste receptor is dependent on the production of materials from the UK or dispose of waste (i.e. the capacity of the available waste management infrastructure). Predicted quantities of materials to be used and the waste forecasts, based on professional judgement, have been used to identify the magnitude of an impact. Further calculations of waste arisings will be developed for the preferred option, once it has been selected. This chapter therefore provides a high level assessment of the impacts and effects associated with materials use and waste generated by the proposed route options.

12.4.4. For a simple assessment environmental desktop study information will be collated through website searches including the Environment Agency. In reporting a Simple Assessment the following baseline information should be collated:

- Description of the current state and where the project concerns construction, improvement or major maintenance;
- Information about construction methods and techniques (where this information is available at the time of assessment);
- The high level policy and strategy targets influencing materials resource use and waste management;
- An assessment of the available waste management infrastructure, including:
- Types of waste management facilities, including landfill sites, materials recovery facilities, transfer stations;
- Locations of waste management facilities in relation to the site; and
- Capacities of identified waste management facilities for each type of waste forecast to be produced.

MATERIALS

12.4.5. An assessment of the effects of consuming materials required during site construction plus the first full year of operation, will be undertaken by considering the origins and sources of materials, including their general availability (production, stock, sales) and the proportion of re-used or recycled materials they contain.

12.4.6. The assessment will take into account the relative volume of materials that need to be consumed, understanding that – typically – the larger a development footprint and associated groundworks, the greater the requirement to consume materials.

12.4.7. Site arisings (from CDE activities) will be evaluated alongside the assessment of materials, to determine the volume of excavations that can be retained for re-use or recycling or (as a last resort) be sent to landfill as waste. Where site arisings can be used as a resource (diverted from landfill), the effects will be assessed as beneficial because of the reduced need to consume primary materials. The effect of each Option on the clearance of vegetation, and subsequent generation of further arisings (which may need to be disposed of), will also be considered.

12.4.8. The assessment will take into account the nature of impacts (adverse/beneficial, permanent/temporary, direct/indirect) from materials and site arisings, and use professional judgement to determine the significance of effect.

LANDFILL CAPACITY

12.4.9. An assessment of the remaining landfill capacity in the West Midlands will be used to determine the impacts and effects of waste generated during site construction and the first full year of operation, for each of the

proposed route options. The assessment shall consider the volume of waste generated by the proposed route options and the potential impact and effects of each on remaining landfill capacity; this will be completed for inert, non-hazardous and hazardous waste types. The assessment will take into account the nature of impacts (adverse/beneficial, permanent/temporary, direct/indirect) from waste generated and disposed of, and use professional judgement to determine the significance of effect.

ASSESSING THE SIGNIFICANCE OF EFFECTS

- 12.4.10. The significance of effects from materials, site arisings and waste from the proposed route options will be assessed using Table 2.4 in DMRB Volume 11 Section 2 Part 5 HA 205/08 in order to assign a significance of effect category. The descriptions provided in Table 12-4 will be used to define the significance of effect from each element (materials, site arisings, waste) assessed.

Table 12-4: Definitions for Significance of Effect

Significance Category	Descriptor of Effect
Very large	Potential for extremely detrimental or beneficial effects in relation to construction / operational materials, site arisings or landfill capacity within the region.
Large	Potential for considerable detrimental or beneficial effects in relation to construction / operational materials, site arisings or landfill capacity within the region.
Moderate	Potential for noticeable detrimental or beneficial effects in relation to construction / operational materials, site arisings or landfill capacity within the region.
Slight	Potential for limited or barely perceptible detrimental or beneficial effects in relation to construction / operational materials, site arisings or landfill capacity within the region.
Neutral	No detrimental or beneficial effects in relation to construction / operational materials, site arisings or landfill capacity within the region.

12.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

MITIGATION DURING DESIGN

- 12.5.1. A number of mitigation measures should be incorporated within the design of the preferred route to limit material and waste material impacts of the proposed Scheme works and aim to reduce the requirement of additional imported materials. Currently there is not sufficient detail on the route options to determine which mitigation would be appropriate for each option. Details of mitigation requirements will be outlined in the ES, when more information is available on the preferred route.
- 12.5.2. Specific design-related mitigation measures could include:
- The proposed Scheme works should aim to minimise export and import of fill materials, for example, by balancing earthworks demolition waste and fill volumes;
 - Topsoil stripped as a result of the works should be reused where possible in order to establish landscaping features such as embankments and verges as well as to provide a basis for landscape planting;
 - Where existing surfaces are to be replaced, this material should be re-used as either a sub-base or inclusion within new scheme construction;
 - Gradient embankments designed to minimise material requirements;
 - Construction compounds and site accesses are provisionally located to allow for the movement of material from one section of the site to another during construction;
 - Using pre-cast concrete materials for structure designs; and
 - Consideration of materials at the preliminary stages of the design allow for mitigation to be incorporated into the design and for such measures to become a part of the proposed Scheme during construction. This approach would continue into the detailed design stage and would minimise the scale of additional

measures required to mitigate residual effects, identifying the opportunity to design out waste prior to construction.

MITIGATION DURING CONSTRUCTION

- 12.5.3. Mitigation during construction should be managed through the implementation of an outline Site Waste Management Plan (SWMP) which will be developed for the preferred route at the Environmental Statement stage.
- 12.5.4. The SWMP will aim to ensure that the waste produced during the final detailed design stage when producing the preferred route is considered with in accordance with the regulations. It ensures that building materials are managed efficiently, waste is disposed of legally and the opportunities for materials recycling, reuse and recovery are maximised.
- 12.5.5. Specific construction-related mitigation measures could include:
 - Using site-won material within the proposed Scheme would mitigate the potential impacts of using large quantities of raw materials and also limit HGV trips associated with construction;
 - Materials would be sourced as locally possible to the proposed Scheme; and
 - If feasible, imported material will be sourced from other construction sites in Herefordshire, where those sites have a surplus of material from earthworks. This would help mitigate the potential impacts on natural resources and also be beneficial to the impacts of the third party development by re-using material that may otherwise be disposed of at landfill.
- 12.5.6. The waste volume from depth of excavation has been worked out as including a 600mm depth of cut for the road and 150mm depth of cut for topsoil. It is currently assumed that 80% of the excavated material would be suitable for use as fill material and 20% of the excavated materials would need to be disposed of in accordance with the Acceptable Waste Criteria by a licensed waste contractor. These figures have been derived from the engineering cut and fill balances and the aspiration is to aim for 80% reuse of material, providing the material is suitable for reuse.

Table 12-5 - Proposed Enhancement and Mitigation Measures

Project Activity	Enhancement and Mitigation Measures	Lifecycle Stages in Which Measures will be Applied	Monitoring
Materials	Identification and specification of materials that can be acquired responsibly, in accordance with BES 6001 Responsible Sourcing of Construction Products⁸⁴.	Design, construction	- Incorporate on engineering plans configurations and layouts that show how the most effective use of materials can be achieved. - Maintain records of materials that were acquired in accordance with BES 6001 Responsible Sourcing of Construction Products.
	Design for resource optimisation: simplifying layout and form, using standard sizes, balancing cut and fill, maximising the use of renewable materials, and materials with recycled or secondary content, and setting net importation as a scheme goal.	Design	
	Design for off-site construction: maximising the use of pre-fabricated structures and components, encouraging a process of assembly rather than construction	Design	
	Design for the future: considering how materials can be designed to be more easily adapted over an asset lifetime, and how deconstructability and demountability of elements can be maximised at end-of-first-life.	Design	
Site arisings	Design for recovery and reuse: identifying, securing and using materials at their highest value, whether they already exist on site, or are sourced from other schemes.	Design	- Incorporate on engineering plans configurations and layouts that show how the most effective use of site arisings can be achieved. - Implement a regime of comparing and contrasting data on site arisings in a Design SWMP (forecast), with construction data (actuals)
	Identify opportunities to minimise materials import and export	Design, construction	
	Working to a proximity principle, ensuring arisings generated are handled, stored, managed and re-used or recycled as close as possible to the point of origin.	Design, construction	

⁸⁴ British Research Establishment (BRE) BES 6001 The Framework Standard for Responsible Sourcing of Construction Products (Version 3.1 2014) [\[link\]](#)

Project Activity	Enhancement and Mitigation Measures	Lifecycle Stages in Which Measures will be Applied	Monitoring
	Forecast and identify the volume and type of woodland and other vegetative arisings that will be generated, and establish opportunities for high value re-use and recycling, on and off site.	Design, construction	
	Identify areas for stockpiling and storing arisings that will minimise quality degradation and leachate, and will minimise damage and loss.	Design, construction	
	Ensure potential arisings and waste are properly characterised before or during design, to maximise the potential for highest value reuse.	Design	
	Capture information and data on site arisings recovered and diverted from landfill, by developing a Design Site Waste Management Plan once a preferred option has been selected.	Design	
	Implement a Materials Management Plan in accordance with the CL:AIRE⁸⁵ Definition of Waste: Code of Practice.	Construction	
Waste to landfill	Engage early with contractors to identify possible enhancement and mitigation measures, and to identify opportunities to reduce waste through collaboration and regional synergies.	Design, Procurement	- Implement a regime of comparing and contrasting data on waste in a Design SWMP (forecast), with construction data (actuals) - Ensure all legal documentation (waste carrier registration, landfill licence, waste transfer documentation) associated with the management of construction and operational materials, site arisings and waste is recorded and retained
	Capture information and data on waste sent to landfill, by developing a Design Site Waste Management Plan once a preferred option has been selected.	Design	

⁸⁵ CL:AIRE is the acronym for 'Contaminated Land: Applications in Real Environments'

12.6 POTENTIAL IMPACTS

- 12.6.1. The impacts of the proposed Scheme from materials and site arisings, and waste generation and disposal, are likely to occur on-site, off-site within the UK and, potentially, internationally. It is expected that most direct and indirect impacts would occur during site construction and the first full year of operation. Impacts arising further into the operational lifecycle of the Scheme are expected to be negligible, and hence have been scoped out of this chapter. Likely impacts are set out in Table 12-6.

Table 12-6: Impacts of Consuming Materials, Generating Site Arisings and Disposing of Waste

Element	Direct Impacts	Indirect Impacts
Materials	Consumption of natural and non-renewable resources	Release of greenhouse gas emissions; Water consumption and scarcity; Environmental degradation and pollution; and Nuisance to communities (visual, noise, health)
Site arisings	Reduced need to consume primary resources	Reduced greenhouse gas emissions; and Reduced environmental degradation and pollution
Waste	Generation and disposal of waste	Release of greenhouse gas emissions; Environmental degradation and pollution; and Nuisance to communities (visual, noise, health)

- 12.6.2. To limit potential impacts upon resources and demonstrate that decisions made during detailed design, construction and operation represent long term value for money, a number of measures for materials resource efficiency and waste have been considered.
- 12.6.3. Bulk cut and fill balances for each route option are outlined in Table 12-7. Geotechnical Investigation works are required before exact volumes can be defined and preliminary volumes for each route option have been estimated based on the current design presented in this report.

Table 12-7: Preliminary Bulk Cut and Fill Volumes for each route option

Route Option	Bulk Cut (m ³) Waste	Bulk Fill (m ³) – Import or Re-used Waste	Net Volume (m ³) – Surplus/Import	Significance of Effect
Orange	311,150	308,437	2,713 (Surplus)	Negligible
Cyan	277,100	323,420	-46,320 (Import)	Sight
Yellow	288,950	320,620	-31,670 (Import)	Slight
Red	418,850	418,913	-63 (Import)	Negligible
Olive	383,600	418,100	-34,500 (Import)	Slight
Black 1	414,000	437,780	23,780 (Import)	Slight
Black 2	323,500	481,230	157,730 (Import)	Slight

12.7 SUMMARY

- 12.7.1. The material requirements and waste generated by the route options contains limited information currently due to the design information available at this early stage in the design process. This assessment will be refined further as part of the ES at Stage 3.

- 12.7.2. Based on the preliminary earthwork cut and fill requirements Orange and Red has been assessed to have a negligible impact due to the net volume being de-minimus in nature and the cut and re-use of waste anticipated to balance more than the other routes. The Cyan, Yellow, Olive, Black 1 and Black 2 routes have been assessed to have a slight adverse effect as they all have a requirement to import a large amount of earthwork material.
- 12.7.3. The bulk cut waste (approximately 80%) of for all options is anticipated to be reused for the proposed Scheme thus reducing the requirement for raw materials or the need for waste to go to landfill. This reduces the significance of effect of the proposed route options significantly.
- 12.7.4. Calculations of waste arising will be developed for the preferred route, once it has been selected. This chapter therefore provides a high level assessment of the impacts associated with materials use and waste generated by the proposed route options however detailed materials and waste requirements will become available as the design progresses and the Geotechnical Investigation results are identified.

13 PEOPLE AND COMMUNITIES

13.1 INTRODUCTION

- 13.1.1. This assessment follows the updated DMRB interim guidance contained within IAN 125/15, combining published guidance in DMRB Volume 11, Section 3, Parts 6 (Land Use), 8 (Pedestrians, Cyclists, Equestrians and Community Effects) and 9 (Vehicle Travellers) into one assessment of People and Communities.
- 13.1.2. The assessment considers any impacts that the proposed Scheme may have on:
- Effects on All Travellers: Motorised Travellers (drivers and passengers of both public and private vehicles) and Non- Motorised Users⁸⁶ (NMU), including amenity and journey length;
 - Effects on Communities: including development land, agricultural land, private and community land, community severance, tourism and recreation, and housing; and
 - Effects on People: including the local economy, employment, health and social profiles.
- 13.1.3. The EAR provides an assessment of the potential for the route options to affect existing travel patterns, journey lengths and community effects within the study area. Road safety has also been considered, together with effects on severance at the local level.

13.2 LEGISLATION AND POLICY FRAMEWORK

NATIONAL POLICY STATEMENT FOR NATIONAL NETWORKS

- 13.2.1. The National Policy Statement for National Networks (NNNPS) identifies the government's objectives for the National Networks, and those relevant to Motorised Travellers (MTs) and NMUs include:
- Support and improve journey quality;
 - Support the delivery of environmental goals and the move to a low carbon economy; and
 - Join up our communities and link effectively to each other.
- 13.2.2. Paragraphs 3.2 to 3 of the NNNPS recognise that for the development of the national road networks to be sustainable they should be designed to minimise social and environmental impacts to improve quality of life. When delivering new schemes, the Government expects applicants to avoid and mitigate environmental and social impacts in line with the principles set out in the National Planning Policy Framework (NPPF) and the Government's planning guidance. Applicants should also provide evidence that they have considered reasonable opportunities to deliver environmental and social benefits as part of schemes.
- 13.2.3. Paragraph 5.184 notes that Public Rights of Way (PRoW), National Trails, and other rights of access to land (e.g. open access land) are important recreational facilities for walkers, cyclists and equestrians. Applicants are expected to take appropriate mitigation measures to address adverse effects on coastal access, PRoWs, National Trails, other and open access land and, where appropriate, to consider what opportunities there may be to improve access.
- 13.2.4. The points raised in the NPPF regarding protection of agricultural protection are further emphasised within the NNNPS, in paragraph 5.168. The Statement also advises that applicants should identify any effects, and seek to minimise impacts, on soil quality, taking into account any mitigation measures proposed. Where possible, developments should be on previously developed (brownfield) sites provided that it is not of high environmental value. For the decision-maker, paragraph 5.176 advises that the economic and other benefits of the best and most versatile agricultural land should be taken into account. The decision-maker should give little weight to the loss of agricultural land in grades 3b, 4 and 5, except in areas (such as uplands) where particular agricultural practices may themselves contribute to the quality and character of the environment or the local economy.

⁸⁶For the purposes of this assessment, the term Non-Motorised User has been used instead of the new term 'Walking, Cycling and Horse-Riding Facility' or 'user facility' described outlined in HD 42/17.

- 13.2.5. Paragraph 5.179 of the NNNPS suggests that applicants can minimise the direct effects of a project on the existing use of the proposed site, or proposed uses near the site by the application of good design principles, including the layout of the project and the protection of soils during construction.

NATIONAL PLANNING POLICY FRAMEWORK

- 13.2.6. The NPPF sets out a number of 'Core Planning Principles', which are necessary to deliver sustainable development. One of the principles, most relevant to this chapter, emphasises the need to manage patterns of growth to make the fullest possible use of public transport, walking and cycling. Section 4 of the NPPF sets how transport should be considered within the context of planning decisions and sustainable development. The Framework states that encouragement should be given to solutions that seek to reduce congestion and serve to facilitate the use of sustainable transport.
- 13.2.7. The NPPF also encourages development that exploits opportunities for sustainable transport. Particularly by giving priority to pedestrian and cycle movements, and providing access to high quality public transport facilities. In addition, the NPPF encourages development that minimised conflict between vehicular traffic, cyclists and pedestrians. The NPPF states that local authorities should 'develop strategies for the provision of viable infrastructure necessary to support sustainable development.
- 13.2.8. In relation to health Chapter 8 of the National Planning Policy Framework (NPPF) supports 'promoting healthy communities' and its core planning principles require consideration of local strategies for health improvement in both plan-making and decision-taking.
- 13.2.9. Paragraph 19 of the NPPF states that the government is committed to ensuring that the planning system does everything it can to support sustainable economic growth. Paragraph 75 requires the protection and enhancement of Public Rights of Way (PRoW) and access, seeking opportunities to provide better facilities for users; for example by adding links to existing rights of way networks. Paragraph 70 of the NPPF details that planning policy and decisions should plan positively for the provision of social, recreational and cultural facilities, and guard against the loss of valued facilities and services.
- 13.2.10. Paragraph 109 of the NPPF identifies the protection and enhancement of soils as a priority in the conservation and enhancement of the natural and local environment. Paragraph 112 then advises that local planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land, i.e., land classified as Grades 1, 2 and 3a in the Agricultural Land Classification (ALC) system of England and Wales. Paragraph 112 of the NPPF goes on to advise that, where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.
- 13.2.11. There is no policy in the NPPF on the effects of development on any agricultural interests other than land quality. However, guidance in Natural England's Technical Information Note (TIN) 049 indicates that, although ALC is a basis for assessing how development proposals affect agricultural land within the planning system, it is not the sole consideration, with planning authorities also guided by the NPPF to protect and enhance soils more widely.

TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 2017 (EIA REGULATIONS)

- 13.2.12. The revised Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations), which came into force on 16th May 2017, now require that EIAs include population and human health when assessing the direct and indirect significant effects of a proposed development.

THE COUNTRYSIDE AND RIGHTS OF WAY ACT 2000

- 13.2.13. The Countryside and Rights of Way Act (CRoW Act) regulates all PRoW and ensures access to them. It requires local highway authorities to publish a Rights of Way Improvement Plan (RoWIP), which should be reviewed every 10 years. The Act also obliges the highway authority to recognise the needs of the mobility impaired when undertaking improvements.

HEREFORD LOCAL PLAN CORE STRATEGY 2011-2031

- 13.2.14. Herefordshire Council has prepared a Local Plan to guide development and change in the county up to 2031. The Local Plan is made up of a number of documents including the Core Strategy. The following policies are relevant to the People and Communities Assessment.

Table 13-1: Relevant policies from Herefordshire Council Local Policy

Policy Reference	Policy Details
Policy H1 – Affordable Housing	The amount of affordable housing including those on strategic housing sites will vary depending on evidence of housing needs identified through the latest housing market assessments and the viability of development.
Policy H2 – Rural exception sites	Proposals for affordable housing schemes in rural areas may be permitted on land which could not normally be released for housing where: the proposal could assist in meeting a proven local need for affordable housing; the affordable housing is made available to and retained in perpetuity for local people in needs of affordable housing; and the site respects the characteristics of its surroundings, demonstrates good design and offers reasonable access to a range of services and facilities normally in a settlement identified in Policy RA2.
Policy H3 – Ensuring an appropriate range and mix of housing	Residential housing developments should provide a range and mix of housing units which can contribute to the creation of balanced and inclusive communities. I.e. providing a range of house types and sizes, adapted for people with specific needs and a range of house types.
Policy SC1 – Social and community facilities	Development proposals which protect, retain or enhance existing social and community infrastructure or ensure that new facilities are available as locally as possible will be supported. New development that creates a need for additional social and community facilities will be expected to meet the additional requirements through existing social facilities.
Policy OS1 – Requirement for open space, sports and recreation facilities	The provision of appropriate open space, sports and recreation facilities will arise in the following proposals for planning applications: All new residential dwellings; Retail and employment proposals; Residential institutions, student accommodation, assembly and leisure, hotels or hostels.
Policy OS2 – Meeting open space, sports and recreation needs	In order to meet the needs of the community, provision for open space, sports and recreation facilities will be sought, where appropriate, taking into account the following principles: Any new development must be in accordance with all applicable set standards of quantity, quality and accessibility as defined; and Provision of open space, sports and recreation facilities should be located on-site unless an off-site or partial off-site contribution would result in an equally beneficial enhancement to an existing open space, sports, recreation facility which is of benefit to the local community.
Policy OS3 – Loss of open space, sports or recreation facilities	Proposals which result in the loss of open space, sports or recreation facility the following will be taken into account: Loss of open space, sports or recreation facilities results in an equally beneficial replacement or enhanced existing facility for the location community. Loss of open space, sports or recreation facility will not result in the fragmentation or isolation of a site which is part of a green infrastructure corridor
Policy E1- Employment Provision	The focus for new employment provision in Herefordshire is to provide a range of locations, types and sizes of employment buildings, land and offices to meet the needs of the local economy.
Policy E4- Tourism	Herefordshire will be promoted as a destination for quality leisure visits and sustainable tourism by utilising, conserving and enhancing the county's unique environmental and heritage assets and by recognising the character and beauty of the countryside. Tourist industry will be supported by: the development of sustainable tourism opportunities, capitalising on assets such as the county's landscape, rivers, other waterways and rural settlements, where there is no detrimental impact on the county's varied natural and heritage assets or

Policy Reference	Policy Details
	on the overall character and quality of the environment. Particular regard will be had to conserving the landscape and scenic beauty in the Areas of Outstanding Natural Beauty; ensuring that cycling, walking and heritage tourism is encouraged by facilitating the development of long distance walking and cycling routes, food and drink trails and heritage trails, including improvements to PRoW whilst having regard for the visual amenity of such routes and trails, and for the setting of heritage assets in their vicinity;

LOCAL TRANSPORT PLAN

13.2.15. The Hereford Local Transport Plan aims to provide a transport network that “*supports growth enabling the provision of new jobs and houses, whilst providing the conditions for safe and active travel, which reduces congestion and increases accessibility by less polluting and healthier forms of transport than the private car*”. The plan aims to:

- Enable economic growth – by building new roads and linking new developments to the transport network and reducing the need to travel short distance by car;
- Provide a good quality transport network for all users - by being proactive and working closely with the public, Highways England and rail and bus companies;
- Promote healthy lifestyles – by making sure new developments maximise healthier and less polluting forms of transport by delivering and promoting active travel schemes and reducing single occupant car journeys;
- Make journeys easier and safer – by ensuring that bus and rail tickets are easier to buy, by improving ‘real time’ information and signage to walking and cycling routes to help people feel safer during their journeys; and
- Ensure access to services for those living in rural areas – by improving the resilience of our road network and by working closely with all transport operators to deliver a range of transport options particularly for those without a car.

13.2.16. The Local Transport Plan outlines the significant role that transport will play to enable the delivery of the Core Strategy Proposals and the need for a major investment in the transport network.

13.3 STUDY AREA

EFFECTS ON ALL TRAVELLERS

13.3.1. The study areas for the assessment of the effect on all travellers are as follows:

- Motorised Travellers - The study area for both views from the road and driver stress is from the alternative routes through Hereford using the A465, A49 and A438.
- Non-Motorised Users - The study area for the assessment of impact on NMU includes those PRoWs and NMU routes directly affected by the proposed route options and any feeder PRoWs.

EFFECTS ON COMMUNITIES

13.3.2. The study areas for the assessment of effect on communities are as follows:

- Community Severance - The study area for ‘community severance’ will be extended to include communities that may potentially be directly affected by the proposed Scheme, for example, through severance;
- Tourism and Recreation - The study area for tourism and recreation facilities includes the facilities accessed from Hereford and those within the land corridor study area surrounding the proposed route options, as described in Chapter 2;
- Housing - Housing will be reviewed according to the relevant ward boundaries;
- Private Assets and Demolition of Private Property - The study area for ‘private assets’ consists of the land parcels required to accommodate the proposed development. Private Property is land outside the existing highways boundary that does not accommodate public open space or any other community facility or asset. It can be residential or commercial/industrial land. Agricultural land will be assessed separately;

- Community Land - Community land is any area of public open space and other facilities such as schools, hospitals, libraries and recreation facilities relied upon for community health and well-being. The study area for 'community land' consists of the land parcels required to accommodate the proposed development;
- Development Land - Development land is land designated within the Rural Areas Sites Allocations Development Plan Document⁸⁷ for particular development purposes, or for which planning permission has been granted or is pending. Committed Developments and Proposed Growth is discussed in Chapter 14 (Consideration of Cumulative Effects) of this EAR. The study area for 'development land' consists of the land parcels required to accommodate the proposed development; and
- Agricultural Land - The study area for 'agricultural land' consists of the agricultural land parcels required to accommodate the proposed development.

EFFECTS ON PEOPLE

13.3.3. The approach and study areas for the assessment of effect on people are as follows:

- Local Economy - Publicly available data has been gathered for the relevant Lower Super Output Areas maintained by the Office of National Statistics (ONS);
- Social Profile - Publicly available data has been gathered for Hereford, according to the data sets within Hereford Council's Facts and Figures
- Health Profile - Publicly available data has been gathered for Hereford, according to the data sets within the published Public Health England Health Profile and available ONS data sets (2011 census).

13.4 BASELINE CONDITIONS

EFFECTS ON ALL TRAVELLERS

Motorised Travellers: Views from the Road

- 13.4.1. The main roads through Hereford comprise the A49 which travels from the south through Hereford and heads north towards Leominster. The A465 travels from the south west from Abergavenny through Hereford and continues north east towards where it meets the Roman Road and converges with the A4103. The A438 travels North West from Whitney-on-Wye and travels through Hereford and continues east towards Ledbury.
- 13.4.2. There are also several minor roads situated on the west of Hereford between the A465 and A438 which join up Breinton and Lower Breinton with Hereford and the communities on the outskirts of Hereford. Between the A438 and A49 there are several larger roads (A4103, Tillington Road and the A4110) these roads connect the minor roads to the larger A438 and A49 in and out of Hereford.
- 13.4.3. From north to south of the existing roads within the west of Hereford which will be affected by the proposed Scheme, the current views from the road are as follows:

A49

- 13.4.4. The A49 road is lined with trees and hedgerows, therefore the views from the road are intermittent. As the A49 enters Hereford from the north, there are increasing residential properties which line both sides of the A49, there are intermittent views from this part of the road.

A4110

- 13.4.5. The A4110 is also lined with shrubby hedgerows on both sides of the carriageway, which restrict some of the views from the road and provide an intermittent view. However, beyond the hedgerows the views are open from the road extend over a fair distance of agricultural fields, with rolling hills and mature trees in the distance.

⁸⁷ Hereford Council, (November 2017),
https://www.herefordshire.gov.uk/info/200185/local_plan/298/rural_areas_site_allocation_development_plan_document/1

A4103

- 13.4.6. The A4103 is lined with trees and hedgerows which provide intermittent views from the road. However, as the A4103 heads west the hedgerows become intermittent and provide larger more open views of the agricultural fields and rural landscape surrounding the carriageway with views of rolling hills in the distance.

Tillington Road

- 13.4.7. Tillington Road is lined with shrubby hedgerows on both sides of the carriageway which provide intermittent views from the road. The occasional gap through a hedgerow or farmers gate display wide open views across the landscape, which comprise rural agricultural fields, with long distance open views of the rolling hills in the distance. The fields are separated by mature trees and hedgerows.

A438

- 13.4.8. The A438 Kings Acre Road has a row of residential properties to the north of the carriageway, and a row of mature trees with hedgerows lining the carriageway to the south. Through the gaps between the hedgerows there are wide open views across agricultural and rural fields which are separated by trees and hedgerows.

Breinton Lane

- 13.4.9. Breinton Lane is lined with high hedges throughout its length from Upper Breinton to where the road converges with the A438. Therefore views from the road will be restricted. Beyond the high hedges, the land is flat and the views are open over the long distances of rural land comprising of agricultural fields and mature trees and hedgerows.

Unnamed/single tracked roads

- 13.4.10. The smaller, single tracked roads between Breinton lane and the west of Hereford through Warham and Breinton all comprise similar views from the road with are predominately restricted by high hedgerows. Beyond the hedgerows the views are open across a rural landscape comprising of agricultural fields. These roads serve mainly several residential dwellings and farms.

Ruckhall Lane

- 13.4.11. Ruckhall Lane comprises a single track road with high hedges lining the carriageway which restrict the views across the landscape. However, part of Ruckhall lane (closer to Belmont) has a shorter hedgerow lining the north western side of the carriage way which offers open views across the rural landscape of agricultural fields and mature trees in the background. Further towards the North West the views become more restricted as the hedgerows lining the carriageway become denser.

B4349

- 13.4.12. The B4349 is lined with high hedges through the length of the road which restrict the views from the road across the landscape. Beyond the hedgerows the landscape is rural comprising agricultural fields with mature trees and hedgerows.

A465

- 13.4.13. The majority of the A465 on the outskirts of Hereford comprise intermittent views across the rural landscape, however, these are restricted by a mature woodland several 100m away from the carriageway. Further south west along the A465, the hedgerows become sparse and the views across the landscape open up towards the south east. The landscape comprises predominately rural agricultural fields with rolling hills in the distance. The occasional residential dwelling is also present adjacent to the carriageway throughout its entirety.

MOTORISED TRAVELLERS: DRIVER STRESS

- 13.4.14. Herefordshire Council describes the main roads through Hereford as congested with unreliable journey times experienced along the A49 which is considered to have a 'key junction capacity issue' and experiences a higher than average collision rate through the city. This all contribute to the increase in driver delay and add to the increasing levels of driver frustration.
- 13.4.15. Due to the presence of connecting footpaths and pavements on stretches of the A438 and A4103 situated on the outskirts of Hereford, and the proximity of houses and community facilities, there are likely to be pedestrians crossing or walking alongside the road. This increases the level of fear felt by MT.
- 13.4.16. It is not possible to assess route uncertainty, however due to the level of driver frustration due to delays currently experienced by MTs, the level of Driver Stress experienced is anticipated to be High. At this stage, a

Simple Level qualitative assessment is applied according to professional judgement and detailed assessment will be done at Stage 3.

NON-MOTORISED USERS: AMENITY AND JOURNEY LENGTH

- 13.4.17. The position of the proposed route options relative to PRow are shown in Appendix 13-1 and the impacts on NMUs are described in Tables 13-15 to 13-27.

PUBLIC RIGHTS OF WAY

- 13.4.18. The following PRow and NMU routes are within the study area. All paths are of local importance and are therefore low sensitivity:
- There is a public footpath (Pipe and Lyde Footpath 9) which transverses several agricultural fields from Lyde Arundel to the A4103 Roman Road. The footpaths are hidden from the roads due to the high hedges which line the carriageways and therefore the view from the roads are restricted.
 - Between Tillington Road and Tow Tree Lane there is a public footpath (Burghill Footpath 11) which connects both roads via the public footpath. The field runs adjacent to a field boundary, and adjacent to the Yazor Brook.
 - Towards the west of the A4110, there is a network of several footpaths (Hereford 1, 55, 37, 38) which connect several of the lanes within Huntington between the A4103 and A410. Footpaths 55 and 38 follow the Yazor Brook, Footpath 1 connects the A4103 with Hunting Court Lane, and Footpath 37 connects Hunting Lane with the A4110. The views from the paths are restricted due to the hedgerows and mature trees which mark the edges of the field boundaries and river corridors.
 - Towards the east of the A480 there are three footpaths (Footpath 11, 35 and 53) which connect the A438, A480 and A4103. Footpath 11 and 53 cuts through an industrial retail park with a garden centre, therefore the views from here are restricted by the surrounding buildings. Footpath 35 runs adjacent to an agricultural field boundary. There is a hedgerow separating the footpath from the field, beyond this there are wide, flat and open views across the landscape of the agricultural fields.
 - Towards the west of the A480 there are two footpaths (Footpaths 11 and 5). Both paths are located along the boundaries of the agricultural field between the A480 and A438, there are no hedgerows restricting views, however this area is more built up, with a flat landscape, therefore the views only extend a few hundred meters over the area before being restricted by mature trees and buildings.
 - South of the A438 there are several bridleways which interconnect. Bridleways 2A, 9 and 3 link the A438 King's Acre Road with Bridleway 25 which is also known as Green Lane. Bridleway 25 provides an east to west link from White Cross to Breinton Lane via Drovers Wood and Green Lane Wood. Bridleway 9 continues past Bridleway 25 heading south past Upper Hill Farm to Breinton Lane.
 - To the north of the River Wye is Footpath 2 which heads west from Warham Lane (U73023) near Warham House into Breinton. Also Footpath 1 also known as the Wye Valley Walk heads from the centre of Hereford along the northern bank of the River Wye into Breinton. A short path, Footpath 8, links Warham Lane (U73023) and Footpath 2 to Footpath 1.
 - There is a larger 'Figure of 8' walk which consists of two circular walks known as the Hatton Trail Walk and totals five miles overall. The walk starts at Breinton Spring Car Park and comprises the smaller of the circular walks. The path heads along Footpath 2 and around the land outside Warham house and with the Greenbank Meadow open space, down Footpath 1 and along the PRow and Bridleway adjacent to the River Wye before heading back up the valley side towards the car park. From here the second part of the 'Figure of 8' walk is a larger circular route which heads north up Footpath 2 passing the Traditional Orchards and turning left at the Caravan Park along Green Lane (Footpath 7). The walk extends slightly outside of the study area and continues west to Stretton Sugwas and joins up with the Wye Valley Walk Bridleway before turning left near Upper Breinton and heading back towards Breinton Springs Car Park along PRow and Bridleway Footpath 10 (See Figure 13-2 below).
 - To the south of the River Wye, Footpath 7 heads west from Belmont, through Belmont House Unregistered Park and Garden to Church Road.
 - There are no National Cycle Network routes that would be affected by any of the proposed route options
- 13.4.19. The majority of PRow's outside of the built up areas of Hereford are set within agricultural land and are likely to be used primarily for recreational purposes. However, the paths are not well connected to the more recreational paths such as the Wye Valley Walk and only provide two circular walks (Wye Valley Walk and Hatton Trail) due to the River Wye which has limited crossings. The PRow generally provide linear access from A to B.



Figure 13-2 - The Hatton Trail 'Figure of 8' trail walk

DEVELOPMENT AND PRIVATE LAND

- 13.4.20. The Hereford Community Farm is based within Warham and is the only facility of its kind within Hereford. The farm has been developed as a centre to provide wide-ranging therapeutic land based activities and skills training for people whom face disadvantage through a range of disabilities, ill health, social needs or any condition or situation that can affect someone's life. The facility is an important component of the community as the centre provides an opportunity for people to develop skills within a real work context and to the benefit of the wider community.
- 13.4.21. The farm is associated with several other facilities within the wider area comprising; local cafes which the farm provides surplus food to, in addition to the Community Vegetable Bag Scheme which provides supported employment opportunities in harvesting, packing and delivery. The farm is also associated with the Three Counties Traditional Orchard project which is set up to manage and conserve traditional orchards.

EFFECTS ON COMMUNITIES

Community Severance

- 13.4.22. Community severance is defined as the separation of residents from facilities and services that they use within their community, in this case as a result of the proposed route options.
- 13.4.23. The route options are located on the western outskirts of Hereford. The nearest communities within this area comprise smaller residential dwellings situated within:
- Holmer (located towards the east of the A49);
 - Huntington (located south of the A4103);
 - Stretton Sugwas (located west of the A4103);
 - King's Acre (located on the A438);
 - Upper Breinton, Breinton and Warham (located between the A438 and River Wye); and
 - Belmont (located to the south of the River Wye).
- 13.4.24. Within this part of Hereford, the area is mainly rural and agricultural; there are no major developments and all community facilities are predominately located within Hereford. The majority of journeys made between these communities and Hereford are likely to be made by vehicle. This is due to the distance and the type of facilities and services being accessed. The roads between these communities comprise of narrow lanes with National Speed limit with no pavements, therefore residents are likely to drive as it may feel safer.
- 13.4.25. These communities may be affected as access to facilities and services to the larger communities within Hereford may be affected by the proposed Scheme. The following paragraphs provide a summary of the

facilities available to residents within these communities and the journeys that are likely to be taken between communities to access certain facilities.

Hereford

13.4.26. Hereford has a population of approximately 55,800 and the city is one of the most rural and sparsely populated in England. Hereford has the following facilities:

- City centre comprising of several public houses, banks and retail shopping centres;
- Hereford County Hospital;
- Cathedral and 16 Churches;
- Four high schools;
- 20 primary schools;
- Football stadium;
- Playing fields and country parks;
- Train station;
- Five Post Offices;
- Five pharmacies;
- Four major route options which provide access to Hereford comprising the A49 (North and South), A465 (South West), A438 (North West and East) and B4224 (South East); and
- The city has general NMU provisions such as shared use paths and pedestrian crossings. National Cycle Route 46 (traffic free and on road route) also runs through Hereford City.

13.4.27. The communities surrounding Hereford comprise several community facilities including:

Holmer and Huntington

- Public Houses;
- Health Club;
- Primary schools;
- Some retail stores; and
- Post office.

13.4.28. In the smaller communities, located approximately 1.5km outside Hereford city, the community facilities comprise:

Warham, Breinton, King's Acre and Stretton Sugwas

- Village Hall;
- Churches;
- Farm shops;
- Garden Centre; and
- Public Houses.

Belmont

- Belmont Abbey and Hedley Lodge Guest House;
- Tesco Supermarket;
- Community Centre;
- Medical Centre;
- Pharmacy;
- Hotels / B&Bs; and
- Recreational area of open land between Dorchester way and Northolme road which comprises a network PRow known as 'Abbey View'

13.4.29. There are fewer community facilities within the smaller villages situated towards the west of Hereford (Huntington, Breinton and Warham) therefore the residents of these communities are likely to access these additional facilities in Hereford by using either the A438 or the A465. Likely journeys to take place to and from Hereford include:

- Journeys to and from the communities situated to the west of Hereford such as Stretton Sugwas and Breinton to access secondary schools, sports and fitness facilities and employment premises via the A438 and A4103;
- Journeys from residents situated on and around Roman Road who may use the PRow to access communities facilities within the north west of Hereford; and

- Residents within Clehonger and Belmont, south of the River Wye who may travel to Hereford to access GPs and Pharmacies within Hunderton. These journeys may be undertaken using the PRoW or by car via the A465.

13.4.30. Many of the PRoW (footpaths 2A, 9, 3, 4 and 2) within the western side of Hereford provide direct links to the smaller roads which provide links to the larger roads which access Hereford.

Tourism and Recreation

13.4.31. There are a number of tourist and recreational facilities located within Hereford, which can be accessed directly from the A465, A49 and A348. The following are located within Hereford:

- The Weir Garden (of local scale and therefore of low sensitivity);
- Museum Resource and Learning Centre (of local scale and therefore of low sensitivity);
- Oliver's Cider and Perry (of local scale and therefore of low sensitivity);
- Herefordshire Light Infantry Museum (of local scale and therefore of low sensitivity);
- The Time Machine Museum (of local scale and therefore of low sensitivity);
- Hereford Cathedral (of regional scale and therefore of medium sensitivity);
- Black and White House Museum (of local scale and therefore of low sensitivity);
- Belmont Abbey and Hedley Lodge (of local scale and therefore of low sensitivity);
- The Waterworks Museum (of local scale and therefore of low sensitivity);
- How Caple Court Gardens (of local scale and therefore of low sensitivity);
- Cider Museum (of local scale and therefore of low sensitivity);
- Preston Campsite (of local scale and therefore of low sensitivity);
- Cuckoo's Corner Campsite (of local scale and therefore of low sensitivity); and
- Trunkquility Treehouse (of local scale and therefore of low sensitivity).

13.4.32. There are also a number of service led business such as hotels, restaurants, campsites and caravan parks situated within Hereford City which would be accessed via the A438, A49 and the A465.

Housing

13.4.33. The following areas have been identified as strategic locations for growth to the west of Hereford within the Core Strategy:

- Three Elms; and
- Holmer West.

13.4.34. Under Policy HD5 – Western Urban Expansion, Herefordshire's LDP identifies land at Three Elms for a mixed use urban expansion with:

- A minimum of 1,000 homes at Three Elms and approximately 460 at Holmer;
- At least 10 hectares of employment land;
- New green infrastructure with pedestrian and cycle links utilising the disused railway;
- Primary School;
- Community hut;
- Transport interchange;
- Sport facilities and recreational areas; and
- Sustainable urban drainage and flood mitigation arising from the Yazor Brook.

Community Land

13.4.35. Greenbank Meadow is considered to be an area of designated public open space. It consist of a narrow strip of land located to south of Warham House and north of the River Wye between the Wye and Rough Coppice ancient woodland and is illustrated on Figure 13-1.

13.4.36. No other community land is found within the study area.

Private Property

13.4.37. There are several residential properties and farmsteads within and around the alignment of the route options, including:

- 19 houses on Canon Pyon Road (A4110);
- 13 houses on Tillington Road;
- 70 Houses on King's Acre Road (A438);
- Individual farms and residential dwellings in Breinton;

- Residential farms and properties in Warham;
- Residential properties on Dorchester Way, Canterbury Close and Tintern Close; and
- Residential properties on Clehonger Road
- Fayre Oaks Home Park and Bovingdon Park residential mobile home parks

Agricultural Land

- 13.4.38. Agricultural land has been classified by the Ministry for Agriculture, Fisheries and Food (MAFF), now Defra, by grade land according to the extent to which chemical and physical characteristics impose long term limitations on agricultural use for food production. In accordance with DMRB guidance, only land potentially falling within ALC grades 1, 2 and 3a, are considered to be “Best and Most Versatile” (BMV). BMV land is best suited to adapting to the changing needs of agriculture and maintaining the competitiveness of UK agriculture against international competitors.
- 13.4.39. The ALC maps, upon which the assessment is based, were created by Herefordshire Council and are available on the Council Website⁸⁸. There is no description about how or when the data was collected, therefore they should be treated with some caution, in the absence of detailed site survey results.
- 13.4.40. The ALC map indicates that the land within the study area is a mixture of Grade 1 (excellent), 2 (very good) and 3 (moderate). The sub-grades between the land classifications were not included on the map.

EFFECTS ON PEOPLE

- 13.4.41. This section sets out the baseline conditions in relation of health, comprising sensitive receptors, local population and facilities information, and indicators of the status of local health, social and economic factors.
- 13.4.42. To inform the assessment, a preliminary desk study has been undertaken to collect indicator data relating to the local economy, employment, health and population. The following tables summarise the findings of this preliminary desk study.

POPULATION AND HEALTH

- 13.4.43. The data summary from the Public Health Profile available through the facts and figures Hereford website⁸⁹ indicated that:
- Total population within Hereford is 189,309 (ONS, 2017)⁹⁰;
 - Female life expectancy at birth in Herefordshire is significantly longer than nationally in the latest period for which there is statistically comparable data (2009-11);
 - Women born in Herefordshire live on average to 83.6 years and men live on average to 79.4 years.
 - People living in Herefordshire at age 65 are also expected to live significantly longer than nationally;
 - Life expectancy at 65 years is around 19 further years for men and 22 further years for women;
 - However people born in the most deprived areas of Herefordshire have a shorter (4-5 years) life expectancy than those living in the least deprived areas.

Health Inequalities

- 13.4.44. Life expectancy is 4.9 years lower for men and 3.5 years lower for women in the most deprived areas of Herefordshire than in the least deprived areas (Males = 80% in Hereford, 79% England Value for and Females = 83.9% in Hereford, and 83.1% for England).

Table 13-2: Difference in life expectancy between most and least deprived areas 2013-2015

Indicator	Male	Female
Life expectancy gap between most and least deprived areas	4.9 years	3.5 years
Hereford Value	80%	83.9%
England Value	79%	83.1%

⁸⁸ https://www.herefordshire.gov.uk/downloads/file/4858/herford_agricultural_land_classification_map, accessed 13/04/2018.

⁸⁹ <http://fingertipsreports.phe.org.uk/health-profiles/2016/e06000019.pdf>

⁹⁰ <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesrevisi> ontool

- 13.4.45. The profile indicates that the difference in life expectancy between the most and least deprived areas is high. If there was no inequality in life expectancy, the difference would be zero. The PHE health profile data therefore indicates that there is health inequality in Hereford.

Deprivation

Table 13-3: Indicator of Deprivation for Hereford Compared with England

Indicator	Period	Local Value	England Value
Deprivation (Index of Multiple Deprivation)	2015	19.7	21.8

- 13.4.46. The profile indicates that deprivation for Hereford is lower compared to the national average. The PHE health profile data therefore indicates that Hereford is a less deprived area than the national average.

Lifestyle

- 13.4.47. The following indicators of public health per year are better than the average in England.

- Rate of smoking related deaths in Hereford;
- Levels of adult physical activity;
- Rates of sexually transmitted diseases;
- Rates of homelessness, violent crime, long term employment; and
- Early deaths from cancer.

Table 13-4: Indicators of Lifestyle for Adults in Hereford Compared with England

Indicator	Period	Local Value	England Value
Smoking Prevalence in Adults	2016	14.0	15.5
Percentage of Physically Active Adults	2015	63.3	57.0

- 13.4.48. The profile indicates that smoking prevalence in Hereford is slightly lower than the national average. The proportion of physically active adults is higher in Hereford in comparison to the national average. The PHE health profile data therefore indicates that the adult population in Hereford has a mixed approach to lifestyle behaviour when compared to the national average.
- 13.4.49. The proportion of children in poverty has risen in recent years, however, it is still below the national average in England.
- 13.4.50. The percentage of 16-18 year olds not in education, employment or training (NEET) has reduced marginally over the period. However, this exceeds the figure for England overall. In Hereford, since the last assessment some progress has been made towards addressing child poverty and some of the forthcoming reforms to the welfare system including benefits and welfare to work programmes should contribute to making a positive difference.

Table 13-5: Indicators of Childhood Health in Hereford Compared with England

Indicator	Period	Local Value	England Value
Children in Low Income Families (under 16s)	2014	14.7	20.1
Obese Children (Year 6)	2015/16	19.8	19.8
GCSEs Achieved	2015/16	57.7	57.8

- 13.4.51. The proportion of children in low income families in Hereford is lower than the national average. The incidence of obesity amongst children in Hereford is the same as the national average. The GCSEs achieved in Hereford is lower than the national average. The PHE health profile data therefore indicates that the level of health of children in Hereford is better than the national average but the level of education is poorer

Collisions Risk

- 13.4.52. In Hereford, the population experience higher numbers of fatalities or instances of being seriously injured on roads whilst in a car, when compared to walking, cycling, or when on a motorbike. However, in general the

number of people seriously injured or killed in a traffic collision has decreased significantly over the years (between 1997 and 2014).

Table 13-6: Indicator of Collision Risk in Hereford Compared with England

Indicator	Period	Local Value	Great Britain Value
Killed and Seriously Injured on Roads	2013-2015	43.3	38.5

- 13.4.53. The population of Hereford appears to experience a higher number of fatalities or instances of being seriously injured on roads than the national average. The PHE health profile data therefore indicates that roads in Hereford are less safe than the national average.

LOCAL ECONOMY

- 13.4.54. The Labour Market Profiles hosted on the NOMIS website for each local authority area compare the indicators of a number of economic and education statistics for each area with the national average. The profile brings together data from several sources.

Qualifications

- 13.4.55. The adult population of Hereford is assessed as having a lower percentage of professional qualifications when compared to the rest of England. The results in table 13-7 below show they have a higher proportion of skilled trade occupations, and a higher proportion of people with no qualifications.

Table 13-7: Percentage of adult populations and qualifications within Hereford compared to England during 2016

Qualification	Period	% Hereford Adult Population	% England Adult Population
NVQ 4 and above	2016	31.9	38.2
NVQ 3 and above	2016	51.5	56.9
NVQ 2 and above	2016	71.6	74.3
NVQ 1 and above	2016	82.4	85.3
No Qualifications	2016	9.5	8.0

Earnings

- 13.4.56. Earning statistics for Hereford provide information on the average weekly wage of the population currently employed (thus providing an indication of the local economy). The gross weekly pay, for both male and female full time works is below that of the national average for England (£81 less for males, and £84 for females). The data therefore indicates that the local economy in Hereford may be performing poorer compared to the national average.

Table 13-8: Average weekly pay in Hereford compared to England during 2016

Gross Weekly Pay	Period	Average Weekly Wage In Hereford	Average Weekly Wage England
Full-time	2016	£460	£541.0
Full-time Male	2016	£507.9	£581.2
Full-time Female	2016	£397.0	£481.1

Employment

- 13.4.57. Employment statistics for Hereford provide information on the percentage of the population currently employed (thus providing an indication of the local economy).
- 13.4.58. The data indicated that in comparison to the national average, a lower percentage of people within Hereford are in full time jobs, however a higher percentage are in part time jobs.

Table 13-9: Average employment percentage in Hereford compared to England during 2016-17

Employment Status	Period	Hereford (%)	England (%)
In Employment	2016-17	82.4	74.2
Employees	2016-17	77.8	63.2
Self Employed	2016-17	16.3	10.6
Unemployed	2016-17	3.4	4.7

SOCIAL PROFILE

13.4.59. According to Facts and Figures about Herefordshire on the Herefordshire website the following conclusions were drawn from the social profile of residents within the districts⁹¹:

- Hereford has a higher proportion of older residents than England and Wales as a whole, with 24% of the population aged over 65 which comprises 24% compared to 18% nationally;
- The total population of Hereford has grown by eight per cent which has been entirely due to net immigration; and
- The current (mid-2016) estimate of the county's resident population is 189,300 people of which Males are 49.5% and Females 50.5%.

HEALTH PROFILE

13.4.60. The data within the Facts and Figures about Herefordshire website indicated that the health in Herefordshire is generally better than the English average⁹²;

- Female life expectancy at birth in Herefordshire is significantly longer than nationally in the latest period for which there is statistically comparable data (2009-11);
- Women born in Herefordshire live on average to 83.6 years and men live on average to 79.4 years;
- People living in Herefordshire at age 65 are also expected to live significantly longer than nationally;
- Life expectancy at 65 years is around 19 further years for men and 22 further years for women;
- However people born in the most deprived areas of Herefordshire have a shorter (4-5 years) life expectancy than those living in the least deprived areas;
- The rate of alcohol-related harm and self-harm stays at hospital are lower than the national average for England; and
- Rates of homelessness, violent crime, long term unemployment, excess winter deaths and early deaths from cancer are better than average.

13.4.61. The priorities in Herefordshire include giving children the best start in life, reducing the prevalence of smoking particularly amongst pregnant women, and reducing the prevalence of obesity.

13.5 ASSESSMENT METHODOLOGY

13.5.1. The assessment follows the updated DMRB interim guidance contained within IAN 125/15, combining published guidance in DMRB Volume 11, Section 3, Parts 6 (Land Use), 8 (Pedestrians, Cyclists, Equestrians and Community Effects) and 9 (Vehicle Travellers) into one assessment of People and Communities.

13.5.2. Unless otherwise stated below, sensitivity criteria, magnitude of impact and level of significance is assigned according to Tables 2.1, 2.2 and 2.4 respectively in DMRB Volume 11, section 2, Part 5.

⁹¹ <https://factsandfigures.herefordshire.gov.uk/>

⁹² <http://fingertipsreports.phe.org.uk/>

EFFECTS ON ALL TRAVELLERS

MOTORISED TRAVELLERS: VIEW FROM THE ROAD

13.5.3. The DMRB Volume 11, Section 3, Part 9 describes 'Views from the Road' as: '*...the extent to which travellers, including drivers are exposed to the different types of scenery through which a route passes.*' Considerations should include:

- The types of scenery or the landscape character as described and assessed for the baseline studies;
- The extent to which travellers may be able to view the scene;
- The quality of the landscape as assessed for the baseline studies; and
- Features of particular interest or prominence in the view.

13.5.4. Views from the road have been categorised by the criteria outline in DMRB Volume 11, Section 3, Part 9, paragraph 2.4 and are outlined in Table 13-10.

Table 13-10: DMRB Criteria for Views from the Road

DMRB "View" Category	Description
No View	Road in deep cutting or contained by earth mounds, environmental barriers or adjacent structures.
Restricted View	Frequent cuttings or structures blocking the view
Intermittent View	Road generally at ground level but with shallow cuttings or barriers at intervals
Open View	View extending over many miles, or only restricted by existing landscape features.

SIGNIFICANCE CRITERIA

13.5.5. The assessment of the potential of the proposed Scheme to have significant adverse environmental effects has been assessed in the following way. The significance of an effect is a factor of the importance or value of the resource affected, and the magnitude of the impact upon it. Unless otherwise stated, guidance in DMRB Volume 11, Section 2, Part 5, was used to determine the value of an affected resource, the magnitude of impact and the significance of effect, as shown in Table 13-11.

Table 13-11: Arriving at the Significance of Effects

		Magnitude of Impact (Degree of Change)				
		No change	Negligible	Minor	Moderate	Major
Environmental Value (Sensitivity)	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

MOTORISED TRAVELLERS: DRIVER STRESS

13.5.6. Driver Stress is defined in Volume 11 of the DMRB as the adverse mental and psychological effects experienced by a driver traversing a road network. Stress can induce in drivers feelings of discomfort,

annoyance, frustration, or fear culminating in physical or emotional tension that detracts from the value and safety of the journey. Volume 11 of the DMRB indicates that with increased driver stress, a drop in driving standards occurs, which may be expressed as an increase in aggression towards other road users, or a diminished response to visual and other stimuli.

13.5.7. The level of stress experienced by a driver may be affected by a number of factors including: road layout and geometry, surface riding characteristics, junction frequency and speed and flow per lane. There are three main components of driver stress:

- Driver frustration – Caused by an inability to drive at a speed consistent with the standard of the road, which increases as speed falls in relation to expectations;
- Driver fear – The main factors are the presence of other vehicles, inadequate sight distances and the likelihood of pedestrians, particularly children, stepping into the road. Fear is highest when speeds, flows and the proportion of heavy vehicles are all high, becoming more important in adverse weather conditions; and
- Driver uncertainty – caused primarily by signing that is inadequate for the individual's purposes.

13.5.8. The measurable aspect of Driver Stress is associated with frustration due to delays. However, no detailed modelling of the performance of the A49 has been undertaken at this stage of assessment. The available research evidence does not permit the use of finely graded assessments of other aspects of driver stress (including Driver Fear and Driver Uncertainty). As a consequence the level of Driver Stress within this assessment has been determined through a qualitative assessment of the above factors, under a three point descriptive scale, as recommended under DMRB guidance, as Low, Moderate or High.

NON-MOTORISED USERS

The proposed methodology will be based on the procedures set out in the DMRB Volume 11, Section 3, Parts 8 and 9 and the application of DMRB Volume 5, Section 2, Part 5, HD42/05 and will consider:

- The proposed Scheme's impact on the journeys that NMU make in its locality;
- The impact on existing usage of the community facilities and routes by pedestrians and others;
- Changes in safety and amenity value of routes which may be affected by the proposed route; and
- The effects of the proposed route options on community severance.

13.5.9. The assessment will involve a desk study to identify likely NMU activity and how local community facilities are likely to be impacted by the construction and operation of the proposed route options in both adverse and beneficial senses.

13.5.10. The sensitivity of NMU routes will be assessed using the sensitivity criteria as described in Table 13-12, which has been devised using Table 2.1 from DMRB Volume 11, Section 2, Part 5 and professional judgement in the absence of best practice criteria for assessing PROW.

Table 13-12: Sensitivity Criteria for Users of NMU Affected by the proposed route options

NMU Route Sensitivity	Description
Very High	Very high importance or rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale and limited potential for substitution: NMU routes that – ■ Are used for both recreational and utility journeys ■ Are national strategic routes or long-distance trails ■ Routes whose use by NMU is principally for recreational journeys, whose amenity value is enhanced by the quality of the landscape to which they provide access (including landscapes protected by designations at national, regional or local level). Or NMU routes which are located in an urban setting and used for primarily for access to residential areas, employment premises or community facilities which do not have an alternative within 500m.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution:

NMU Route Sensitivity	Description
	NMU which act as 'feeder routes' to other NMU routes of 'Very High' or 'High' sensitivity. Or NMU routes which are located in an urban setting and used for primarily for access to residential areas, employment premises or community facilities which have an alternative within 500m
Low	Low or medium importance and rarity, local scale: NMU routes which are located in an urban setting and used for primarily for access to residential areas, employment premises or community facilities which have an alternative within 250m.
Very Low	Very low importance and rarity, local scale: NMU shown on the Definitive Map, but which in reality are severed or otherwise permanently unusable.

13.5.11. The level of new severance will be taken into account using criteria set out by DMRB Volume 11, Section 3, Part 8 which categorises the level of severance using a three point scale as follows:

- Slight - In general the current journey pattern is likely to be maintained, but there will probably be some hindrance of movement; and
- Moderate – Some residents, particularly children and elderly people, are likely to be dissuaded from making trips. Other trips will be longer and less attractive. Severe – People are likely to be deterred from making trips to an extent sufficient to induce a re-organisation of their habits. This would lead to a change in the location of centres of activity or in some cases to a permanent loss to a particular community. Alternatively, considerable hindrance will be cause to people trying to make their existing journeys.

EFFECTS ON COMMUNITIES

- 13.5.12. A qualitative desk based assessment will be carried out for each of the elements, as described in DMRB guidance within Volume 11, Section 3, Part 6. Receptors will be categorised by the sensitivity criteria outlined in Table 2.1 of DMRB, Volume 11, Section 2, Part 5. Magnitude of impact will be determined according to Table 2.2 and significance by the criteria in Table 2.3 of DMRB Volume 11, Section 2, Part 5.
- 13.5.13. Agricultural land has been assessed by a high level desk study using publicly available data at this time. Soil analysis will be carried out at a later stage, if considered appropriate. Agricultural land will be classified by the criteria in Table 13-13, which is based on general best practice and professional judgement.

Table 13-13: Value or Sensitivity of Agricultural Land

Sensitivity	Agricultural Land Grade
High	Grade 1, excellent quality agricultural land
Medium	Grade 2 and Subgrade 3a, very good to good quality agricultural land
Low	Subgrade 3b and Grade 4, moderate to poor quality agricultural land
Negligible	Grade 5, very poor quality agricultural land

- 13.5.14. The magnitude of impact on agricultural land and soil resources is assessed according to the criteria set out in Table 13-14 which is based on general best practice and professional judgement.

Table 13-14: Magnitude of Impact on Agricultural Land

Magnitude	Definition
Major	50 hectares or more of agricultural land is affected by the proposed Scheme
Moderate	Between 20 and 50 hectares of agricultural land is affected by the proposed Scheme
Minor	Between 5 and 20 hectares of agricultural land is affected by the proposed Scheme
Negligible	Less than 5 hectares of agricultural land is affected by the proposed Scheme

EFFECTS ON PEOPLE AND HEALTH

- 13.5.15. There is no consolidated methodology or practice for this topic, however the scope of the assessment is considered to be covered by existing Highways England Guidance as set out below. This recognises the specific requirements of the National Policy Statement for National Networks⁹³ (NNNPS) for consideration of health, specifically within paragraphs 4.79-4.82.
- 13.5.16. This will address health by utilising the following guidance:
- Air Quality: HA 207/07⁹⁴, IAN 185/15⁹⁵, IAN 174/13⁹⁶, IAN 170/12⁹⁷;
 - Noise and vibration: HD 213/11⁹⁸, IAN 185/15;
 - Road Drainage & The Water Environment HD 45/09⁹⁹; and
 - Pedestrians, Cyclists, Equestrians and Community Effects¹⁰⁰.
- 13.5.17. It is considered that these assessments, conducted principally in isolation as is required by their methodologies, will not provide a sufficient analysis of the effects of the proposed Scheme. To enable such conclusions to be drawn, a qualitative assessment of information collated via the topic assessment listed above will be undertaken and presented within the Combined Effects section of the ES. Potential health effects of specific issues will also be reported within the relevant ES topic chapters.
- 13.5.18. Reference should therefore be made to the following chapters for the assessment of effects on Population and Human Health:
- Chapter 5 Air Quality;
 - Chapter 6 Noise and Vibration;
 - Chapter 10 Water drainage;

⁹³ Department for Transport (2014), National Policy Statement for National Networks, available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf, accessed 01/05/2018.

⁹⁴ Highways England (2007), DMRB Volume 11, Section 3, Part 1, HA207/07 Air Quality, available online <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3/ha20707.pdf>, accessed 09/05/2018.

⁹⁵ Highways England (2015), Updated traffic, air quality and noise advice on the assessment of link speeds and generation of traffic data into speed-bands for users of DMRB Volume 11, Section 3, Part 1, Air Quality (HA207/07) and Volume 11, Section 3, Part 7 Noise (HD213/11), available online <http://www.standardsforhighways.co.uk/ha/standards/ians/index.htm>, accessed 09/05/2018.

⁹⁶ Highways England (2013), Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07), available online <http://www.standardsforhighways.co.uk/ha/standards/ians/index.htm>, accessed 09/05/2018.

⁹⁷ Highways England (2012), Updated air quality advice on the assessment of future NOx and NO2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality, available online <http://www.standardsforhighways.co.uk/ha/standards/ians/index.htm>, accessed 09/05/2018.

⁹⁸ Highways England (2011), DMRB Volume 11, Section 3, HD213/11, Noise and Vibration, available online <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3/hd21311.pdf>, accessed 09/05/2018.

⁹⁹ Highways England (2009), DMRB Volume 11, Section 3, Part 10, Road Drainage and the Water Environment, available online <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3/hd4509.pdf>, accessed 09/05/2018.

¹⁰⁰ Highways England (1993), DMRB Volume 11, Section 3, Part 8, Pedestrians, Cyclists, Equestrians and Community Effects, available online <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3/11s3p08.pdf>, accessed 09/05/2018.

- Chapter 13 People and Communities; and
- Chapter 15 Combined and Cumulative Effects.

13.6 ASSUMPTIONS AND LIMITATIONS

- 13.6.1. A number of assumptions and limitations have been identified for the assessment conducted at this stage. These are;

ASSUMPTIONS

- Vulnerable groups have been assumed to be present throughout the study area, though where specific areas have been identified as deprived, these areas will be emphasised.

LIMITATIONS

- The assessment of the NMU route amenity relies on qualitative descriptions by the assessor which is subjective. There is also a degree of subjectivity in the assessment of views.
- The DMRB Volume 11, Section 3, Part 8 methodology is over 20 years old (published in 1993) and some aspects may not be as relevant to the assessment of road schemes today. The guidance is currently being revised so the original guidance is being used.
- The assessment to date has been compiled from desk based study only, using publicly available data. Agricultural Land Classification has been carried out on desk based study only for this stage of assessment. Soil analysis will be carried out as part of the Environmental Impact Assessment on the preferred route.
- A formal methodology for the assessment of health in EIA is yet to be prepared or adopted within DMRB and there is therefore a lack of certainty about the scope of such assessments. It is proposed to address this uncertainty through the application of certain aspects of Health Impact Assessment (HIA) methodology, professional expertise on the assessment of social and population impacts of road Schemes, and guidance issued by the Institute of Environmental Management and Assessment. It should be noted that whilst HIA provides a useful steer as to what the scope of an EIA health assessment might consider, it does not constitute an assessment of health in EIA terms itself.
- The assessment will rely, in part, on data provided by third parties (e.g. OS Mapping, Local Authorities, ONS and PHE) which are the most up-to-date, available at the time of the assessment. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment for EIA purposes.
- Any limitations found or assumptions used in the final assessment will be highlighted within the EIA at the next stage.

13.7 DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

- 13.7.1. The proposed Scheme design will aim to minimise the amount of road closures and diversions during the construction phase to ensure the impacts and journey times for all travellers are as small as possible. Best practise construction techniques will also reduce the effects generated from construction disturbance and will therefore have a reduced impact on the amenity value of the surrounding area.

MOTORISED TRAVELLERS

- 13.7.2. The preferred design solution should improve the experience of motorised travellers (MT) using the route and connecting roads. The following mitigation and enhancement measures will contribute to an improved experience for MTs. Other measures could include:
- Where overriding landscape or design constraints do not restrict this, the view from the road for MT should not be further obstructed by new structure(s), and open views of the surrounding countryside should be retained; the delays currently experienced by MT using the existing roads, and connecting roads are expected to lead to frustration, and should be reduced. The best performing options will result in a reduction in Driver Stress associated with delays;
 - Signage and layout should be clear to understand and avoid creating Route Uncertainty. Any diversions or closures undertaken during construction should be clearly advertised, and any diversionary routes should not lead to Uncertainty; and
 - Best Practice landscape management techniques, as outlines in the DMRB, Volume 10, will be embedded in the design to ensure safety whilst respecting the environment. Embedded design to ensure safety whilst

respecting the environment. Embedded design safety measures will reduce fear of accidents with other MTs and NMUs.

- 13.7.3. These issues should be addressed at the subsequent phase of design.

NON MOTORISED USERS

- 13.7.4. The preferred design solution should accommodate NMUs and either retain or improve the existing access arrangements. For example, the existing footpaths should be retained and where crossed by the route, provided with proper means of access to prevent severance. Any diversionary works or closure of NMU routes should be undertaken following proper consultation with affected groups or individuals, and the required consent orders obtained. Other measures could include:
- Use of the best practise design with regards to the safety of NMU to improve the amenity of users of the footpaths in the surrounding area and adopt traffic management methods which maintain access for users such as pedestrians, cyclists and equestrians:
 - Design any permanent diversions in NMU routes to provide the same, or improved standard of pathway:
 - Continue to facilitate opportunities to access visitor attractions and recreational opportunities throughout the route where possible:
 - Incorporate effective rationalisation between NMU routes, safe crossing points and provisions for access to public transport:
 - Existing types of access to PRow should be retained, for example, by not introducing new barriers such as stiles and kissing gates which may restrict certain users: and
 - Enhance recreational value of the PRow to introduce new routes to provide better connections between the existing PRow, which may help to promote more walking and cycling activities in the area.

EFFECTS ON COMMUNITIES

Community Severance

- 13.7.5. Existing footpaths should be retained and where crossed by the route, provided with proper means of access to prevent severance. PRow and bridleways should be diverted and remain open throughout the construction period where possible. The extent of diversions or closures are not known at this stage of design. Existing roads should be incorporated into the proposed Scheme, allowing for crossing points within the design.

Tourism and Recreation

- 13.7.6. Use of best practice construction methods during construction will reduce disruption to users of facilities within the vicinity of the proposed Scheme. This will include maintaining motorised traveller and NMU access to tourism and recreational facilities throughout the construction period. PRow and bridleways should be diverted and remain open throughout the construction period where possible.

Housing

- 13.7.7. The preferred design solution should be designed with future development in mind, in particular the Three Elms development north west of Hereford.

Community Land

- 13.7.8. Replacement land would be needed in exchange for any land lost at the Greenbank Meadow open space.

Agricultural Land

- 13.7.9. As significant areas of BMV agricultural land are required to enable development of the proposed Scheme option, once a preferred option has been decided there may be a need to undertake a Detailed Agricultural Impact Assessment. This should consider the impact of the preferred route on the existing agricultural business affected by the loss, and the future viability of any land which is severed by development. The Agricultural Impact Assessment will be undertaken in conjunction with a consultation with Defra and the affected land owners.
- 13.7.10. Although agricultural land required within the footprint of the route will be lost permanently, the following measures can be implemented during construction:

- Agricultural land take – Ensure the proposed Scheme involves the permanent land take of the minimum amount of land necessary. Wherever possible, land required in addition for construction, for example for site compounds, would be returned to agricultural use;
- Severance during construction to be minimised through careful siting of construction compounds and lay down areas, and careful planning of construction activities through consultation with landowners;
- Crop loss and timing impacts – crop loss can be reduced by giving advanced warning to enable farmers to plan ahead;
- Consideration of field drainage impacts during the design phase; and
- Noise and dust to be kept to a minimum and within acceptable working limits, using best practice methods.

EFFECTS ON PEOPLE

Economy

- 13.7.11. Where possible, the workforce and proposed Scheme supply chain should be sourced locally.

Social Profile

- 13.7.12. The design should take account of vulnerable groups such as the disabled, children and elderly people and particularly the users of Hereford Community Farm which will be significantly impacted upon by the proposed Scheme.

Health Profile

- 13.7.13. Best practice construction methods should be used to minimise noise and emissions to air during construction.
- 13.7.14. PRoW should remain open where possible and diverted if necessary, instead of closures, to allow active travel and recreational use by residents.

13.8 POTENTIAL IMPACTS

- 13.8.1. This assessment considers the potential impacts that would arise from the key features of each route option in relation to motorised and non-motorised users and the driver stress, views from the road and overall amenity of community features and how they are impacted by the route options. They have been assessed against the baseline conditions which have been set out above.

- 13.8.2. Impacts to People and the Community could arise from the following:

- Increase in built form including the new road, earthworks, lighting, signage, traffic and new overbridges - notably a new viaduct over the River Wye which disrupt existing roads and PRoW;
- Severance in the community by segregating the west of Hereford from the main city centre;
- Loss of mature tree, shrub and hedgerow cover within the existing rural landscape which provide amenity value on PRoW;
- Driver uncertainty caused by diversions and road closures during the construction of the proposed Scheme.

- 13.8.3. Tables 13-15 to 13-26 present a summary of the potential effects of each of the proposed route options divided into Elements 1, 2 and 3. The table also includes the magnitude of the impact and significance of the effect.

ELEMENT 1

Orange

- 13.8.4. The Orange option would traverse several roads, PRoWs and crosses over the River Wye. The route would be within proximity to residential properties within Belmont and also transverses several farms, high grade agricultural land and parkland. The route also traverses Hereford Community Farm. Table 13-15 provides a summary of the main impacts of the Orange option within Element 1.

Table 13-15: Summary of Impacts on people and communities for Element 1 - Orange

Orange	Potential Impacts	Magnitude of Impact	Significance of Effect
All Travellers	The route would traverse all main roads towards the west of Hereford between the A465 and the lane just north of Breinton. These smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which will require access to Hereford from the West. Providing existing roads remain as a means of access to Hereford and between the existing communities, no significant impacts to Motorised users are anticipating.	Moderate	Moderate
Views from the Road	Many of the roads within Element 1 of the proposed route options are lined with high hedges and the topography undulates which limits the views across the landscape.	Minor	Slight
Driver Stress	Diversions and road closures would have a significant impact on motorised users by increasing driver stress and frustration due to increase in journey times.	Moderate	Slight
NMU/PRoW	This route also traverses several PRoWs and bridleways which connect the smaller communities and the Wye Valley Walk along the River Wye. These would be directly impacted and would require a suitable temporary diversion, closure or new crossing point during construction. In the event of a closure, it is anticipated that this would be a temporary major impact. Should a suitable diversion be put in place, the magnitude of impact is expected to be a temporary minor adverse impact. The following footpaths would be affected: ■ Haywood Footpath 3; ■ Clehonger Footpath 7; and ■ Breinton Footpath 1 (Wye Valley Walk) All footpaths crossed by the route option will see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRoW to increase in length if diversions are put in place, increasing NMU journeys.	Moderate	Large
Community severance	There may be a temporary impact on community severance during the construction scheme due to diversions and road closures as the route transverse the main roads in and out of Breinton.	Minor	Slight
Tourism and Recreation	The route would be within proximity to Belmont Abbey and Hedley Lodge which could have a significant impact on the residents, users and amenity value of the Abbey due to an increase in noise and disturbance during both the construction and operational phase. The proposed Scheme would	Major	Very Large

Orange	Potential Impacts	Magnitude of Impact	Significance of Effect
	also transverse Belmont House Unregistered Park and Garden (not publically accessible) which comprise a well used PRoW. No other tourism or recreation facilities would be impacted.		
Housing	The routes would be within proximity to residential properties along Clehonger Road, Canterbury Close, Tintern Close, Dorchester Way and in Belmont Abbey and Warham which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Moderate	Large
Community Land	The route would traverse the fields associated with the Hereford Community Farm, which could have a moderate adverse impact on the vulnerable users who rely on the facilities provided by the farm during both the construction and operation phase of the proposed Scheme. The impact would be permanent.	Moderate	Large
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development land	No development land would be affected in this Element.	No Change	Neutral

Cyan and Yellow

- 13.8.5. The Cyan and Yellow options would traverse several roads, PRoWs and crosses over the River Wye. The route would be within proximity to residential properties within Belmont and also traverses several farms, high grade agricultural land and parkland. The route would also traverse Hereford Community Farm. Table 13-16 provides a summary of the main impacts of the Cyan and Yellow route within Element 1.

Table 13-16: Summary of Impacts on people and communities for Element 1 –Cyan and Yellow

Cyan and Yellow	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The Yellow and Cyan route would traverse all main roads towards the west of Hereford between the A465 and the lane just north of Breinton. These smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which would require	Moderate	Moderate

Cyan and Yellow	Potential Impacts	Magnitude of Impact	Significance of effect
	access to Hereford from the west. Providing existing roads remain as a means of access to Hereford and between the existing communities, no significant impacts to Motorised users are anticipated.		
Views from the Road	Many of the roads within Element 1 of the proposed route options are lined with high hedges and the topography undulates which limits the views across the landscape.	Minor	Slight
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration due to increase in journey times.	Moderate	Slight
NMU/PRoW	These routes also traverses several PRoWs and bridleways which connect the smaller communities and the Wye Valley Walk along the River Wye. These would be directly impacted and would require a suitable temporary diversion, closure or new crossing point during construction. In the event of a closure, it is anticipated that this would be a temporary major impact. Should a suitable diversion be put in place, the magnitude of impact is expected to be a temporary minor adverse impact. The following footpaths would be affected: ▪ Haywood Footpath 3; ▪ Clehonger Footpath 7; and ▪ Breinton Footpath 1 (Wye Valley Walk). All footpaths crossed by the route option would see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRoW to increase in length if diversions are put in place, increasing NMU journeys.	Moderate	Large
Community severance	There may be a temporary impact on community severance during the construction scheme due to diversions and road closures as the route transverse the main roads in and out of Breinton.	Minor	Slight
Tourism and Recreation	The routes would be within proximity to Belmont Abbey and Hedley Lodge which could have a significant impact on the residents and users of the Abbey due to an increase in noise and disturbance during both the construction and operational phase. The route would also traverse Belmont House 'Unregistered Park and Garden', which comprise a well used PRoW. No other tourism or recreation facilities would be impacted.	Major	Very Large
Housing	The routes would be within proximity to residential properties along Clehonger Road, Canterbury Close, Tintern Close, Dorchester Way and in Belmont Abbey and Warham which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Moderate	Large

Cyan and Yellow	Potential Impacts	Magnitude of Impact	Significance of effect
Community Land	The route would traverse the fields associated with the Hereford Community Farm, which could have a moderate adverse impact on the vulnerable users who rely on the facilities provided by the farm during both the construction and operation phase of the proposed Scheme. The impact would be permanent.	Moderate	Large
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development land	No development land would be impacted in this Element.	No Change	Neutral

Red and Black 2

- 13.8.6. The Red and Black 2 route options would traverse several roads, PRoWs and crosses over the River Wye. The route would be within proximity to residential properties within Belmont and also transverses several farms, high grade agricultural land and parkland. The route would also traverse Hereford Community Farm. Table 13-17 provides a summary of the main impacts of the Red and Black 2 route within Element 1.

Table 13-17: Summary of Impacts on people and communities for Element 1 – Red and Black 2

Red and Black 2	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The routes traverse all main roads towards the west of Hereford between the A465 and the lane just north of Breinton. These smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which will require access to Hereford from the west. Providing existing roads remain as a means of access to Hereford and between the existing communities, no significant impacts to Motorised users are anticipating.	Moderate	Moderate
Views from the Road	Many of the roads within Element 1 of the proposed route options are lined with high hedges and the topography undulates which limits the views across the landscape.	Minor	Slight
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration due to increase in journey times.	Moderate	Slight

Red and Black 2	Potential Impacts	Magnitude of Impact	Significance of effect
NMU/PRoW	These routes also traverses several PRoWs and bridleways which connect the smaller communities and the Wye Valley Walk along the River Wye. These would be directly impacted and would require a suitable temporary diversion, closure or new crossing point during construction. In the event of a closure, it is anticipated that this would be a temporary major impact. Should a suitable diversion be put in place, the magnitude of impact is expected to be a temporary minor adverse impact. The following footpaths would be affected: ▪ Haywood Footpath 3; ▪ Clehonger Footpath 7; and ▪ Breinton Footpath 1 (Wye Valley Walk). All footpaths crossed by the route option would see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRoW to increase in length if diversions are put in place, increasing NMU journeys.	Moderate	Large
Community severance	There may be a temporary impact on community severance during the construction scheme due to diversions and road closures as the route transverse the main roads in and out of Breinton.	Minor	Slight
Tourism and Recreation	The routes would be within proximity to Belmont Abbey and Hedley Lodge which could have a significant impact on the residents and users of the Abbey due to an increase in noise and disturbance during both the construction and operational phase. The route would also traverse Belmont House 'Unregistered Park and Garden', which comprise a well used PRoW. No other tourism or recreation facilities would be impacted.	Major	Very Large
Housing	The routes would be within proximity to residential properties along Clehonger Road, Canterbury Close, Tintern Close, Dorchester Way and in Belmont Abbey and Warham which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Moderate	Large
Community Land	The route would traverse the fields associated with the Hereford Community Farm, which could have a moderate adverse impact on the vulnerable users who rely on the facilities provided by the farm during both the construction and operation phase of the proposed Scheme. The impact would be permanent.	Moderate	Large
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large

Red and Black 2	Potential Impacts	Magnitude of Impact	Significance of effect
Development land	No development land would be impacted in this Element.	No Change	Neutral

Olive and Black 1

- 13.8.7. The Olive and Black 1 options would traverse several roads and PRowS. The routes cross over the River Wye to the west of Warham House and also traverse several farms, high grade agricultural land and parkland. Table 13-18 below provides a summary of the main impacts of the Olive and Black 1 route within Element 1.

Table 13-18: Summary of Impacts on people and communities for Element 1 – Olive and Black 1

Olive and Black 1	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The routes would traverse all main roads towards the west of Hereford between the A465 and the lane just north of Breinton. These smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which will require access to Hereford from the west. Providing existing roads remain as a means of access to Hereford and between the existing communities, no significant impacts to Motorised users are anticipating.	Moderate	Moderate
Views from the Road	Many of the roads within Element 1 of the proposed route options are lined with high hedges and the topography undulates which limits the views across the landscape.	Minor	Moderate
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration due to increase in journey times.	Moderate	Moderate
NMU/PRow	The routes traverse several PRow and Bridleways which connect the smaller communities and the Wye Valley Walk along the River Wye. These PRowS would also require closure or diverting during both the construction and / or operational phase of the proposed Scheme which can have adverse impacts on non-motorised users. The following footpaths would be affected: ■ Haywood Footpath 3; ■ Clehonger Footpath 7; and ■ Breinton Footpath 1 (Wye Valley Walk); and ■ Breinton Footpath 2.	Moderate	Large

Olive and Black 1	Potential Impacts	Magnitude of Impact	Significance of effect
	All footpaths crossed by the option would see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRow to increase in length if diversions are put in place, increasing NMU journeys.		
Community severance	There may be a temporary impact on community severance during the construction scheme due to diversions and road closures as the route transverse the main roads in and out of Breinton.	Minor	Slight
Tourism and Recreation	The routes would be within proximity to Belmont Abbey and Hedley Lodge which could have a significant impact on the residents and users of the Abbey due to an increase in noise and disturbance during both the construction and operational phase. The route would also traverse Belmont House 'Unregistered Park and Garden', which comprise a well used PRow. The route would traverse Greenbank Meadow and the Brian Hatton trial having a permanent adverse impact on the land.	Major	Large
Housing	The routes would be within proximity to residential properties along Clehonger Road, Canterbury Close, Tintern Close, Dorchester Way and in Belmont Abbey and Warham which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Moderate	Large
Community Land	The routes transverses Greenbank Meadow open space. Replacement land of comparable quality would need to be provided as mitigation.	Major	Large
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development land	No development land would be impacted in Element 1.	No Change	Neutral

ELEMENT 2

Orange

- 13.8.8. The Orange route option would traverse several roads and three PRoWs. The route may directly affect private properties along King's Acre Road. The route would also traverse several farms and high grade agricultural land. Table 13-19 below provides a summary of the main impacts of the orange route within Element 2.

Table 13-19: Summary of Impacts on people and communities for Element 2 –Orange

Orange	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The Orange route would traverse all main roads within Element 2 towards the west and north west of Hereford between the lanes just north of Breinton to the A4103 north east of Hereford. Roads directly impacted by the route comprise the A438, A4103 and the A4110. The smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which would require access to Hereford from the West.	Moderate	Moderate
Views from the Road	The A438 King's Acre Road has a row of residential properties to the north of the carriageway, and a row of mature trees with hedgerows lining the carriageway to the south. Through the gaps between the hedgerows there are wide open views across agricultural and rural fields which are separated by trees and hedgerows, however, the views from the A4103 and Tillington road are restricted due to high hedges limiting views across the landscape.	Minor	Slight
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration.	Moderate	Slight
NMU/PRoW	This route would also traverse several PRoWs and Bridleways which connect the smaller communities and residents situated on King's Acre Road. The route would also traverse a PRoW which travels adjacent to the Yazor Brook. These PRoWs would also require closure or diversion during both the construction and operational phase of the proposed Scheme which can have adverse impacts on non-motorised users. The following footpaths would be affected: ■ Bridleway 25 (Green Lane); ■ Bridleway 3; and ■ Hereford Footpath 1 and 55.	Moderate	Large

Orange	Potential Impacts	Magnitude of Impact	Significance of effect
	All footpaths crossed by the option would see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRow to increase in length if diversions are put in place, increasing NMU journeys.		
Community severance	Access between communities by vehicle would not be affected and there would be no effect on community severance for MT, providing existing roads remain as a means of access to Hereford and between the existing communities.	Minor	Slight
Tourism and Recreation	No tourism and recreation would be affected in this Element	No Change	Neutral
Housing	The Orange route may directly affect private properties on King's Acre Road which would have adverse impacts on the residents, in addition to the communities within close proximity that will suffer from increase disturbance due to the proximity of the bypass. The routes would be within proximity to residential properties within Fayre Oaks Home Park and Bovingdon Park and properties along Tow Tree Lane, Tillington Road and Canon Pyon Road which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Major	Very Large
Community Land	No Community land would be affected.	No Change	Neutral
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development land	The proposed route would have an impact on the three Elms Development by severing the site.	Major	Large

Yellow

- 13.8.9. The Yellow Route would traverse several roads and three PRow's. The route may directly affect private properties along King's Acre Road. The route would also traverse several farms and high grade agricultural land. Table 13-20 below provides a summary of the main impacts of the yellow route within Element 2.

Table 13-20: Summary of Impacts on people and communities for Element 2 –Yellow

Yellow	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The Yellow route would traverse all main roads within element 2 towards the west and north west of Hereford between the lane just north of Breinton to the A4103 north east of Hereford. Roads directly impacted by the route comprise the A438, A4103 and the A4110. The smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which will require access to Hereford from the West.	Moderate	Moderate
Views from the road	The A438 King's Acre Road has a row of residential properties to the north of the carriageway, and a row of mature trees with hedgerows lining the carriageway to the south. Through the gaps between the hedgerows there are wide open views across agricultural and rural fields which are separated by trees and hedgerows, however, the views from the A4103 and Tillington road more are restricted due to high hedges limiting views across the landscape. All other minor roads within element 2 have restricted views due to the high hedges which line the single lanes.	Minor	Slight
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration.	Moderate	Slight
NMU/PRoW	This route also transverses several PRoWs and Bridleways which connect the smaller communities and residents situated on King's Acre Road. The route also transverses a PRoW which travels adjacent to the Yazor Brook. These PRoW will also require closure or diverting during both the construction and operational phase of the proposed Scheme which can have adverse impacts on non-motorised users. The following footpaths will be affected: ■ Breinton Bridleway 4; ■ Breinton Bridleway 3; ■ Hereford Footpath 55; and ■ Hereford Footpath 1	Moderate	Large

Yellow	Potential Impacts	Magnitude of Impact	Significance of effect
	All footpaths crossed by the option will see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRoW to increase in length if diversions are put in place, increasing NMU journeys.		
Community severance	Access between communities by vehicle will not be affected and there will be no effect on community severance for MT, providing existing roads remain as a means of access to Hereford and between the existing communities.	Minor	Slight
Tourism and Recreation	No tourism and recreation would be affected in this Element	No Change	Neutral
Housing	The yellow route may directly affect private properties on King's Acre Road which would have adverse impacts on the residents, in addition to the communities within close proximity that will suffer from increase disturbance due to the proximity of the bypass. The routes would be within proximity to residential properties within Fayre Oaks Home Park and Bovingdon Park and properties along Tow Tree Lane, Tillington Road and Canon Pyon Road which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Major	Very Large
Community Land	No Community land will be affected.	No Change	Neutral
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development Land	The proposed route will have an impact on the three Elms Development by severing the site.	Major	Large

Cyan

13.8.39. The Cyan option would traverse several roads and three PRoWs. The route may directly affect private properties along King's Acre Road. The route would also traverse several farms and high grade agricultural land. Table 13-21 provides a summary of the main impacts of the Cyan route within Element 2.

Table 13-21: Summary of Impacts on people and communities for Element 2 – Cyan

Cyan	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The Cyan route would transverse all main roads within Element 2 towards the west and north west of Hereford between the lanes just north of Breinton to the A4103 north east of Hereford. Roads directly impacted by the route comprise the A438, A4103 and the A4110. The smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which will require access to Hereford from the West.	Moderate	Moderate
Views from the Road	The A438 King's Acre Road has a row of residential properties to the north of the carriageway, and a row of mature trees with hedgerows lining the carriageway to the south. Through the gaps between the hedgerows there are wide open views across agricultural and rural fields which are separated by trees and hedgerows, however, the views from the A4103 and Tillington road are restricted due to high hedges limiting views across the landscape.	Minor	Slight
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration.	Moderate	Slight
NMU/PRoW	This route would also traverse several PRoWs and Bridleways which connect the smaller communities and residents situated on King's Acre Road. The route also transverses a PRoW which travels adjacent to the Yazor Brook. These PRoWs would also require closure or diverting during both the construction and operational phase of the proposed Scheme which can have adverse impacts on non-motorised users. The following footpaths would be affected: ■ Bridleway 25 (Green Lane); ■ Bridleway 3; and ■ Burghill Footpath 11.	Moderate	Large

Cyan	Potential Impacts	Magnitude of Impact	Significance of effect
	All footpaths crossed by the option would see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRow to increase in length if diversions are put in place, increasing NMU journeys.		
Community severance	Access between communities by vehicle would not be affected and there would be no effect on community severance for MT, providing existing roads remain as a means of access to Hereford and between the existing communities.	Minor	Slight
Tourism and Recreation	No tourism and recreation would be affected in this Element.	No Change	Neutral
Housing	The cyan route may directly affect private properties on King's Acre Road which would have adverse impacts on the residents, in addition to the communities within close proximity that will suffer from increase disturbance due to the proximity of the bypass. The routes would be within proximity to residential properties within Fayre Oaks Home Park and Bovington Park and properties along Tow Tree Lane, Tillington Road and Canon Pyon Road which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Moderate	Very Large
Community Land	No Community land would be affected.	No Change	Neutral
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development Land	The proposed route would have an impact on the three Elms Development by severing the site.	Moderate	Moderate

Red

- 13.8.40. The Red route option would traverse several roads and two PRow. The route may directly affect private properties along King's Acre Road. The route would also traverse several farms and high grade agricultural land. Table 13-22 below provides a summary of the main impacts of the Red route within Element 2.

Table 13-22: Summary of Impacts on people and communities for Element 2 – Red

Red	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The Red route transverses all main roads within element 2 towards the west and north west of Hereford between the lane just north of Breinton to the A4103 north east of Hereford. Roads directly impacted by the route comprise the A438, A4103 and the A4110. The smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which will require access to Hereford from the West.	Moderate	Moderate
Views from the Road	The A438 King's Acre Road has a row of residential properties to the north of the carriageway, and a row of mature trees with hedgerows lining the carriageway to the south. Through the gaps between the hedgerows there are wide open views across agricultural and rural fields which are separated by trees and hedgerows, however, the views from the A4103 and Tillington road are restricted due to high hedges limiting views across the landscape.	Minor	Slight
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration.	Moderate	Slight
NMU/PRoW	This route also transverses several PRoWs and Bridleways which connect the smaller communities and residents situated on King's Acre Road. The route also transverses a PRoW which travels adjacent to the Yazor Brook. These PRoW will also require closure or diverting during both the construction and operational phase of the proposed Scheme which can have adverse impacts on non-motorised users. The following footpaths will be affected: ■ Breinton Bridleway 4 (Drovers Wood) ■ Hereford Footpath 1 All footpaths crossed by the option will see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRoW to increase in length if diversions are put in place, increasing NMU journeys.	Moderate	Large
Community severance	Access between communities by vehicle will not be affected and there will be no effect on community severance for MT, providing existing roads remain as a means of access to Hereford and between the existing communities.	Minor	Slight

Red	Potential Impacts	Magnitude of Impact	Significance of effect
Tourism and Recreation	No tourism and recreation would be affected in this Element.	No Change	Neutral
Housing	The Red route may directly affect private properties on King's Acre Road which would have adverse impacts on the residents, in addition to the communities within close proximity that will suffer from increase disturbance due to the proximity of the bypass. The routes would be within proximity to residential properties within Fayre Oaks Home Park and Bovingdon Park and properties along Tow Tree Lane, Tillington Road and Canon Pyon Road which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Moderate	Very Large
Community Land	No Community land will be affected.	No Change	Neutral
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development Land	The proposed route will have an impact on the three Elms Development by severing the site.	Moderate	Moderate

Olive

13.8.44. The Olive option would traverse several roads and three PROWs. The route may directly affect private property along Kings Acre Road. The route would also transverse several farms and high grade agricultural land. Table 13-23 below provides a summary of the main impacts of the Olive route within Element 2.

Table 13-23: Summary of Impacts on people and communities for Element 2 –Olive

Olive	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The Olive route would traverse all main roads within Element 2 towards the west and north west of Hereford between the lane just north of Breinton to the A4103 north east of Hereford. Roads directly impacted by the route comprise the A438, A4103 and the A4110. The smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the	Moderate	Moderate

Olive	Potential Impacts	Magnitude of Impact	Significance of effect
	B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which will require access to Hereford from the West.		
Views from the Road	The A438 King's Acre Road has a row of residential properties to the north of the carriageway, and a row of mature trees with hedgerows lining the carriageway to the south. Through the gaps between the hedgerows there are wide open views across agricultural and rural fields which are separated by trees and hedgerows, however, the views from the A4103 and Tillington road are restricted due to high hedges limiting views across the landscape.	Minor	Slight
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration.	Moderate	Slight
NMU/PRoW	This route would also traverse several PRoWs and Bridleways which connect the smaller communities and residents situated on King's Acre Road. The route also transverses a PRoW which travels adjacent to the Yazor Brook. These PRoW will also require closure or diverting during both the construction and operational phase of the proposed Scheme which can have adverse impacts on non-motorised users. The following footpaths would be affected: ■ Breinton Bridleway 4 (Drovers Wood); and ■ Hereford Footpath 1. All footpaths crossed by the option would see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRoW to increase in length if diversions are put in place, increasing NMU journeys.	Moderate	Large
Community severance	Access between communities by vehicle would not be affected and there will be no effect on community severance for MT, providing existing roads remain as a means of access to Hereford and between the existing communities.	Minor	Slight
Tourism and Recreation	No tourism and recreation would be affected in this Element.	No Change	Neutral
Housing	The Olive route may directly affect private properties on King's Acre Road which would have adverse impacts on the residents, in addition to the communities within close proximity that will suffer from increase disturbance due to the proximity of the bypass.	Moderate	Moderate

Olive	Potential Impacts	Magnitude of Impact	Significance of effect
	The routes would be within proximity to residential properties within Fayre Oaks Home Park and Bovingdon Park and properties along Tow Tree Lane, Tillington Road and Canon Pyon Road which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.		
Community Land	No Community land would be affected.	No Change	Neutral
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agriculturalland surveys.	Major	Large
Development Land	The proposed route would have an impact on the three Elms Development by severing the site.	Moderate	Moderate

Black 1

- 13.8.48. The Black 1 option would traverse several roads and three PRoWs. The route may directly affect private properties along King's Acre Road. The route would also traverse several farms and high grade agricultural land. Table 13-24 below provides a summary of the main impacts of the Black 1 route within Element 2.

Table 13-24: Summary of Impacts on people and communities for Element 2 – Black 1

Olive	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The Black 1 route would traverse all main roads within element 2 towards the west and north west of Hereford between the lane just north of Breinton to the A4103 north east of Hereford. Roads directly impacted by the route comprise the A438, A4103 and the A4110. The smaller roads facilitate the movement between the smaller residential dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which will require access to Hereford from the West.	Moderate	Moderate
Views from the Road	The A438 King's Acre Road has a row of residential properties to the north of the carriageway, and a row of mature trees with hedgerows lining the carriageway to the south. Through the	Minor	Slight

Olive	Potential Impacts	Magnitude of Impact	Significance of effect
	gaps between the hedgerows there are wide open views across agricultural and rural fields which are separated by trees and hedgerows, however, the views from the A4103 and Tillington road are restricted due to high hedges limiting views across the landscape.		
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration.	Moderate	Slight
NMU/PRoW	This route also transverses several PRoW and Bridleways which connect the smaller communities and residents situated on King's Acre Road. The route also transverses a PRoW which travels adjacent to the Yazor Brook. These PRoW will also require closure or diverting during both the construction and operational phase of the proposed Scheme which can have adverse impacts on non-motorised users. The following footpaths will be affected: ■ Breinton bridleway 4 (Drovers Wood) ■ Breinton Bridleway 9 (Drovers Wood) ■ Burghill Footpath 11 All footpaths crossed by the option will see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRoW to increase in length if diversions are put in place, increasing NMU journeys.	Moderate	Large
Community severance	Access between communities by vehicle will not be affected and there will be no effect on community severance for MT, providing existing roads remain as a means of access to Hereford and between the existing communities.	Minor	Slight
Tourism and Recreation	Black 1 traverses Drovers Wood (Woodland Trust) which is used recreationally by the community. This could have a significant impact on the loss of woodland and amenity value of the site.	Major	Very Large
Housing	The Black 1 route may directly affect private properties on King's Acre Road which would have adverse impacts on the residents, in addition to the communities within close proximity that will suffer from increase disturbance due to the proximity of the bypass. The routes would be within proximity to residential properties within Fayre Oaks Home Park and Bovingdon Park and properties along Tow Tree Lane, Tillington Road and Canon Pyon Road which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Moderate	Very Large

Olive	Potential Impacts	Magnitude of Impact	Significance of effect
Community Land	No Community land would be affected.	No Change	Neutral
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development Land	The proposed route would have an impact on the three Elms Development by severing the site.	Slight	Slight

Black 2

13.8.52. The Black 1 option would traverse several roads and three PRowS. The route may directly affect private properties along King's Acre Road. The route would also traverse several farms and high grade agricultural land. Table 13-25 below provides a summary of the main impacts of the Black 2 route within Element 2.

Table 13-25: Summary of Impacts on people and communities for Element 2 – Black 2

Black 2	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The Black 2 route would traverse all main roads within element 2 towards the west and north west of Hereford between the lane just north of Breinton to the A4103 north east of Hereford. Roads directly impacted by the route comprise the A438, A4103 and the A4110. The smaller roads facilitate movement between dwellings and connect the communities to each other and to the larger roads which travel into Hereford such as the B4339, A49 and A38. Therefore, disturbance to these roads is likely to have a major impact on the effects of motorised users during the construction phase within the communities of Warham, Breinton Common, Upper Breinton and Breinton which would require access to Hereford from the West.	Moderate	Moderate
Views from the Road	The A438 King's Acre Road has a row of residential properties to the north of the carriageway, and a row of mature trees with hedgerows lining the carriageway to the south. Through the gaps between the hedgerows there are wide open views across agricultural and rural fields which are separated by trees and hedgerows, however, the views from the A4103 and Tillington road are restricted due to high hedges limiting views across the landscape.	Minor	Slight

Black 2	Potential Impacts	Magnitude of Impact	Significance of effect
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration.	Moderate	Slight
NMU/PRoW	This route would also traverse several PRoW and Bridleways which connect the smaller communities and residents situated on King's Acre Road. The route also transverses a PRoW which travels adjacent to the Yazor Brook. These PRoW would also require closure or diverting during both the construction and operational phase of the proposed Scheme which can have adverse impacts on non-motorised users. The following footpaths will be affected: ■ Breinton bridleway 4 (Drovers Wood); ■ Breinton Bridleway 9 (Drovers Wood); and ■ Burghill Footpath 11. All footpaths crossed by the option would see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRoW to increase in length if diversions are put in place, increasing NMU journeys.	Moderate	Large
Community severance	Access between communities by vehicle would not be affected and there will be no effect on community severance for MT, providing existing roads remain as a means of access to Hereford and between the existing communities.	Minor	Slight
Tourism and Recreation	Black 2 traverse Drovers Wood (Woodland Trust) which is used recreationally by the community, which could cause a loss of woodland and have a significant impact on the amenity value of the site.	Major	Very Large
Housing	The Black 2 route may directly affect private properties on King's Acre Road which would have adverse impacts on the residents, in addition to the communities within close proximity that will suffer from increase disturbance due to the proximity of the bypass. The routes would be within proximity to residential properties within Fayre Oaks Home Park and Bovingdon Park and properties along Tow Tree Lane, Tillington Road and Canon Pyon Road which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Moderate	Moderate
Community Land	No Community land would be affected.	No Change	Neutral

Black 2	Potential Impacts	Magnitude of Impact	Significance of effect
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development Land	No development land would be affected.	Slight	Slight

ELEMENT 3

All Route Options

13.8.56. All the options would traverse one road and one PRoW and would run within proximity to several residential properties along the A4110. The routes would also cross BMV agricultural land. Table 13-26 below provides a summary of the main impacts of the routes within Element 3.

Table 13-26: Summary of Impacts on people and communities for Element 3 – All options

All Options	Potential Impacts	Magnitude of Impact	Significance of effect
All Travellers	The route options converge just before traversing the A4410 Canon Pyon Road. The route alignment here would travel through the field which is adjacent to the residential houses located on the road. This is likely to have a significant impact on the residents and motorised users of the A4410 due to the diversions and road closures in place during the construction and operation phase of the proposed Scheme.	Moderate	Moderate
Views from the Road	The views from the roads within Element 3 are generally restricted and intermittent due to the vegetation which lines the sides of the A4410 and A49 and also the residential properties which limit the views across the landscape.	Minor	Slight
Driver Stress	Diversions and road closures may have a significant adverse impact on motorised users by increasing driver stress and frustration.	Moderate	Slight
NMU/PRoW	From the A4410 in the proposed Scheme all seven routes would traverse mainly agricultural land before converging with the A49. The routes would traverse one PRoW between the A4410 and A49. NMU amenity would be temporarily adversely affected by improvements works where PRoW routes and roadside paths interact with the road. The following footpath would be affected:	Moderate	Large

All Options	Potential Impacts	Magnitude of Impact	Significance of effect
	■ Pipe and Lyde Footpath 9 Providing the footpath is accommodated within the design and access remains at the same location, journey length for NMU would not increase. The footpath crossed by the options would see a localised permanent reduction in amenity due to the visual intrusion and increased noise levels and there is potential for PRow to increase in length if diversions are put in place, increasing NMU journeys.		
Community severance	Access between communities by vehicle would not be affected and there would be no effect on community severance for MT, providing existing roads remain as a means of access to Hereford and between the existing communities.	Minor	Slight
Tourism and Recreation	The bypass would be within the vicinity of Lyde Arundel, which operates as a wedding, party and performing arts venue. The bypass may have an impact on the setting of the grounds by increase in noise disturbance which may have an impact on the business. However, the venue is screened by large mature vegetation around the grounds, therefore the impact may be minor.	Major	Large
Housing	All routes would be within proximity to residential properties along the A49 where the routes link with the A49 which may have a significant impact due to the increase in noise disturbance during both the construction and operational phase of the proposed Scheme.	Moderate	Very Large
Community Land	No Community land would be affected.	No Change	Neutral
Agricultural Land	There would be a loss of agricultural land required to accommodate the works. The majority of the fields will be bisected, which may impact on their viability. However the magnitude of this impact may be lowered following the detailed agricultural land surveys.	Major	Large
Development Land	No development land would be affected.	No Change	Neutral

13.9 SUMMARY

- 13.9.1. Overall, the proposed Scheme would have a beneficial effect on commuter journeys and access into Hereford, as traffic is diverted away from the existing A49. However, all options would require permanent use of agricultural land and may have an adverse impact on the commercial viability of affected farm holdings. It would have a beneficial effect on the flow of traffic on the A49, A465 and surrounding roads and is therefore likely to have a beneficial effect on air quality (and therefore amenity) for the residents of Hereford. However, the proposed Scheme may have an adverse impact on the amenity of the countryside for residents on the outskirts of Hereford (such as those residents located on the A4110) which is used recreationally for walking etc., as noise levels and general disturbance for these residents may increase.

14 CLIMATE

14.1 INTRODUCTION

- 14.1.1. The Climate Change Act 2008¹⁰¹ sets ambitious, legally binding targets of reducing carbon dioxide (CO₂), emissions by 34% by 2020 and 80% by 2050, relative to the 1990 baseline. This legislation was passed in response to the understanding that rising concentrations of greenhouses gases, including CO₂, are causing changes in climate beyond that of expected fluctuations. It is anticipated that changes in climate will have significant implications for infrastructure assets in future, particularly those with long operational lifetimes. This makes them sensitive, not only to the existing climate at the time of their construction, but also to climate variations over the duration of their use.
- 14.1.2. This chapter presents the assessment for the climate change related environmental factor. To align with the requirements of the Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017 and the National Policy Statement for National Networks (NNNPS) it has been divided into two separate aspects:
- Greenhouse gas (GHG) assessment – In accordance with Paragraph 5.17 of the NNNPS, effects on climate change of GHG emissions arising from the proposed Scheme, including how the project will affect the ability of Government to meet its carbon reduction plan targets; and,
 - Climate change resilience assessment – In accordance with Paragraph 4.40 of the NNNPS and the Infrastructure Planning (EIA) Regulations 2017, the resilience of the proposed scheme to climate change, including how the design will take account of the projected effects of climate change.

14.2 LEGISLATION AND POLICY FRAMEWORK

- 14.2.1. The following national and local planning policies are of relevance and will be considered during the GHG impact assessment and the climate change resilience assessment.
- Climate Change Act 2008;
 - National Networks National Policy Statement¹⁰²;
 - EIA Directive 2014/52/EU¹⁰³;
 - Carbon Budget Orders 2009¹⁰⁴;
 - England Biodiversity Strategy 2011¹⁰⁵;
 - National Planning Policy Framework (NPPF) and associated National Planning Practice Guidance (NPPG)¹⁰⁶; and,
 - PINS Advice note 17: Cumulative effects assessment relevant to nationally significant infrastructure)¹⁰⁷.
- 14.2.2. The following guidance documents have been used to inform the assessment:
- Climate Adaptation Risk Assessment Progress Update¹⁰⁸;
 - IEMA Environmental Impact Assessment guide to Climate Change Resilience and Adaptation¹⁰⁹;
 - IEMA's Guidance on Assessing the GHG Emissions and Evaluating their Significance¹¹⁰;

¹⁰¹ UK Climate Change Act (2008), Chapter 27 Targeting and Budgeting, <https://www.legislation.gov.uk/ukpga/2008/27/contents>

¹⁰² Department for Transport (DfT) (2014), National Policy Statement for National Networks, The Statutory Office

¹⁰³ European Commission, Environmental Impact Assessment, EIA Directive (85/337/EEC)

¹⁰⁴ Climate Change (2009) The Carbon Budgets Order No.1259

¹⁰⁵ DEFRA, Biodiversity 2020: A strategy for England's wildlife and ecosystem services.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69446/pb13583-biodiversity-strategy-2020-111111.pdf

¹⁰⁶ Department for Communities and Local Government (2012), National Planning Policy Framework (NPPF), the National Archives

¹⁰⁷ The Planning Inspectorate, Advice note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects; <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf>

¹⁰⁸ Highways England (2016) Climate Adaptation Risk Assessment [online] available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/596812/climate-adrep-highways-england.pdf

¹⁰⁹ IEMA (2015) IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation available at:

[https://www.iema.net/assets/templates/documents/iema_guidance_documents_eia_climate_change_resilience_and_adaptation%20\(1\).pdf](https://www.iema.net/assets/templates/documents/iema_guidance_documents_eia_climate_change_resilience_and_adaptation%20(1).pdf)

¹¹⁰ IEMA (2017) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance [online] available at: <https://www.iema.net/policy/ghg-in-eia-2017.pdf>

- TAG Unit A3 Environmental Impact Appraisal - Chapter 4 Greenhouse Gases¹¹¹; and,
- PAS 2080:2016 Carbon management in infrastructure¹¹².

EUROPEAN UNION LEGISLATION

- 14.2.3. Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment provides the overarching legislative framework for assessing the significance of impacts and effects from schemes on the environment.
- 14.2.4. The Directive requires Environmental Impact Assessment to identify, describe and assess the direct and indirect significant effects of a project on climate (Article 3). It also stipulates that the information to be included within the Environmental Impact Assessment report should include *“the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change”* (Annex IV).

UK LEGISLATION AND POLICY

UK Climate Change Act

- 14.2.5. The Climate Change Act 2008 established a legal requirement for an 80% reduction in the greenhouse gas emissions of the UK economy by 2050 in comparison to the 1990 baseline. The Act also created the Committee on Climate Change, with a responsibility for:
- Setting five year carbon budgets, covering successive periods of emissions reduction to 2050;
 - Advising and scrutinising the UK Government’s associated climate change adaptation programmes; and
 - Producing a national adaptation plan for the UK Government to implement.
- 14.2.6. In 2011, Highways England was required to complete a climate change adaptation report and submit it to UK government to inform the national adaptation plan. In 2015, Highways England submitted a voluntary report on progress following the climate change adaptation report.

Infrastructure Carbon Review

- 14.2.7. In 2013, the UK government published the Infrastructure Carbon Review¹¹³ aiming to *“release the value of lower carbon solutions and to make carbon reduction part of the DNA of infrastructure in the UK.”* Major infrastructure owners, operators and developers were invited to endorse, become signatories and make commitments under the review. Highways England was one of these organisations.
- 14.2.8. The review provided increased emphasis on ‘capital carbon’ (greenhouse gas emissions associated with raw materials, activities and transport for construction, repairs, replacement, refurbishment and de-construction of infrastructure) while acknowledging that ‘operational carbon’ (associated with energy consumption for the operation and use of infrastructure) will continue to dominate overall emission to 2050 and beyond.
- 14.2.9. The Infrastructure Carbon Review highlighted the importance of assessing greenhouse gas emissions early in the lifecycle of an infrastructure scheme when there is the greatest carbon reduction potential.

National Planning Policy Framework

- 14.2.10. The National Planning Policy Framework¹¹⁴ sets out the core planning principle of supporting *“the transition to a low carbon future in a changing climate...”*:
- **Chapter 4:** Promoting Sustainable Transport - considers how people should be offered a choice of transportation modes, encouraging a movement away from the use of single private vehicles, the latter being understood to contribute to a significant proportion of total UK carbon emissions
 - **Chapter 10:** Meeting the Challenge of Climate Change, Flooding and Coastal Change - establishes that local planning authorities should *“adopt proactive strategies to mitigate and adapt to climate change”* with

¹¹¹ Department for Transport (2015) TAG Unit A3 Environmental Impact Appraisal available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/638648/TAG_unit_a3_envir_imp_app_dec_15.pdf

¹¹² BSI (2016) PAS 2080:2016 Carbon Management and Infrastructure.

¹¹³ Infrastructure Carbon Review, HM Treasury, November 2013.

¹¹⁴ National Planning Policy Framework, Department for Communities and Local Government, March 2012.

particular focus on reducing emissions, energy (efficiency and renewables, for example), flood risk and coastal change.

National Policy Statement for National Networks

- 14.2.11. Table 14-1 below details the chapters of the National Policy Statement for National Networks¹¹⁵ (NNNPS) that are relevant to climate change mitigation and adaptation.

Table 14-1: NNNPS chapters of relevance to climate change mitigation and adaptation

Chapter 3: Wider Government policy on national networks	
Emissions	Identifies that the transport sector will play an important part in meeting the Government's carbon targets. It is acknowledged that technologies, fuels, and promoting lower carbon transport choices will make the biggest reductions and that (comparatively) the likely impact from road development is "very small."
Technology	Sets out how the use of innovative technologies has the potential to improve the way we travel while "reducing costs and environmental impacts."
Sustainable transport	Describes how carbon impacts can be reduced by promoting "sustainable modes of transport and high-quality cycling and walking environments" which are "essential to reducing carbon emissions from transport."
Chapter 4: Assessment principles	
Environment impact assessment	This section sets out the fact that all proposals are subject to <i>Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment</i> which requires "an environmental impact assessment to identify, describe and assess effects on...air, climate...and the interactions between them."
Climate change adaptation	Sets out the how the policy statement shall put policy into practice with regards to climate change mitigation and adaptation when developing and consenting infrastructure.
Chapter 5: Generic impacts	
Carbon emissions	Sets out Government policy on climate change and outlines the importance of reducing carbon emissions, stating that the Government has a legally binding commitment to reduce greenhouse gas emissions by "at least 80% by 2050" and to conform to carbon budgets outlined in the "Carbon Plan 2011." The policy states that "carbon impacts will be considered as part of the appraisal of route options (in the business case), prior to the submission of an application for a development consent order" and that "any Environmental Statement will need to describe an assessment of any likely significant climate factors in accordance with the requirements in the [Directive 2014/52/EU]." However, it goes on to say that "it is very unlikely that the impact of a road project will, in isolation, affect the ability of Government to meet its carbon reduction plan targets. However, road projects applicants should provide evidence of the carbon impact of the project and an assessment against the Government's carbon budgets." The policy also states that "an increase in carbon emissions is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the proposed scheme are so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets."
Biodiversity	The Biodiversity 2020 Strategy's aims need to be "viewed in the context of the challenge of climate change: failure to address this challenge will result in significant impacts on biodiversity."
Coastal change	Sets out the key considerations for infrastructure projects that are proposed on or near the coast. Developments in these areas are required to "undertake an assessment of the vulnerability of the proposed development to coastal change, taking account of climate change, during the project's operational life."

¹¹⁵ National Policy Statement for National Networks, Department for Transport, December 2014.

	With regards to the decision making process, the policy states that "the applicant must demonstrate that a full account has been taken of the policy on assessment and mitigation...taking account of the potential effects of climate change on these risks."
Flood risk	Acknowledges the fact that climate change will likely lead to an "increased flood risk in areas susceptible to flooding, and to an increased risk of flooding in some areas which are not currently thought of as being at risk." It also states that an applicant's assessment should "identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account" by taking "the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made" when preparing the flood risk assessment.

14.3 STUDY AREA

EFFECTS ON CLIMATE

- 14.3.1. The effects on climate assessment will consider the greenhouse gas emission potential throughout the lifecycle of the proposed Scheme for construction and operation over the design-life of the proposed Scheme.

VULNERABILITY OF THE SCHEME TO CLIMATE

- 14.3.2. Climate change effects on the design elements of the proposed Scheme such as structures, technology, mitigation and compensation areas and the environmental receptors will be considered. The assessment will identify the key climate effects on the proposed Scheme design elements, as well as environmental receptors identified, in the context of climate change.
- 14.3.3. Assessments of climate change effects typically consider construction and operational effects on the proposed Scheme as a result of climate change. Climate change effects on construction have the potential to be scoped out depending on the construction duration, whereas operation assessments are informed by the design-life of key elements of the proposed Scheme and UK Climate Projections.

14.4 BASELINE CONDITIONS

EFFECTS ON CLIMATE

- 14.4.1. In the UK, national greenhouse gas emissions on a national scale decreased in 2015 decreased by 38% from 1990. In 2015, UK net CO₂ emissions were estimated at 403.8 million tonnes, a decrease of 3.8% in comparison to 2014 levels¹¹⁶. Similar statistics for 2016 were provisional¹¹⁷ at the time of writing in March 2018, but these indicated a 7.4% reduction in UK net CO₂ emissions to 374 million tonnes. This decrease was largely due to the increased use of renewables and nuclear sources for energy supply; CO₂ emission due to transport increased by 1%.
- 14.4.2. There were 37.3 million vehicles licensed for use on roads in the UK in 2016, which increased from 36.5 million in 2015. However, of these additional 0.8 million vehicles, 42,000 were ultra-low emission vehicles (ULEVs), which represents an increase of 40% since 2015¹¹⁸.
- 14.4.3. The UK construction industry is the largest consumer of natural resources, with an average of over 400 million tonnes of material consumed every year. This accounts for approximately 10% of the total UK carbon

¹¹⁶ Department for Business, Energy and Industrial Strategy (2015) 2015 UK Greenhouse Gas Emissions [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/589602/2015_Final_Emissions_Statistics_one_page_summary.pdf

¹¹⁷ Department for Business, Energy and Industrial Strategy (2016) 2016 UK Greenhouse Gas Emissions (provisional) [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/604408/2016_Provisional_Emissions_statistics.pdf

¹¹⁸ Vehicle Licensing Statistics: Annual 2016, Department for Transport (April 2017)-
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/608374/vehicle-licensing-statistics-2016.pdf

emissions¹¹⁹. Therefore, approximately 40.38 million tonnes of CO₂ are attributed to the embodied carbon of construction materials.

VULNERABILITY OF THE SCHEME TO CLIMATE

- 14.4.4. Regional climate information is produced by the Met Office, for which Hereford lies within the Midlands region. High-level climate observations for the Midlands¹²⁰ over a 30-year averaging period from 1981 to 2010 are presented in Table 14-2 below.

Table 14-2: High-level climate observations for the Midlands

Climatic conditions	Climate observations
Temperature	January is the coldest month, with mean daily minimum temperatures varying from just below 0°C to about 1.5°C. The higher values occur in the lower Severn valley due to milder maritime air coming in from the Bristol Channel. Cold air drainage into the river valleys results in large-scale frost hollows, with the Severn, Wye and Avon valleys enhancing the general frostiness of the western half of the Midlands. With snow cover, record low temperatures have been recorded, such as -25.2°C at Shawbury, Shropshire on 13 th December 1981 and -26.1°C at Newport, Shropshire on 10 th January 1982. This value at Newport is the lowest ever recorded in England
Sunshine	Average annual sunshine durations over the Midlands range from less than 1,400 hours in the higher northern and western fringes, to about 1,600 hours near the southern boundary. These figures compare with values of less than 1,100 hours a year in the Shetland Islands to over 1,750 hours along the south coast of England and over 1,900 hours in the Channel Islands. The tendency for convective cloud to develop over inland areas in summer leads to sunshine averages that are lower than coastal sites.
Rainfall	The wettest areas in the Midlands, with an average of over 800mm per year, are the Welsh border, Cotswolds and the Peak District. The more sheltered areas of the South and East Midlands are the driest, with less than 600mm per year in parts of Northamptonshire, the lower Trent valley and the Avon valley. These values can be compared with annual totals around 500mm in the drier parts of eastern England and over 4,000mm in the western Scottish Highlands.
Wind	The Midlands area is one of the more sheltered parts of the UK. The strongest winds are associated with the passage of deep areas of low pressure close to or across the UK. The frequency and strength of these depressions is greatest in the winter half of the year, especially from December to February, and this is when mean speeds and gusts (short duration peak values) are strongest.

- 14.4.5. With predicted changes in climate leading to shorter, more intense rainfall events, the proposed Scheme would be increasingly susceptible to flood events. Chapter 10 Water drainage describes the flood zones across the study area and the susceptibility of the proposed Scheme to increased flooding due to climate change.

14.5 ASSESSMENT METHODOLOGY

- 14.5.1. Information on the climate baseline and future projections are based on freely available information from third parties, including the historical meteorological variables recorded by the Met Office and the UK Climate Projections (UKCP09) developed by the Met Office. In addition, the assessment has been informed by a

¹¹⁹ Alinden, B. (2014) Embodied Energy and Carbon, ICE [online] available at: <https://www.ice.org.uk/knowledge-and-resources/briefing-sheet/embodied-energy-and-carbon>.

¹²⁰ The Met Office (2018) Midlands: Climate [online] available at: <https://www.metoffice.gov.uk/climate/uk/regional-climates/mi>

selected range of existing climate change research and literature, available at the time of writing this assessment. This third party data has not been independently verified.

- 14.5.2. The UK Climate Projections (UKCP09) developed by the Met Office are not predictions or forecasts but simulations of potential scenarios of future climate, under a range of hypothetical emissions scenarios and assumptions. The results must therefore be considered to projections which are open to various interpretations. Generally global projections are more certain than regional, and temperature projections are more certain than those for precipitation. Further, the degree of uncertainty associated with all climate change projections increases for projections further into the future.
- 14.5.3. There is no single accepted methodology for the assessment of climate change within Environmental Impact Assessments (EIAs) and the following therefore represents a qualitative assessment based on professional judgement.
- 14.5.4. Due to the number of route options that are being considered for this Stage 2 EAR, which has the aim of informing the decision regarding the Preferred option selection, no embedded carbon calculations have been carried out and this Environmental Assessment Report (EAR) therefore does not contain an assessment of where the proposed Scheme results in additional or avoided emissions, in comparison to the baseline scenario and its assumed evolution.

14.6 DESIGN, MITIGATION AND ENHANCEMENT MEASURES, INCLUDING MONITORING REQUIREMENTS

- 14.6.1. The magnitude of greenhouse gas emissions associated with the construction phase of the proposed Scheme can be minimised by, amongst others:
 - Selecting a design which requires less materials and construction activity (but not where this is at the expense of greater emissions at other lifecycle stages);
 - Maximising the use of construction materials and products with recycled or secondary and low carbon content, from renewable sources, and offering sustainability benefit;
 - Using locally-sourced materials where available and practicable to minimise the distance materials are transported from source to site; and
 - Using more efficient construction plant and delivery vehicles, and/or those powered by electricity of alternative/lower carbon fuels.
- 14.6.2. The magnitude of greenhouse gas emissions associated with the operational phase of the proposed Scheme can be minimised by, amongst others:
 - Selecting a design which reduces regional end user (traffic) emissions by improving the efficiency and flow of traffic movements in the area of the proposed Scheme and the surrounding road network (for example, due to the layout, profile or construction/materials used) – relative to the do-nothing scenario and/or other junction options being considered;
 - Designing, specifying and constructing the proposed Scheme with a view to maximising the operational lifespan and minimising the need for maintenance and refurbishment (and all associated emissions);
 - Designing, specifying and constructing the proposed Scheme with a view to maximising the potential for reuse and recycling of materials/elements at the end-of-life stage;
 - Specifying high efficiency mechanical and electrical equipment such as lighting and telecoms; and
 - Operating, maintaining and refurbishing the proposed Scheme using best-practice efficient approaches and equipment.
- 14.6.3. In terms of climate resilience, there are a variety of means to minimise the potential impacts, including:
 - Ensure the proposed Scheme design (in particular the drainage system) provides for the Environment Agency Climate Change Allowances relating to peak rainfall;
 - Design and specification of pavement construction, expansion joints and other elements which are resilient to anticipated increases in peak summer temperatures;
 - Wind restraints/baffles and/or monitoring and alert systems, for any locations which are particularly susceptible to risks of increasing wind intensity; and
 - Design and specification of pavement construction, drainage systems, embankments and other elements with a view to anticipated increases in peak rainfall as well as increased variability of ground conditions (wetting and drying).

- 14.6.4. Additional design, mitigation and enhancement measures in relation to materials can be found in Chapter 12 Materials.

14.7 CONCLUSION

- 14.7.1. Throughout the Stage 3 design of the preferred option, materials will be evaluated and their carbon emissions calculated. This will ensure that materials with lower carbon outputs are considered. An assessment of the embedded using the Highways England Carbon Tool¹²¹, in conjunction with the Carbon Reduction Hierarchy, will be carried out as part of the Stage 3 design of the preferred option.

¹²¹ Highways England (2015) Carbon Emissions Calculation Tool available at: <https://www.gov.uk/government/publications/carbon-tool>

15 COMBINED AND CUMULATIVE EFFECTS

15.1 INTRODUCTION

15.1.1. There are two types of effects covered in this section:

- Combined effects are those caused only by the proposed Scheme which arise when an individual receptor or group of receptors would experience multiple effects as a result of the proposed Scheme; for example, an individual property experiencing combined noise, air quality and visual amenity effects. These are also referred to as intra-project effects; and,
- Cumulative effects are those caused by the proposed Scheme acting with other relevant schemes. These are also referred to as inter-project effects.

15.1.2. In both cases, combined or cumulative effects may be of greater significance than the significance of any of the identified individual effects. The assessments cover the main likely significant combined and cumulative effects, rather than trying to report every interaction.

15.2 ASSESSMENT METHODOLOGY

15.2.1. The requirement for combined and cumulative effects assessment is set out in Article 4(3) and Article 5(1) of the Environmental Impact Assessment (EIA) Directive 2014. However, there are no legislative or policy requirements that set out how the assessment for combined and cumulative effects should be undertaken. Therefore, the assessment of the combined and cumulative effects is undertaken by using professional judgement based on the assessment of similar schemes and in accordance with The Planning Inspectorate Advice note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects.

COMBINED EFFECTS (INTRA-PROJECT EFFECTS)

- 15.2.2. The proposed assessment methodology for combined effects is primarily based on Design Manual for Roads and Bridges (DMRB) Volume 11 Section 2 Part 5 and IAN 125/15. The assessment methodology for combined effects identifies interactions associated with the proposed scheme upon separate environmental receptors, to better understand the overall environmental effects.
- 15.2.3. The cumulative effects of different aspects of the proposed Scheme is determined by identifying any individual receptors, or categories of receptors, affected by multiple effects under more than one specialist topic. The significance of construction and operational phase environmental effects is brought forward from the preceding chapters of the Environmental Assessment Report (EAR) into matrices, providing an overview of the potential effects on individual receptors. The assessment considers adverse residual effects, after mitigation measures have been taken into account. The significance of combined effects upon each environmental receptor group is then identified based upon the balance of scores and using professional judgement derived from experience of similar schemes. Justification for the conclusions reached is given in this chapter.
- 15.2.4. There is also the potential for an individual receptor, or groups of receptors, to be affected by adverse effects under one topic and beneficial effects under another, sometimes as a result of the same feature of the proposed scheme. In such cases, it is necessary to determine the balance between the two. The combined effects assessment focuses on key sensitive receptors, including properties and communities.
- 15.2.5. The assessment presented in Chapter 9 Ecology considers effects on ecological resources and receptors in terms of changes to the local hydrology, water quality, air quality, noise, light or disturbance, among others. It is therefore considered that the biodiversity assessment inherently considers combined effects from these different sources. Therefore, there are no additional effects which require consideration in this combined effects assessment.
- 15.2.6. In addition, potential health effects reflect the health status of the neighbouring community; air quality and traffic / construction noise impacts, as well as access to employment. Therefore, these have been scoped into the combined effects assessment.
- 15.2.7. The study area for the assessment of combined effects, for both construction and operation, is defined by the study areas identified within the relevant environment topic chapters contained within the EAR for the proposed Scheme.

CUMULATIVE EFFECTS (INTER-PROJECT EFFECTS)

- 15.2.8. The proposed assessment methodology for cumulative effects is primarily based on The Planning Inspectorate's (PINS) Advice Note Seventeen¹²². The assessment methodology for cumulative effects involves the identification of incremental changes likely to be caused by other potential relevant future developments together with the proposed Scheme. For the proposed assessment, the following criteria, based on the type and scale of potential effects generated by a proposed development, are used to define those developments included in the cumulative effects assessment. These criteria are based on the screening criteria contained within the Town and Country Planning (Environmental Impact Assessment) Regulations 2017:
- The development includes more than 1ha of development which is not dwelling house development;
 - The development includes more than 150 dwelling houses; and
 - The area of the development exceeds 5ha.
- 15.2.9. Proposed developments that are outside the threshold limits but have characteristics likely to give rise to a significant effect, or for which could give rise to a cumulative effect by virtue of proximity to the proposed Scheme, are included in the assessment. The justification for their inclusion is provided if any are identified.
- 15.2.10. The developments considered are listed within the cumulative effects section of this chapter, or within an appendix to the chapter if deemed appropriate. The assessment of cumulative effects should include “*effects with other existing and/or approved projects*”. This relates directly to developments that are described as being Near Certain. However, taking the precautionary principle into account for this assessment, the cumulative effects assessment also considers those classed as More Than Likely.

Table 16-1: Certainty of outcome and development status

Certainty of outcome	Development status
Near Certain: The outcome will happen or there is a high probability of it occurring.	Intent announced by proponent to regulatory agencies. Approved development proposals. Projects under construction.
More Than Likely: The outcome is likely to happen but some uncertainty.	Development application within the consent process and in accordance with development plan.
Reasonably Foreseeable: The outcome may happen but significant uncertainty.	Includes projects that are committed. Identified within a development plan and, although not directly associated with the project, may occur if the project is implemented.
Hypothetical: There is considerable uncertainty whether the outcome would ever happen.	Conjecture based upon currently available information. Discussed on a conceptual basis. One of a number of possible inputs in an initial consultation process.

- 15.2.11. The methodology for the assessment of cumulative effects concentrates on the likely significant effects, with the aim to differentiate between permanent, temporary, direct, indirect and secondary effects, positive or negative. Where appropriate, effects that are not considered significant, but are still worthy of note, will be included in the assessment.
- 15.2.12. The significance of cumulative effects upon each environmental resource is made based on the balance of scores and using professional judgement from experience of similar schemes. An on-balance approach is taken when identifying the overall cumulative effect in conjunction with the other relevant developments. Where significant cumulative effects, beyond those identified as residual effects from the proposed Scheme in isolation, are identified, additional mitigation measures would be developed to reduce or avoid significant effects.

¹²² The Planning Inspectorate (2015), Advice Note Seventeen, Cumulative Effects Assessment, available online at <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf>, accessed April 2018.

- 15.2.13. In accordance with PINS) Advice Note Seventeen, the assessment of cumulative effects has considered the Zone of Influence (Zol) of each topic chapter, as summarised in Table 15-2 below. These Zols have been applied to the Uncertainty Log from the traffic model (presented in Appendix 15-2), which gives the full list of developments included within the traffic model, to give the list of developments considered within this cumulative effects assessment. The list of developments and the reason for their inclusion within this cumulative effects assessment is presented in Table 16-3 below and on Figure 15-1 in Appendix 15-1.

Table 15-2: Zol summary table

Environmental Topic	Zone of Influence
Air quality	200m
Noise and vibration	1km
Landscape	2km
Cultural heritage	1km
Ecology	2km
Water drainage	1km
Geology and soils	1km
People and Communities	2km

- 15.2.14. The Zol used in Chapter 12 Materials has not been included in this cumulative effects assessment, as there is insufficient information at this stage in the assessment to carry out a cumulative assessment. This will be carried out for the Environmental Statement at Stage 3.

Table 16-3: Developments included within the cumulative effects assessment

Site Code	Development Name	Development Description
D001, D002, D050, D066	Hereford Western Urban Expansion (Three Elms) (P162920/F)	Urban extension comprising up to 1,200 homes; employment development; a neighbourhood centre comprising a mix of retail; health provision and leisure uses a new one form entry primary school; park & choose interchanges; together with open and play space, landscaping, highways, infrastructure and associated works.
D038	Holmer Estates (P150659/O)	Demolition of all existing buildings and hard standings, remediation of the site, including reinstatement or landscaping of the former canal and development of up to 120 homes, landscaping, public open space, new vehicle and pedestrian access and associated works.
D067	Holmer Road (DCCE2007/1655/O)	Mixed Use development comprising residential (115 units), employment (office, industrial and warehousing), retail and supporting infrastructure including new access off College Road, roads, footpaths, open spaces, landscaping, parking and re-opening of part of canal.
D105	Holmer West (P150478/O)	Proposed erection of up to 460 dwellings including affordable housing, public open space, a Park & Ride facility, with associated landscaping access, drainage and other associated works.

SIGNIFICANCE CRITERIA

- 15.2.15. The assessment of significance of the combined and cumulative effects arising from the proposed Scheme with other relevant developments is based upon the definitions within Table 16-4 and reported as Significant Adverse / Beneficial, Not Significant Adverse / Beneficial, or Neutral. Where an effect is Moderate or above (Adverse or Beneficial), it is deemed to be Significant.
- 15.2.16. Where there is no potential for combined effects due to a lack of interaction between topics, these have been noted in Tables 16-5 and 16-6, as 'No interrelationship'. For example, residual adverse effects identified on biodiversity, such as the temporary loss of habitat due to vegetation clearance to enable construction, could not affect noise and therefore this has been marked as 'No interrelationship'. Similarly, residual adverse effects on air quality could not affect landscape and this has also been marked as 'No interrelationship'.
- 15.2.17. The following interrelationships and therefore potential for combined effects, have been identified and are assessed in Tables 16-5 and 16-6 below:
- Air quality could affect biodiversity (nitrogen deposition on sensitive habitats), road drainage and the water environment nitrogen deposition on sensitive aquatic habitats) and human health (respiratory conditions);
 - Cultural heritage could affect landscape (loss of heritage features could have visual effects);
 - Landscape could affect cultural heritage (loss of trees could affect the setting of assets) and biodiversity (loss of trees would be a loss of habitat);
 - Ecology and Nature Conservation could affect landscape (loss of trees or vegetation would have visual effects);
 - Noise and vibration could affect landscape (tranquillity and setting), biodiversity (disturbance to species) and human health (disturbance to sleep and stress); and
 - Road Drainage and the Water Environment could affect biodiversity (aquatic or water dependent habitats) and human health (abstractions for drinking water or recreation).
- 15.2.18. Due to the level of assessment that has been possible at this stage for materials and climate, these topics have been omitted from the assessment of combined effects.

Table 16-4: Significance of combined and cumulative effects¹²³

Significance		Definition
Significant Adverse / Beneficial	Major (Adverse or Beneficial)	Where the combined effects of the proposed Scheme or cumulative effects of the proposed Scheme in association with other existing or more than likely / near certain future major development upon an individual or collection of environmental receptors would be highly significant. Effects would be: • Permanent and far reaching for receptors of very high value.
	Moderate (Adverse or Beneficial)	Where the combined effects of the proposed Scheme or cumulative effects of the proposed scheme in association with other existing or more than likely / near certain major future developments upon an individual or collection of environmental receptors would be significant. Effects would be: ■ Permanent and far reaching for receptors of high value; ■ Localised for a receptor of very high value; or, ■ Temporary for a receptor of very high value.
Not Significant Adverse / Beneficial	Slight (Adverse or Beneficial)	Where the combined effects of the proposed Scheme or cumulative effects of the proposed Scheme in association with other existing or more than likely / near certain major development upon an individual

¹²³ Source: Based on DMRB Volume 11 Section 2 Part 5 and professional judgement

		or collection of environmental receptors would be noteworthy but not significant. Effects would be: Permanent and far reaching for receptors of medium value; - Localised for receptors of high value; or, - Temporary for a receptor of high value.
	Negligible (Adverse or Beneficial)	Where the combined effects of the proposed Scheme or cumulative effects of the proposed Scheme in association with other existing or more than likely / near certain future major developments upon an individual or collection of environmental receptors would be negligible. Effects would be: - Permanent and far reaching for receptors of low value; - Localised for receptors of medium value; or, - Temporary for a receptor of medium value.
Neutral	Neutral	Where the combined effects of the proposed Scheme or the cumulative effects of the proposed Scheme in association with other existing or more than likely / near certain future major developments would balance.

15.3 ASSESSMENT OF COMBINED EFFECTS

15.3.1. The potential combined effects during construction are summarised in Table 16-5 and the potential combined effects during operation are summarised in Table 16-6.

Table 16-5: Combined residual construction phase effects (all options)

Receptor	Topic Area												
	Air Quality	Cultural Heritage	Landscape	Ecology and Nature Conservation	Noise and Vibration	Road Drainage and the Water Environment	Geology and Soils	People and Communities	Human Health	Materials	Climate	Vehicle Travellers	Significance of Combined Effects
Air Quality	Not significant adverse effect	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Not significant adverse effect
Climate	Not assessed at this stage	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Not assessed at this stage	No interrelationship	Not assessed at this stage
Cultural Heritage	Not significant adverse effect	Significant adverse effect	Significant adverse effect	No interrelationship	Not significant adverse effect	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect
Landscape/Townscape	No interrelationship	No interrelationship	Significant adverse effect	Significant adverse effect	Significant adverse effect	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect
Biodiversity	Negligible	No interrelationship	Adverse effects predicted, although significance to be determined	Adverse effects predicted, although significance to be determined	Adverse effects predicted, although significance to be determined	Adverse effects predicted, although significance to be determined	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Adverse effects predicted, although significance to be determined
Geology and Soils	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect	No interrelationship	No interrelationship	Not significant adverse effect	No interrelationship	No interrelationship	Significant adverse effect
Material Resources	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Not significant adverse effect	No interrelationship	No interrelationship	Not significant adverse effect	No interrelationship	No interrelationship	Not significant adverse effect
Noise and Vibration	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effects
Communities	Not significant adverse effect	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect	No interrelationship	No interrelationship	Not significant adverse effect	Not significant adverse effect	No interrelationship	No interrelationship	Not significant adverse effect	Not significant adverse effect
Vehicle Travellers	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Not significant adverse effect	Not significant adverse effect
Water Drainage	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect	Significant adverse effect	No interrelationship	No interrelationship	No interrelationship	Neutral/negligible	No interrelationship	Significant adverse effect
Human Health	Negligible	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect	No interrelationship	No interrelationship	Not significant adverse effect	Not significant adverse effect	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect
* For People and Communities, effects assessed for driver stress are included within the receptor 'vehicle travellers' row, effects assessed for agricultural land are included within the receptor 'geology and soils' row, and effects assessed for Non-Motorised Users, Amenity, Severance, Individual Farm Businesses, Demolition of Private Property, Land Take, and Motorised travellers view from the road are included within the receptor 'communities' row. ** For Chapter 14 Climate Change, effects assessed for the receptor 'climate' only refer to effects on climate, and do not take into consideration the Scheme's vulnerability to climate change.													

Table 16-6: Combined residual operational phase effects (all options)

	Topic Area												
Receptor	Air Quality	Cultural Heritage	Landscape	Ecology and Nature Conservation	Noise and Vibration	Road Drainage and the Water Environment	Geology and Soils	People and Communities	Human Health	Materials	Climate	Vehicle Travellers	Significance of Combined Effects
Air Quality	Not significant adverse effect	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect
Climate	Not assessed at this stage	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Not assessed at this stage	No interrelationship	Not assessed at this stage
Cultural Heritage	No interrelationship	Significant adverse effect	Significant adverse effect	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect
Landscape/Townscape	No interrelationship	No interrelationship	Significant adverse effect	No interrelationship	Not significant adverse effect	No interrelationship	No interrelationship		No interrelationship	No interrelationship	No interrelationship	No interrelationship	Not significant adverse effect
Biodiversity	Adverse effects predicted, although significance to be determined	No interrelationship	Adverse effects predicted, although significance to be determined	Adverse effects predicted, although significance to be determined	Adverse effects predicted, although significance to be determined	Adverse effects predicted, although significance to be determined	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Adverse effects predicted, although significance to be determined
Geology and Soils	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Not significant adverse effect	No interrelationship	No interrelationship	Negligible	No interrelationship	No interrelationship	Not significant adverse effect
Material Resources	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Negligible	No interrelationship	No interrelationship	Negligible	No interrelationship	No interrelationship	Negligible
Noise and Vibration	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect
Communities	Not significant adverse effect	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect	No interrelationship	No interrelationship	Negligible	Neutral	No interrelationship	No interrelationship	Beneficial effect	Negligible
Vehicle Travellers	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Beneficial effect	Beneficial effect
Water Drainage	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Neutral/negligible	Neutral/negligible	No interrelationship	No interrelationship	No interrelationship	No interrelationship	Neutral/negligible	No interrelationship	Negligible
Human Health	Not significant adverse effect	No interrelationship	No interrelationship	No interrelationship	Significant adverse effect	No interrelationship	No interrelationship	Neutral	Neutral	No interrelationship	No interrelationship	No interrelationship	Not significant adverse effect
* For People and Communities, effects assessed for driver stress are included within the receptor 'vehicle travellers' row, effects assessed for agricultural land are included within the receptor 'geology and soils' row, and effects assessed for Non-Motorised Users, Amenities, Severance, Individual Farm Businesses, Demolition of Private Property, Land Take, and Motorised travellers view from the road are included within the receptor 'communities' row. ** For Chapter 14 Climate Change, effects assessed for the receptor 'climate' only refer to effects on climate, and do not take into consideration the Scheme's vulnerability to climate change.													

15.4 ASSESSMENT OF CUMULATIVE EFFECTS

15.4.1. The potential cumulative effects during construction are summarised in Table 16-7 and the potential cumulative effects during operation are summarised in Table 16-8.

Table 16-7: Assessment of Cumulative Effects during construction

Receptor	Hereford Western Urban Expansion (Three Elms)	Holmer Estates	Holmer Road	Holmer West	Hereford Transport Package	Cumulative Effects
Air Quality	Not significant adverse effect	Negligible*	No effect	No effect	Not significant adverse effect	Not significant adverse effect
Climate	No effect*	Negligible*	Negligible*	Negligible*	Negligible	Negligible*
Cultural Heritage	Not significant adverse effect	Negligible*	Negligible*	Significant adverse effect	Significant adverse effect	Significant adverse effect
Landscape / Townscape	Significant adverse effect	Not significant adverse effects*	Not significant adverse effect*	Significant adverse effect	Significant adverse effect	Significant adverse effects
Biodiversity	Significant adverse effect	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect*	Adverse effects predicted, although significance to be determined	Significant adverse effects
Geology and Soils	Negligible	Significant beneficial effect*	Significant beneficial effect*	Not significant adverse effect*	Not significant adverse effect	Neutral
Material Resources	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect	Not significant adverse effect
Noise and Vibration	Not significant adverse effect	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect*	Significant adverse effect	Significant adverse effect
Communities	Significant adverse effect*	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect	Significant Adverse effect
Vehicle Travellers	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect*	Not significant adverse effect	Not significant adverse effect*
Water Drainage	Not significant beneficial effect	Not significant beneficial effect*	Not significant beneficial effect*	Not significant adverse effect*	Significant adverse effect	Neutral
Human Health	Negligible *	Negligible *	Negligible *	Negligible *	Negligible *	Negligible *

*A full assessment has not been completed by the applicant and therefore the effect has been confirmed on a worst case basis with some mitigation anticipated.

Table 16-8: Assessment of Cumulative Effects during operation

Receptor	Hereford Western Urban Expansion (Three Elms)	Holmer Estates	Holmer Road	Holmer West	Hereford Transport Package	Cumulative Effects
Air Quality	Not significant adverse effect	Negligible*	Negligible*	Negligible*	Negligible	Not significant adverse effect
Climate	No effect	Negligible*	Negligible*	Negligible*	Negligible*	Negligible
Cultural Heritage	Not significant adverse effect	Negligible*	Negligible*	Significant adverse effect	Significant adverse effect	Significant adverse effect
Landscape / Townscape	Significant adverse effect	Not significant beneficial effect*	Not significant beneficial effect*	Not significant adverse effect	Negligible	Neutral
Biodiversity	Not significant beneficial effect	Negligible*	Negligible*	Negligible*	Adverse effects predicted, although significance to be determined	Neutral
Geology and Soils	Negligible	Not significant beneficial effect*	Not significant beneficial effect*	Negligible*	Not significant adverse effect	Neutral
Material Resources	Negligible	Negligible*	Negligible*	Negligible*	Negligible*	Negligible*
Noise and Vibration	Negligible	Negligible*	Negligible*	Negligible*	Significant adverse effect	Significant adverse effect
Communities	Significant beneficial effect	Significant beneficial effect*	Not significant beneficial effect*	Not significant beneficial effect*	Not significant beneficial effect	Not significant beneficial effect
Vehicle Travellers	Negligible	Negligible*	Negligible*	Negligible*	Significant Beneficial effect	Significant Beneficial effect
Water Drainage	Not significant beneficial effect	Significant beneficial effect*	Negligible*	Negligible*	Negligible	Negligible
Human Health	Negligible *	Negligible*	Negligible	Negligible	Negligible	Negligible

*A full assessment has not been completed by the applicant and therefore the effect has been confirmed on a worst case basis with some mitigation anticipated.

16 CONCLUSION

16.1 SUMMARY OF SIGNIFICANT AND NON-SIGNIFICANT ENVIRONMENT EFFECTS

- 16.1.1. In summary, this Stage 2 Environmental Assessment Report (EAR) has shown that there are several environmental constraints to the construction and operation of the proposed Scheme, including:
- Ecological constraints in the form of ancient woodland, important trees (Ancient, Veteran and Notable) and the viaduct crossing over the River Wye SAC;
 - Cultural heritage assets and buried archaeological matter and the potential effects on setting;
 - Landscape effects to historic views within the Wye Valley which have remained unchanged for hundreds of years;
 - Noise effects for residents within proximity to the proposed route; and
 - Effects to Grade 1 and Grade 2 agricultural land.
- 16.1.2. As the detailed design progress and with mitigation incorporated into the final design of the preferred route, any significant effects (i.e. those which have been identified as moderate or greater) caused by the scheme are anticipated to decline in significance over time during the operational phase of the scheme. There are a number of further assessments which will be carried out within and in support of the Stage 3 Environmental Statement (ES) with the aim of reducing any significant adverse effects.
- 16.1.3. As the design proceeds to the detailed design stage it will aim to maximise beneficial environmental effects, in particular those which are expected to arise from the provision and future management of scheme.
- 16.1.4. Tables 16-1 to 16-12 below provides a summary of the main environmental effects as a result of each of the potential route options.

Table 16-1: Summary of potential effects on Air Quality of the seven proposed route options

Air Quality	Summary of Potential Effects
Orange	- During construction 18 properties within 50m likely to be affected and 91 properties within 200m likely to be affected; - During construction adverse impacts from dust and exhaust emissions could potentially occur at sensitive receptors within 200m of worksites associated with the proposed Scheme. Impacts would be temporary in nature and with appropriate mitigation (see section 5.7), the risk of such impacts could be minimised; and - The greatest increase in annual NO₂ concentrations during the operational phase would be at Edgewood, A438 Bramley Ct and Towtree House, however levels are still below annual mean criteria.
Cyan	- During the construction phase 16 properties within 50m likely to be affected and 111 properties within 200m likely to be affected; - During construction adverse impacts from dust and exhaust emissions could potentially occur at sensitive receptors within 200m of worksites associated with the proposed Scheme. Impacts would be temporary in nature and with appropriate mitigation (see section 5.7), the risk of such impacts could be minimised; and - The greatest increase in annual NO₂ concentrations during the operational phase would be at Edgewood and Hunting Brook West, however levels are still below annual mean criteria.
Yellow	- During the construction phase 13 properties within 50m likely to be affected and 133 properties within 200m likely to be affected; - During construction adverse impacts from dust and exhaust emissions could potentially occur at sensitive receptors within 200m of worksites associated with the proposed Scheme. Impacts would be temporary in nature and with appropriate mitigation (see section 5.7), the risk of such impacts could be minimised; and - The greatest increase in annual NO₂ concentrations during the operational phase would be at Edgewood, Hunting Brook West and Towtree House, however levels are still below annual mean criteria.
Red	- During the construction phase 9 properties within 50m likely to be affected and 72 properties within 200m likely to be affected; - During construction adverse impacts from dust and exhaust emissions could potentially occur at sensitive receptors within 200m of worksites associated with the proposed Scheme. Impacts would be temporary in nature and with appropriate mitigation (see section 5.7), the risk of such impacts could be minimised; and - The greatest increase in annual NO₂ concentrations would be at Forest View, A438 Bramley Ct, and Towtree House, however levels are still below annual mean criteria.
Olive	- During the construction phase 9 properties within 50m likely to be affected and 139 properties within 200m likely to be affected - During construction adverse impacts from dust and exhaust emissions could potentially occur at sensitive receptors within 200m of worksites associated with the proposed Scheme. Impacts would be temporary in nature and with appropriate mitigation (see section 5.7), the risk of such impacts could be minimised; and - The greatest increase in annual NO₂ concentrations during the operational phase would be at Forest View, A438 Bramley Ct, and Towtree House, however levels are still below annual mean criteria.

Black 1	- During the construction phase, 10 properties within 50m likely to be affected and 129 properties within 200m likely to be affected; - During construction adverse impacts from dust and exhaust emissions could potentially occur at sensitive receptors within 200m of worksites associated with the proposed Scheme. Impacts would be temporary in nature and with appropriate mitigation (see Section 5.7), the risk of such impacts could be minimised; and - The greatest increase in annual NO₂ concentrations during the operational phase would be at Forest View, Kings Acre Road, and A4110, however levels are still below annual mean criteria.
Black 2	- During the construction phase 10 properties within 50m likely to be affected and 96 properties within 200m likely to be affected; - During construction adverse impacts from dust and exhaust emissions could potentially occur at sensitive receptors within 200m of worksites associated with the proposed Scheme. Impacts would be temporary in nature and with appropriate mitigation (see Section 5.7), the risk of such impacts could be minimised; and - The greatest increase in annual NO₂ concentrations during the operational phase would be at Forest View, Kings Acre Road, and A4110, however levels are still below annual mean criteria.

Table 16-2: Summary of potential effects on Noise and Vibration of the seven proposed route options

Noise and Vibration	Summary of Potential Effects
Orange	In the short-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 6% of those studied; and - a beneficial impact of either minor to moderate is likely to be experienced at 2,532 properties, corresponding to the 9% of properties. In the long-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied; and - a minor beneficial impact is likely to be experienced at only one property. Receptors potentially subject to a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Orange route with the A438 King Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Number of properties which potentially qualify for Noise Insulation Regulations (NIR): Element 1 – 24; Element 2 – 143; Element 3 – 25; Total – 192.
Cyan	In the short-term - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 6% of those studied; and

Noise and Vibration	Summary of Potential Effects
	- a beneficial impact of minor to moderate is likely to be experienced at 2,520 properties, corresponding to the 9% of properties. In the long-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied; and - a minor beneficial impact of minor to moderate is likely to be experienced at one property. Receptors potentially subject to a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Cyan route with the A438 King Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Number of properties which potentially qualify for Noise Insulation Regulations (NIR): Element 1 – 24; Element 2 – 121; Element 3 – 25; Total – 170
Yellow	In the short-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 6% of those studied; and - a beneficial impact of minor to moderate is likely to be experienced at 2,513 properties, corresponding to the 9% of properties. In the long-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied; and - a minor beneficial impact is likely to be experienced at one property. Receptors potentially subject to a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Yellow route with the A438 King Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Number of properties which potentially qualify for Noise Insulation Regulations (NIR): Element 1 – 24; Element 2 – 140; Element 3 – 24; Total – 188.
Red	In the short-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 6% of those studied; and - a beneficial impact of minor to moderate is likely to be experienced at 2,540 properties, corresponding to the 9% of properties. In the long-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied; and - a minor beneficial impact is likely to be experienced at one property.

Noise and Vibration	Summary of Potential Effects
	Receptors subject to a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Red route with the A438 King Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Number of properties which potentially qualify for Noise Insulation Regulations (NIR): Element 1 – 13; Element 2 – 114; Element 3 – 13; Total – 140.
Olive	In the short-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied; and - a beneficial impact of minor to moderate is likely to be experienced at 3,000 properties, corresponding to the 11% of properties. - The Olive option is located further to the west for most of the route, hence there is a slightly higher number of properties with a beneficial impact, compared to options to Orange, Cyan, Yellow and Red. In the long-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 4% of those studied, slightly lower than other options; and - a minor beneficial impact is likely to be experienced at one property. Receptors subject to a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Olive route with the A438 King Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Number of properties which potentially qualify for Noise Insulation Regulations (NIR): Element 1 – 12; Element 2 – 116; Element 3 – 14; Total – 142.
Black 1	In the short-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied; - a beneficial impact of minor to moderate is likely to be experienced at 3,015 properties, corresponding to the 11% of properties; and - The Black 1 option is located further to the west for most of the route, hence there is a slightly higher number of properties with a beneficial impact, compared to Orange, Cyan, Yellow, Red and Olive options. In the long-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 4% of those studied, slightly lower than other options; and - a minor beneficial impact is likely to be experienced at one property.

Noise and Vibration	Summary of Potential Effects
	Receptors subject to a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Black 1 route with the A438 King Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Number of properties which potentially qualify for Noise Insulation Regulations (NIR): Element 1 – 12; Element 2 – 114; Element 3 – 14; Total – 140.
Black 2	In the short-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 5% of those studied; and - a beneficial impact of minor to moderate is likely to be experienced at 2,549 properties, corresponding to the 9% of properties. In the long-term: - the majority of receptors would experience a magnitude impact of either negligible or minor; - residential receptors subject to an adverse impact of either moderate or major correspond to 4% of those studied, slightly lower than other options; and - a minor beneficial impact is likely to be experienced at one property. Receptors subject to a significant adverse impact (i.e. moderate or major) are mainly concentrated near the intersection of the Black 1 route with the A438 King Acre Road, intersection with the A4110 Canon Pyon Road and in Belmont, south of the river Wye. Number of properties which potentially qualify for Noise Insulation Regulations (NIR): Element 1 – 13; Element 2 – 116; Element 3 – 14; Total – 143.

Table 16-3: Summary of potential effects on Landscape of the seven proposed route options

Landscape	Summary of Potential Effects
Orange	- Route option uncharacteristic of the character area - Potential indirect impacts to ancient woodland - Impacts on hedgerows and important trees - Impact of the addition of artificial lighting near Belmont Abbey - Crossing at the river would cause visual fragmentation within the character area - Impacts to the character and setting of Belmont Park and Belmont Abbey - Impact on Burghill Hospital Unregistered Park and Garden and Hospital Farm traditional orchard - Change in local landscape character and visual amenity for users of the local PRoW network and waterways - At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 reducing to a magnitude of change of Moderate and a significance of effect of Moderate and adverse with mitigation planting and appropriate noise barriers.
Cyan	- Route option uncharacteristic of the character area - Potential indirect impacts to ancient woodland - Impacts on hedgerows and important trees - Impacts to the character and setting of Belmont Park and Belmont Abbey - Crossing at the river would cause visual fragmentation within the character area - Impacts to the character area and wetland area of the Yazor Brook due to severance caused by the route and the addition of hard surfacing, artificial lighting and traffic - Impacts to Burghill Hospital Unregistered Park and Garden and Hospital Farm traditional orchard - Change in local landscape character and visual amenity for users of the local PRoW network and waterways - At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 reducing to a magnitude of change of Moderate and a significance of effect of Moderate and adverse with mitigation planting and appropriate noise barriers.
Yellow	- Route option uncharacteristic of the character area - Potential indirect impacts to ancient woodland - Impacts on hedgerows and important trees - Impacts to the character and setting of Belmont Park and Belmont Abbey - Crossing at the river would cause visual fragmentation within the character area - Impact of the addition of artificial lighting near Belmont Abbey - Impact on Green Lane (Bridleway BT4) and TPO woodland - Change in local landscape character and visual amenity for users of the local PRoW network and waterways

Landscape	Summary of Potential Effects
	At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 reducing to a magnitude of change of Moderate and a significance of effect of Moderate and adverse with mitigation planting and appropriate noise barriers.
Red	- Route option uncharacteristic of the character area - Potential indirect impacts to ancient woodland - Impacts on hedgerows and important trees - Impact to the character and setting of Belmont Park and Belmont Abbey - Crossing at the river would cause visual fragmentation within the character area - Impact of the addition of artificial lighting near Belmont Abbey - Loss of small area of Traditional Orchard - Impact to Burghill Hospital Unregistered Park and Garden due to reduction in parkland area - Change in local landscape character and visual amenity for users of the local PRow network and waterways - At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 reducing to a magnitude of change of Moderate and a significance of effect of Moderate and adverse with mitigation planting and appropriate noise barriers.
Olive	- Route option uncharacteristic of the character area - Potential indirect impacts to ancient woodland - Impacts on hedgerows and important trees - Impact on cultural association with Brian Hatton and his paintings of Warham by permanently altering some of the views of the ground. - Impact on views from River due to visual fragmentation from the river crossing - Impact on Wye Valley Walk - Loss of tree cover and vegetation due to route option - There is limited mitigation available at operation due to the nature of the bridge within an open river corridor but the design and structure of the bridge would define the quality of the built form within the character area and should be sympathetic and complimentary to its setting. - Loss of small area of Traditional Orchard - Impact on Burghill Hospital Unregistered Park and Garden due to reduction in parkland area - Change in local landscape character and visual amenity for users of the local PRow network and waterways - At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of large and adverse at Year 0 but reducing to a magnitude of Moderate and a significance of effect of Moderate/ Large and adverse at Year 15.
Black 1	- Route option uncharacteristic of the character area - Potential indirect impacts to ancient woodland - Impacts on hedgerows and important trees - Impact on cultural association with Brian Hatton and his paintings of Warham by permanently altering some of the views of the ground.

Landscape	Summary of Potential Effects
	- Impact on views from River due to visual fragmentation from the river crossing - Loss of tree cover and vegetation due to route option - Impact and loss of land in Drovers Wood - Impact on Burghill Hospital Unregistered Park and Garden due to reduction in parkland area - Impact on character area and wetland area of the Yazor Brook due to severance caused by the route and the addition of hard surfacing, artificial lighting and traffic - Change in local landscape character and visual amenity for users of the local PRow network and waterways - At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of large and adverse at Year 0 but reducing to a magnitude of Moderate and a significance of effect of Moderate/ Large and adverse at Year 15.
Black 2	- Route option uncharacteristic of the character area - Potential indirect impacts to ancient woodland - Impacts on hedgerows and important trees - Impact to the character and setting of Belmont Park and Belmont Abbey - Crossing at the river would cause visual fragmentation within the character area - Impact of the addition of artificial lighting near Belmont Abbey - Loss of trees within Belmont Parkland in addition to impact on the character of Belmont unregistered Park and Garden due to disruption of view - Loss of small area of Traditional Orchard - Impact to the character area and wetland area of the Yazor Brook due to severance caused by the route and the addition of hard surfacing, artificial lighting and traffic - Impact and loss of land in Drovers Wood - Effects to Burghill Hospital Unregistered Park and Garden due to reduction in parkland area - Change in local landscape character and visual amenity for users of the local PRow network and waterways - At Operation, the magnitude of change is considered to be Major resulting in a significance of effect of Large and adverse at Year 0 reducing to a magnitude of change of Moderate and a significance of effect of Moderate and adverse with mitigation planting and appropriate noise barriers.

Table 16-4: Summary of potential effects on Cultural Heritage of the seven proposed route options

Cultural Heritage	Summary of Potential Effects
Orange	A total of 55 heritage assets are expected to be affected as a result of the Orange route option. <u>Archaeological below Ground Assets</u> Potential adverse impacts anticipated on a number of Non-designated assets resulting in partial or full removal and associated hitherto unknown archaeological remains. <u>Effects on Setting (Built Heritage Assets)</u> Adverse effects are anticipated on the setting of Belmont Abbey and associated assets (Large adverse) and Belmont House (Moderate adverse) by reducing historic views due to loss of appreciation and tranquillity. Adverse Effects are also anticipated to Burghill Hospital Landscape Park by reducing the views from the hospital to the cottages and Huntington Conservation area due to the increase in noise disturbance and light pollution rural tranquil setting of the assets.
Cyan	A total of 41 heritage assets are expected to be affected as a result of the Cyan route option. <u>Archaeological below Ground Assets</u> Potential adverse impacts anticipated on a number of Non-designated assets resulting in partial or full removal and associated hitherto unknown archaeological remains. <u>Effects on Setting (Built Heritage Assets)</u> Adverse effects are anticipated on the setting of Belmont Abbey and associated assets (Large adverse) and Belmont House (Moderate adverse) by reducing historic views due to loss of appreciation and tranquillity. Adverse effects are also anticipated on Burghill Hospital Landscape Park by reducing the views from the hospital to the cottages and Huntington Conservation area due to the increase in noise disturbance and light pollution rural tranquil setting of the assets.
Yellow	A total of 28 heritage assets are expected to be affected as a result of the Yellow route option. <u>Archaeological below Ground Assets</u> Potential adverse impacts anticipated on a number of Non-designated assets resulting in partial or full removal and associated hitherto unknown archaeological remains. <u>Effects on Setting (Built Heritage Assets)</u> Adverse effects are anticipated on the setting of Belmont Abbey and associated assets (Large adverse) and Belmont House (Moderate adverse) by reducing historic views due to loss of appreciation and tranquillity. Adverse effects are also anticipated on Burghill Hospital Landscape Park by

Cultural Heritage	Summary of Potential Effects
	reducing the views from the hospital to the cottages and Huntington Conservation area due to the increase in noise disturbance and light pollution rural tranquil setting of the assets.
Red	A total of 41 heritage assets are expected to be affected as a result of the Red route option. <u>Archaeological below Ground Assets</u> Potential adverse impacts anticipated on a number of Non-designated assets resulting in partial or full removal and associated hitherto unknown archaeological remains. <u>Effects on Setting (Built Heritage Assets)</u> Adverse effects are anticipated on the setting of Belmont Abbey and associated assets (Large adverse) and Belmont House (Moderate adverse) by reducing historic views due to loss of appreciation and tranquillity. Adverse effects are also anticipated on Burghill Hospital Landscape Park by reducing the views from the hospital to the cottages and Huntington Conservation area due to the increase in noise disturbance and light pollution rural tranquil setting of the assets.
Olive	A total of 49 heritage assets are expected to be affected as a result of the Olive route option. <u>Archaeological below Ground Assets</u> Potential adverse impacts anticipated on a number of Non-designated assets resulting in partial or full removal and associated hitherto unknown archaeological remains. <u>Effects on Setting (Built Heritage Assets)</u> Adverse effects are anticipated on the setting of Belmont Abbey and associated assets (Large adverse) and Belmont House (Large adverse) by reducing historic views due to loss of appreciation and tranquillity. Adverse effects are also anticipated on Burghill Hospital Landscape Park by reducing the views from the hospital to the cottages and Huntington Conservation area due to the increase in noise disturbance and light pollution rural tranquil setting of the assets.
Black 1	A total of 35 heritage assets are expected to be affected as a result of the Black 1 route option. <u>Archaeological below Ground Assets</u> Potential adverse impacts anticipated on a number of Non-designated assets resulting in partial or full removal and associated hitherto unknown archaeological remains. <u>Effects on Setting (Built Heritage Assets)</u>

Cultural Heritage	Summary of Potential Effects
	Adverse effects are anticipated on the setting of Belmont Abbey and associated assets (Large adverse) and Belmont House (Large adverse) by reducing historic views due to loss of appreciation and tranquillity. Adverse effects are also anticipated on Burghill Hospital Landscape Park by reducing the views from the hospital to the cottages and Huntington Conservation area due to the increase in noise disturbance and light pollution rural tranquil setting of the assets.
Black 2	A total of 39 heritage assets are expected to be affected as a result of the Black 2 route option. <u>Archaeological below Ground Assets</u> Potential adverse impacts anticipated on a number of Non-designated assets resulting in partial or full removal and associated hitherto unknown archaeological remains. <u>Effects on Setting (Built Heritage Assets)</u> Adverse effects are anticipated on the setting of Belmont Abbey and associated assets (Large adverse) and Belmont House (Moderate adverse) by reducing historic views due to loss of appreciation and tranquillity. Adverse effects are also anticipated on Burghill Hospital Landscape Park by reducing the views from the hospital to the cottages and Huntington Conservation area due to the increase in noise disturbance and light pollution rural tranquil setting of the assets.

Table 16-5: Summary of potential effects on Ecology of the seven proposed route options

Ecology	Summary of Potential Effects
Orange	■ Potential damage to ancient woodland (within 20m of proposed route) and habitat loss (2 Ha) within Belmont Park Habitat of Principal Importance during construction and operation of the scheme. ■ Impact on double hedgerows along the lanes near Warham House, Warham Farm and near King's Acre Road. These hedgerows also contain mature / important trees ■ Fragmentation of habitats linking bat roosts and foraging habitats may have an impact on confirmed bat roosts within residential buildings in the area. ■ Fragmentation of Yazor Brook due to propose culvert could affect aquatic habitats and wildlife corridor currently provided by the stream. ■ Loss of pond habitat due to proposed junction with potential to support great crested newts.
Cyan	■ Potential damage to ancient woodland (within 20m of proposed route) and habitat loss (2 Ha) within Belmont Park Habitat of Principal Importance during construction and operation of the scheme. ■ Impact on double hedgerows along the lanes near Warham House, Warham Farm and near King's Acre Road. These hedgerows also contain mature / important trees ■ Fragmentation of habitats linking bat roosts and foraging habitats may have an effect on confirmed bat roosts within residential buildings in the area. ■ The proposed route may directly affect farm buildings at Warham Farm which have moderate bat roosting potential. ■ Fragmentation of Yazor Brook due to propose culvert could affect aquatic habitats and wildlife corridor currently provided by the stream.
Yellow	■ Potential damage to ancient woodland (within 20m of proposed route) and habitat loss (2 Ha) within Belmont Park Habitat of Principal Importance during construction and operation of the scheme. ■ Impact on double hedgerows along the lanes near Warham House, Warham Farm and near King's Acre Road. These hedgerows also contain mature / important trees ■ Fragmentation of habitats linking bat roosts and foraging habitats may have an effect on confirmed bat roosts within residential buildings in the area. ■ The proposed route may directly affect farm buildings at Warham Farm which have moderate bat roosting potential. ■ Fragmentation of Yazor Brook due to propose culvert could affect aquatic habitats and wildlife corridor currently provided by the stream. ■ Loss of pond habitat due to proposed junction with potential to support great crested newts.
Red	■ Habitat loss (3 Ha) within Belmont Park Habitat of Principal Importance as it takes a less direct route through the park which also results in the loss of several scattered parkland trees. ■ Potential damage to ancient woodland (within 20m of proposed route) during construction and operation of the scheme. ■ Impact on double hedgerows along the lanes near Warham House, Warham Farm and near King's Acre Road. These hedgerows also contain mature / important trees.

Ecology	Summary of Potential Effects
	- Fragmentation of habitats linking bat roosts and foraging habitats may have an effect on confirmed bat roosts within residential buildings in the area. - The proposed route will require the removal of a mature / important trees and may directly affect farm buildings with high and moderate bat potential near Warham Farm. - Habitat loss to a Traditional Orchard and Habitat of Principal Importance and habitat loss to a newly planted (Pippin Trust) heritage orchards - Fragmentation of Yazor Brook due to proposed culvert could affect aquatic habitats and wildlife corridor currently provided by the stream. - Loss of pond habitat due to proposed junction with potential to support great crested newts, and loss of great crested newt breeding pond near Hospital Farm.
Olive	- Habitat loss (4 Ha) within Belmont Park Habitat of Principal Importance. The route would result in the most amount of habitat loss within Belmont Park due to the size of the proposed cutting, which will also result in the loss of several scattered parkland trees. - The route has the greatest impact on habitat loss of mixed semi-natural woodland south of the River Wye - Impact on badgers and otters may be greater with this route option - Potential damage to ancient woodland (within 20m of proposed route) during construction and operation of the scheme. - Potential to exacerbate the extent of habitat fragmentation of ancient woodland already existing within the woodland belt - Potential impact on foraging bats (highest number of bat passes at this location). - Impact on double hedgerows along the lanes near Warham House and Warham Farm. - Habitat loss to a Traditional Orchard and Habitat of Principal Importance and habitat loss to a newly planted (Pippin Trust) heritage orchards - Fragmentation of Yazor Brook due to propose culvert could affect aquatic habitats and wildlife corridor currently provided by the stream. - Loss of pond habitat due to proposed junction on Roman road with potential to support great crested newts, and loss of great crested newt breeding pond near Hospital Farm.
Black 1	- Habitat loss (4 Ha) within Belmont Park Habitat of Principal Importance. The route would result in the most amount of habitat loss within Belmont Park due to the size of the proposed cutting, which will also result in the loss of several scattered parkland trees. - The route has the greatest impact on habitat loss of mixed semi-natural woodland south of the River Wye - Impacts on badgers and otters may be greater with this option - Potential damage to ancient woodland (within 20m of proposed route) during construction and operation of the scheme. - Potential to exacerbate the extent of habitat fragmentation of ancient woodland already existing within the woodland belt - Potential impact on foraging bats (highest number of bat passes at this location). - Impacts on double hedgerows along the lanes near Warham House and Warham Farm. - Habitat loss to a Traditional Orchard and Habitat of Principal Importance and habitat loss to a newly planted (Pippin Trust) heritage orchards - Fragmentation of Yazor Brook due to propose culvert could affect aquatic habitats and wildlife corridor currently provided by the stream. - Habitat loss to Drovers Wood (Woodland Trust site). - Impacts on habitats within Hereford Cattle Market and in particular to bats which has had a high level of activity recorded in this area - Potential impacts to Yazor Brook and adjacent fishing pond resulting in low retention of stream beds.

Ecology	Summary of Potential Effects
	Loss of pond habitat with potential to support great crested newts, and loss of great crested newt breeding pond near Hospital Farm.
Black 2	- Habitat loss (3 Ha) within Belmont Park Habitat of Principal Importance as it takes a less direct route through the park which also results in the loss of several scattered parkland trees. - Potential damage to ancient woodland (within 20m of proposed route) during construction and operation of the scheme. - Impact on double hedgerows along the lanes near Warham House, Warham Farm and near King's Acre Road. These hedgerows also contain mature / important trees. - Fragmentation of habitats linking bat roosts and foraging habitats may have an effect on confirmed bat roosts within residential buildings in the area. - The proposed route will require the removal of a mature / important trees and may directly affect farm buildings with high and moderate bat potential near Warham Farm. - Habitat loss to a Traditional Orchard and Habitat of Principal Importance and habitat loss to a newly planted (Pippin Trust) heritage orchards - Fragmentation of Yazor Brook due to propose culvert could affect aquatic habitats and wildlife corridor currently provided by the stream. - Habitat loss to Drovers Wood (Woodland Trust site). - Impacts on habitats within Hereford Cattle Market and in particular to bats which has had a high level of activity recorded in this area - Potential impacts to Yazor Brook and adjacent fishing pond resulting in low retention of stream beds.

Table 16-6: Summary of potential effects on Water Environment of the seven proposed route options

Water Environment	Summary of Potential Effects
Orange	<u>Impacts on surface water resources</u> - Minor adverse effect anticipated on water quality providing appropriate pollution control measures are in place throughout the construction period - Negligible effect to River Wye due to proposed bridge crossing - Potential of increased sedimentation as a result of the works at the proposed crossing of Belmont Stream and Yazor Brook resulting in moderate adverse effect - Realignment of the watercourse between C1189 (Lower Breinton Road) and Warham Lane (U73023) may be required. - Minor adverse effects anticipated to the hydromorphological quality of Belmont Stream. - Effects to the hydromorphological quality of the Yazor Brook is considered to be moderate adverse after re-alignment and reprofiling, although this is likely to reduce to minor adverse after the watercourse has become established.

Water Environment	Summary of Potential Effects
	<u>Impact on groundwater resources</u> - Negligible effects to groundwater resources are anticipated providing pollution prevention measures are put in place throughout the construction period. <u>Impact on flood risk</u> - Unmitigated impacts to the floodplain of the River Wye has been assessed as Slight adverse, Belmont Stream assessed as Neutral and Yazor Brook assessed as Moderate Adverse.
Cyan	<u>Impacts on surface water resources</u> - Negligible effect on water quality of the River Wye due to proposed bridge crossing - Potential of increased sedimentation as a result of the works at the proposed crossing of Belmont Stream and Yazor Brook resulting in minor adverse effect - Realignment of the watercourse between C1189 (Lower Breinton Road) and Warham Lane (U73023) may be required. - Due to the distance of the proposed bridge piers from the River Wye, the effect on hydromorphological quality is considered negligible. <u>Impacts on groundwater resources</u> - Negligible effects to groundwater resources are anticipated providing pollution prevention measures are put in place throughout the construction period. <u>Impacts on flood risk</u> - Unmitigated impacts to the floodplain of the River Wye has been assessed as Slight adverse, Belmont Stream assessed as Neutral and Yazor Brook assessed as Large Adverse.
Yellow	<u>Impacts on surface water resources</u> - Negligible effect on water quality of the River Wye due to proposed bridge crossing - Potential of increased sedimentation as a result of the works at the proposed crossing of Belmont Stream resulting in minor adverse effect - Realignment of the watercourse between C1189 (Lower Breinton Road) and Warham Lane (U73023) may be required. - Due to the distance of the proposed bridge piers from the River Wye, the effect on hydromorphological quality is considered negligible. - Effects to the hydromorphological quality of the Yazor Brook is considered to be moderate adverse after re-alignment and reprofiling, although this is likely to reduce to minor adverse after the watercourse has become established.

Water Environment	Summary of Potential Effects
	<u>Impacts on groundwater resources</u> - Negligible effects to groundwater resources are anticipated providing pollution prevention measures are put in place throughout the construction period. <u>Impact on flood risk</u> - Unmitigated impacts to the floodplain of the River Wye has been assessed as Slight adverse, Belmont Stream assessed as Neutral and Yazor Brook assessed as Moderate Adverse.
Red	<u>Impacts on surface water resources</u> - Negligible effect on water quality of the River Wye due to proposed bridge crossing - Potential of increased sedimentation as a result of the works at the proposed crossing of Belmont Stream and Yazor Brook resulting in moderate adverse effect - Realignment of the watercourse between C1189 (Lower Breinton Road) and Warham Lane (U73023) may be required. Minor adverse effects are anticipated on water quality at this stage. - Major adverse effects to hydromorphological quality of the stream at this location if the alignment of Belmont Stream is altered and the downstream extents of Belmont brook experience a significant reduction in flow in order to maintain hydraulic connectivity with the downstream extent of the watercourse. - Due to the distance of the proposed bridge piers from the River Wye, the effect on hydromorphological quality is considered negligible. - Effects to the hydromorphological quality of the Yazor Brook is considered to be moderate adverse after re-alignment and reprofiling, although this is likely to reduce to minor adverse after the watercourse has become established. <u>Impacts on groundwater resources</u> - Negligible effects to groundwater resources are anticipated providing pollution prevention measures are put in place throughout the construction period. <u>Impact on flood risk</u> - Unmitigated impacts to the floodplain of the River Wye has been assessed as Slight adverse, Belmont Stream assessed as Very Large Adverse and Yazor Brook assessed as Moderate Adverse.
Olive	<u>Impacts on surface water resources</u> - Negligible effect on water quality of the River Wye due to proposed bridge crossing - Potential of increased sedimentation as a result of the works at the proposed crossing of Belmont Stream resulting in moderate adverse effect

Water Environment	Summary of Potential Effects
	- Major adverse effects to hydromorphological quality of the stream at this location if the alignment of Belmont Stream is altered and the downstream extents of Belmont brook experience a significant reduction in flow in order to maintain hydraulic connectivity with the downstream extent of the watercourse. - Moderate adverse effects are considered likely to the water quality of a tributary of the Yazor Brook during the realignment of the Yazor Brook during the construction phase - Effects to the hydromorphological quality of the Yazor Brook is considered to be moderate adverse after re-alignment and reprofiling, although this is likely to reduce to minor adverse after the watercourse has become established. <u>Impacts on groundwater resources</u> - Negligible effects to groundwater resources are anticipated providing pollution prevention measures are put in place throughout the construction period. <u>Impact on flood risk</u> - Unmitigated impacts to the floodplain of the River Wye has been assessed as Slight adverse, Belmont Stream assessed as Very Large Adverse and Yazor Brook assessed as Moderate Adverse.
Black 1	<u>Impact on surface water resources</u> - Negligible effect on water quality of the River Wye due to proposed bridge crossing - Potential of increased sedimentation as a result of the works at the proposed crossing of Belmont Stream and Yazor Brook resulting in moderate adverse effect - Major adverse effects to hydromorphological quality of the stream at this location if the alignment of Belmont Stream is altered and the downstream extents of Belmont brook experience a significant reduction in flow in order to maintain hydraulic connectivity with the downstream extent of the watercourse. - Effects to the hydromorphological quality of the Yazor Brook is considered to be moderate adverse after re-alignment and reprofiling, although this is likely to reduce to minor adverse after the watercourse has become established. <u>Impact on groundwater resources</u> - Negligible effects to groundwater resources are anticipated providing pollution prevention measures are put in place throughout the construction period. <u>Impact on flood risk</u> - Unmitigated impacts to the floodplain of the River Wye has been assessed as Slight adverse, Belmont Stream assessed as Very Large Adverse and Yazor Brook assessed as Large Adverse.

Water Environment	Summary of Potential Effects
Black 2	<u>Impacts on surface water resources</u> ▪ Negligible effect on water quality of the River Wye due to proposed bridge crossing ▪ Potential of increased sedimentation as a result of the works at the proposed crossing of Belmont Stream and Yazor Brook resulting in moderate adverse effect ▪ Realignment of the watercourse between C1189 (Lower Breinton Road) and Warham Lane (U73023) may be required. Minor adverse effects are anticipated on water quality at this stage. ▪ Major adverse effects to hydromorphological quality of the stream at this location if the alignment of Belmont Stream is altered and the downstream extents of Belmont brook experience a significant reduction in flow in order to maintain hydraulic connectivity with the downstream extent of the watercourse. ▪ Due to the distance of the proposed bridge piers from the River Wye, the effect on hydromorphological quality is considered negligible. <u>Impacts on groundwater resources</u> ▪ Negligible effects to groundwater resources are anticipated providing pollution prevention measures are put in place throughout the construction period. <u>Impact on flood risk</u> ▪ Unmitigated impacts to the floodplain of the River Wye has been assessed as Slight adverse, Belmont Stream assessed as Very Large Adverse and Yazor Brook assessed as Large Adverse.

Table 16-7: Summary of potential effects on Geology of the seven proposed route options

Geology	Summary of Potential Effects
All options	<u>Impacts on Geology, Geomorphology and Mineral Resources</u> Neutral effect on local geology, geomorphology and mineral resources. <u>Soil</u> Further assessment is required on the Agricultural land within the study area. Therefore the effect on soils at this stage is considered slight. <u>Groundwater</u> Providing construction works are undertaken in accordance with all relevant legislation, guidance and best practise and detailed design minimised the risks to aquifers and abstraction wells the effect on groundwater is likely to be slight/moderate. <u>Surface Waters</u> There is a potential for minor adverse effects to surface water and quality of SPZ2 and 3 associated with construction but the significance of the effect on surface water is unlikely to exceed slight/moderate. <u>Built Environment</u> Neutral risk to new infrastructure. <u>End Users</u> Neutral risk to human health.

Table 16-8: Summary of potential effects on Materials of all options

Materials	Summary of Potential Effects
All options	- The effects of the route options from materials and site arising, and waste generation and disposal, are likely to occur on-site, off-site within the UK and, potentially, internationally. - It is expected that most direct and indirect effects would occur during site construction and the first full year of operation. Effects arising further into the operational lifecycle are expected to be negligible, and hence have been scoped out of Stage 2 EAR.

Materials	Summary of Potential Effects
	<u>Material Use</u> The potential impact of material use on the Scheme include: ■ Consumption of natural and non-renewable resources ■ Release of greenhouse gas emissions; ■ Water consumption and scarcity; ■ Environmental degradation and pollution; and ■ Nuisance to communities (visual, noise, health) <u>Site Arisings</u> The potential impact of site arisings from the Scheme include: ■ Reduced need to consume primary resources ■ Reduced greenhouse gas emissions; and ■ Reduced environmental degradation and pollution <u>Waste</u> The potential impacts of waste from the Scheme include: ■ Generation and disposal of waste ■ Release of greenhouse gas emissions; ■ Environmental degradation and pollution; and ■ Nuisance to communities (visual, noise, health) Based on the preliminary earthwork cut and fill requirements Orange and Red has been assessed to have a negligible impact due to the net volume being de-minimus in nature and the cut and re-use of waste anticipated to balance more than the other routes. The Cyan, Yellow, Olive, Black 1 and Black 2 routes have been assessed to have a slight adverse effect as they all have a requirement to import a large amount of earthwork material.

Table 16-9: Summary of potential effects on people and communities of the seven proposed route options

People and Communities	Summary of Potential Effects
Orange	<u>All Travellers</u> - Moderate effect due to disruption to all roads situated on the west which provide access to the communities and Hereford City. <u>Views from the Road</u> - Slight effect as most of the roads within Hereford are lined with high hedges which restrict views across the landscape - Minor effects from King's Acre Road which has more open views across the landscape. <u>Driver Stress</u> - Slight effect on driver stress from diversions and road closures and increasing journey times. <u>NMU/PROW</u> - Moderate effect to PRow which may result in closures and diversions and increased journey times and effects on recreational areas. <u>Community Severance</u> - Temporary effects on community severance as roads and PRow are closed/diverted, however access between communities by vehicle will not be affected. <u>Tourism and Recreation</u> - Major effect on Belmont Abbey and well used PRow associated with the grounds. <u>Housing</u> - Directly affected houses along on King's Acre Road. - Moderate effect to residents in close prominty to the route <u>Community Land</u> - Moderate effect on Hereford Community Farm as the route transverses the land. <u>Agricultural Land</u> - Major effect as high grade agricultural land will be lost.

People and Communities	Summary of Potential Effects
	<u>Development Land</u> Major effect on Three Elms Development.
Cyan	<u>All Travellers</u> - Moderate effect due to disruption to all roads situated on the west which provide access to the communities and Hereford City. <u>Views from the Road</u> - Slight effect as most of the roads within Hereford are lined with high hedges which restrict views across the landscape - Minor effects from King's Acre road which has more open views across the landscape. <u>Driver Stress</u> - Slight effect on driver stress from diversions and road closures and increasing journey times. <u>NMU/PROW</u> - Moderate effect to PROW which may result in closures and diversions and increased journey times and effects on recreational areas. <u>Community Severance</u> - Temporary effects on community severance as roads and PROW are closed/diverted, however access between communities by vehicle will not be affected. <u>Tourism and Recreation</u> - Major effect on Belmont Abbey and well used PROW associated with the grounds. <u>Housing</u> - Directly affected houses on King's Acre Road. - Moderate effect on residents in close proximity to the route. <u>Community Land</u> - Moderate effect on Hereford Community Farm as the route transverses the land. <u>Agricultural Land</u> - Major effect as high grade agricultural land will be lost.

People and Communities	Summary of Potential Effects
	<u>Development Land</u> Moderate effect on Three Elms Development.
Yellow	<u>All Travellers</u> - Moderate effect due to disruption to all roads situated on the west which provide access to the communities and Hereford City. <u>Views from the Road</u> - Slight effect as most of the roads within Hereford are lined with high hedges which restrict views across the landscape - Minor effects from King's Acre road which has more open views across the landscape. <u>Driver Stress</u> - Slight effect on driver stress from diversions and road closures and increasing journey times. <u>NMU/PROW</u> - Moderate effect to PRow which may result in closures and diversions and increased journey times and effects on recreational areas. <u>Community Severance</u> - Temporary effects on community severance as roads and PRow are closed/diverted, however access between communities by vehicle will not be affected. <u>Tourism and Recreation</u> - Major effect on Belmont Abbey and well used PRow associated with the grounds. <u>Housing</u> - Directly affected houses along on King's Acre Road. - Moderate effect to residents in close proximity to the route. <u>Community Land</u> - Moderate effect on Hereford Community Farm as the route transverses the land. <u>Agricultural Land</u> - Major effect as high grade agricultural land will be lost.

People and Communities	Summary of Potential Effects
	<u>Development Land</u> Major effect on Three Elms Development.
Red	<u>All Travellers</u> - Moderate effect due to disruption to all roads situated on the west which provide access to the communities and Hereford City. <u>Views from the Road</u> - Slight effect as most of the roads within Hereford are lined with high hedges which restrict views across the landscape - Minor effects from King's Acre road which has more open views across the landscape. <u>Driver Stress</u> - Slight effect on driver stress from diversions and road closures and increasing journey times. <u>NMU/PROW</u> - Moderate effect to PROW which may result in closures and diversions and increased journey times and effects on recreational areas. <u>Community Severance</u> - Temporary effects on community severance as roads and PROW are closed/diverted, however access between communities by vehicle will not be affected. <u>Tourism and Recreation</u> - Major effect on Belmont Abbey and well used PROW associated with the grounds. <u>Housing</u> - Directly affected houses on King's Acre Road. - Moderate effect to residents in close proximity to route. <u>Community Land</u> - Moderate effect on Hereford Community Farm as the route transverses the land.

People and Communities	Summary of Potential Effects
	<u>Agricultural Land</u> - Major effect as high grade agricultural land will be lost. <u>Development Land</u> - Moderate effect on Three Elms Development.
Olive	<u>All Travellers</u> - Moderate effect due to disruption to all roads situated on the west which provide access to the communities and Hereford City. <u>Views from the Road</u> - Slight effect as most of the roads within Hereford are lined with high hedges which restrict views across the landscape <u>Driver Stress</u> - Slight effect on driver stress from diversions and road closures and increasing journey times. <u>NMU/PROW</u> - Moderate effect to PROW which may result in closures and diversions and increased journey times and effects on recreational areas. <u>Community Severance</u> - Temporary effects on community severance as roads and PROW are closed/diverted. <u>Tourism and Recreation</u> - Major effect on Belmont Abbey and well used PROW associated with the grounds. - Major effect to Greenbank Meadow open space <u>Housing</u> - Directly affected houses on King's Acre Road. - Moderate effect to residents in close proximity to the route. <u>Community Land</u> - Major effect to Greenbank Meadow open space

People and Communities	Summary of Potential Effects
	<u>Agricultural Land</u> - Major effect as high grade agricultural land will be lost. <u>Development Land</u> - Moderate effect on Three Elms Development.
Black 1	<u>All Travellers</u> - Moderate effect due to disruption to all roads situated on the west which provide access to the communities and Hereford City. <u>Views from the Road</u> - Slight effect as most of the roads within Hereford are lined with high hedges which restrict views across the landscape - Minor effects from King's Acre road which has more open views across the landscape. <u>Driver Stress</u> - Slight effect on driver stress from diversions and road closures and increasing journey times. <u>NMU/PROW</u> - Moderate effect to PROW which may result in closures and diversions and increased journey times and effects on recreational areas. <u>Community Severance</u> - Temporary effects on community severance as roads and PROW are closed/diverted. <u>Tourism and Recreation</u> - Major effect on Belmont Abbey and well used PROW associated with the grounds. - Major effect to Greenbank Meadow open space - Major effect to Drovers Wood (permanent land take) <u>Housing</u> - Directly affected houses on King's Acre Road. - Moderate effect to residents in close proximity to the route. <u>Community Land</u>

People and Communities	Summary of Potential Effects
	- Major effect to Greenbank Meadow open space <u>Agricultural Land</u> - Major effect as high grade agricultural land will be lost. <u>Development Land</u> - Slight effect on Three Elms Development.
Black 2	<u>All Travellers</u> - Moderate effect due to disruption to all roads situated on the west which provide access to the communities and Hereford City. <u>Views from the Road</u> - Slight effect as most of the roads within Hereford are lined with high hedges which restrict views across the landscape. - Minor effects from King's Acre road which has more open views across the landscape. <u>Driver Stress</u> - Slight effect on driver stress from diversions and road closures and increasing journey times. <u>NMU/PROW</u> - Moderate effect to PRow which may result in closures and diversions and increased journey times and effects on recreational areas. <u>Community Severance</u> - Temporary effects on community severance as roads and PRow are closed/diverted, however access between communities by vehicle will not be affected. <u>Tourism and Recreation</u> - Major effect on Belmont Abbey and well used PRow associated with the grounds. - Major effect to Drovers Wood (permanent land take) <u>Housing</u> - Directly affected houses on King's Acre Road. - Moderate effect on residents in close proximity to the route.

People and Communities	Summary of Potential Effects
	<u>Community Land</u> - Moderate effect on Hereford Community Farm as the route transverses the land. <u>Agricultural Land</u> - Major impact as high grade agricultural land will be lost. <u>Development Land</u> - Slight effect on Three Elms Development.

Table 16-10: Summary of potential effects on Climate of all the proposed route options

Climate	Summary of Potential Effects
All Route Options	With predicted changes in climate leading to shorter, more intense rainfall events, the proposed Scheme would be increasingly susceptible to flood events. Chapter 10 Water drainage describes the flood zones across the study area and the susceptibility of the proposed Scheme to increased flooding due to climate change.

Table 16-11: Summary of potential Combined effects of all the proposed route options

Combined effects	Summary of Potential Effects
All options	There is the potential for significant adverse combined effects during construction on cultural heritage, landscape/townscape, biodiversity (although significance of effects are to be determined), geology and soils, noise and vibration, water drainage and human health. There is the potential for significant adverse combined effects during operation on air quality, cultural heritage, biodiversity (although significance of effects are to be determined), and noise and vibration. There is the potential for beneficial effects on vehicle travellers during operation.

Table 16-12: Summary of potential cumulative effects of all the proposed route options

Cumulative	Summary of Potential Effects
All options	There is the potential for significant adverse cumulative effects during construction on cultural heritage, landscape/townscape, biodiversity, noise and vibration, and communities, due to potential interactions with the proposed Three Elms, Holmer Estates and Holmer West schemes. There is the potential for significant adverse cumulative effects during operation on cultural heritage, and noise and vibration, due to potential interactions with the proposed Three Elms, Holmer Estates and Holmer West schemes. There is the potential for beneficial effects on vehicle travellers and communities during operation.

17 ENVIRONMENTAL CONSTRAINTS PLANS

The Environmental Constraints Plans can be seen in Appendix 17-1.

18 GLOSSARY

Abbreviation	Description	Definition
$\mu\text{g}/\text{m}^3$	Microgram	The concentration of an air pollutant given in micrograms per cubic meter air
AADT	Annual Average Daily Traffic	One of several ways of measuring the flow of traffic; represents the daily average number of vehicles using a particular link in the network, averaged across the whole year.
AAWT	Annual Average Weekly Traffic	Annual average daily traffic, abbreviated AADT, is a measure used primarily in transportation planning and transportation engineering. Traditionally, it is the total volume of vehicle traffic of a highway or road for a year divided by 365 days. AADT is a useful and simple measurement of how busy the road is. Newer advances from traffic data providers are now providing AADT by side of the road, by day of week and by time of day
AGLV	Area of Great Landscape Value	An area of land in England which is considered to have a particular scenic value and is therefore afforded a degree of protection by local authorities.
ALC	Agricultural Land Classification	A system of classifying the quality of agricultural land, from Grade 1 (best) to Grade 5 (Worst). Grade 3 is subdivided into 3a and 3b. For the purposes of government policy Grades 1-3a are further classified as 'best most versatile' agricultural land.
AOD	Above Ordnance Datum	In the British Isles, an ordnance datum or OD is a vertical datum used by an ordnance survey as the basis for deriving altitudes on maps. A spot height may be expressed as AOD for "above ordnance datum".
AONB	Area of Outstanding Natural Beauty	Statutory designation which confers the means to protect the most important landscape of England and Wales for the benefit of future generations.
APIS	Air Pollution Information System	Searchable online database providing information on pollutants and their impacts on habitats and species
AQMA	Air Quality Management Areas	Local planning authorities are obliged to declare an AQMA in any area where there are, or are expected to be exceedences of the relevant Air Quality objectives. The Authority declaring an AQMA is obliged to prepare a management plan to prevent or remove any such exceedences.
ARN	Affected Road Network	The extent of the road network which is likely to experience negative or positive environmental effects.
ATM	Active Travel Measures	Active traffic management (also managed lanes, smart lanes, managed/smart motorways) is method of increasing peak capacity and smoothing traffic flows on busy major highways. Techniques include variable speed limits, hard-shoulder running and ramp-metering controlled by overhead variable message signs.
AWI	Ancient Woodland Inventory	The inventory identifies over 52,000 ancient woodland sites in England. Ancient woodland is identified using presence or absence of woods from old maps, information about the wood's name, shape, internal boundaries, location relative to other features, ground survey, and aerial photography. The information recorded about each wood and stored on the Inventory Database

		includes its grid reference, its area in hectares and how much is semi-natural or replanted. Prior to the digitisation of the boundaries, only paper maps depicting each ancient wood at 1:50 000 scale were available.
B		
BAP	UK Biodiversity Action Plan	Biodiversity Action Plan is the UK Government's response to the Convention on Biological Diversity CBD signed in 1992. It describes the UK's biological resources and commits a detailed plan for the protection of these resources. The UK BAP has 391 Species Action Plans, 45 Habitat Action Plans and 162 Local Biodiversity Action Plans with Targeted Actions.
BGS	British Geological Survey	A geoscience centre for survey and monitoring; modelling and research; data and knowledge.
BMV	Best Most Versatile	Agricultural land that falls within classification 1,2 or 3a.
BNDP	Breinton Neighbourhood Development Plan	The Breinton Neighbourhood Development Plan (BNDP) sets out detailed planning policy for Breinton parish. It will be used to help shape the future development of Breinton parish up to 2031.
BoCC	UK Birds of Conservation Concern	Commonly referred to as the UK Red List for birds, this is the fourth review of the status of birds in the UK, Channel Islands and Isle of Man, and updates the last assessment in 2009. Using standardised criteria, 244 species with breeding, passage or wintering populations in the UK were assessed by experts from a range of bird NGOs and assigned to the Red, Amber or Green lists of conservation concern.
BPEO	Best Practicable Environmental Option	Best Practicable Environmental Option (BPEO) A term used with reference to environmental management. The outcome of a systematic consultative decision making procedure that emphasises the protection of the environment across land, air and water.
BS	British Standards	British Standards are the standards produced by the BSI Group which is incorporated under a Royal Charter.
C		
CAF	Corridor Appraisal Framework	Report setting out the process of appraisal of the 24 routes considered at 'long-list' stage.
CDE	Construction Demolition Excavation	Preventing pollution, managing waste and resources sustainably.
CEMP	Construction Environmental Management Plan	A plan prepared by a contractor before the start of construction work, detailing 'environmental aspects' that may be affected by the construction work and management methods to prevent any such effects. The CEMP would include methods and site management practises to be applied to prevent generation of nuisance dust, accidental pollution events and a range of other environment, and respond and reporting procedures to minimise the damage in the event of a pollution incident.
CIRIA	Construction Industry Research and Information Association.	

CLR	Contaminated Land Report	Reports showing progress on dealing with contaminated land in England and Wales.
CO ₂	Carbon Dioxide	A colourless, odourless gas produced by burning carbon and organic compounds and by respiration. It is naturally present in air (about 0.03 per cent) and is absorbed by plants in photosynthesis.
CPRE	Campaign Protect Rural England	The Campaign to Protect Rural England (CPRE) is a registered charity in England with over 40,000 members and supporters. Formed in 1926 by Sir Patrick Abercrombie to limit urban sprawl and ribbon development.
CRoW	Countryside and Rights of Way Act	Areas where the public can walk freely on mapped areas of mountain, moor, heath, downland and registered common land without having to stick to paths.
CRTN	Calculation of Road Traffic Noise	A computer model used to calculate the level of road traffic noise change.
CSM	Conceptual Site Model	The Conceptual site Model (CSM) is one of the primary planning tools that can be used to support the decision making process managing contaminated land and groundwater on a large scale. The CSM organizes available information about a site in a clear and transparent structure and facilitate the identification of data and information gaps. Once the CSM is established, additionally needed data can be gathered and integrated in the CSM, followed by a revision of the CSM and a refinement of decision goals, if required.
D		
dB	Decibels	A unit used to measure the intensity of a sound or the power level of an electrical signal by comparing it with a given level on a logarithmic scale
DCLG	Department for Communities and Local Government	The Ministry of Housing, Communities and Local Government's (formerly the Department for Communities and Local Government) job is to create great places to live and work, and to give more power to local people to shape what happens in their area.
DCO	Development Consent Order	Order under which the relevant Secretary of State can grant consent for construction of a Nationally Significant Infrastructure Project, on the advice of the Planning Inspectorate, under the Planning Act 2008 as amended.
DEFRA	Department of Environment, Food and Rural Affairs	The Department for Environment, Food and Rural Affairs (Defra) is the government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the United Kingdom of Great Britain and Northern Ireland. Concordats set out agreed frameworks for co-operation, between it and the Scottish Government, Welsh Government and Northern Ireland Executive, which have devolved responsibilities for these matters in their respective nations.
DM	Do-minimum	A hypothetical scenario used to provide a realistic comparison of the effects of a scheme. The do-minimum scenario includes any changes to the highway infrastructure that would occur even if the scheme does not go ahead, and any other developments in the

		surrounding area that would influence the movement of traffic and would occur independently of the scheme.
DMRB	Design Manual for Roads and Bridges	The 'Design Manual for Roads and Bridges' was introduced in 1992 in England and Wales. It provides a comprehensive manual system, which accommodates all current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads and motorways.
DNA	Deoxyribonucleic acid	Deoxyribonucleic acid is a thread-like chain of nucleotides carrying the genetic instructions used in the growth, development, functioning and reproduction of all known living organisms and many viruses.
DS	Do-Something	
DSCs	District Strategic Corridors	
E		
EA	Environment Agency	A non-departmental government body covering England and Wales, responsible for protection of the
EAR	Environmental Assessment Report	This report sets out the results of the environmental assessment undertaken to date for the Scheme, and sets out the results of the assessment undertaken to date for each of the options, and provides a comparison between them in terms of their anticipated environmental effects.
EFT	Emission Factor Toolkit	The Emissions Factors Toolkit (EFT) is published by Defra and the Devolved Administrations to assist local authorities in carrying out Review and Assessment of local air quality as part of their duties under the Environmental Act 1995. The EFT allows users to calculate road vehicle pollutant emission rates for NOx, PM10, PM2.5 and CO2 for a specified year, road type, vehicle speed and vehicle fleet composition. The EFT is updated periodically due to updates to underlying data including vehicle fleet composition and emissions factors.
EHO	Environmental Health Officer	Local Authority Officer responsible for carrying out measures for protecting public health, including administering and enforcing legislation related to environmental health and providing support to minimise health and safety hazards.
EIA	Environmental Impact Assessment	Under Infrastructure Planning (Environmental Impact Assessment) Regulations 2009, proposers of certain scheduled developments are required to submit a planning application with an accompanying environmental statement, evaluating the likely environmental impacts of the development, together with an assessment of how the severity of the impacts could be reduced.
ELC	European Landscape Convention	The European Landscape Convention, also known as the Florence Convention, is the first international treaty to be exclusively devoted to all aspects of European landscape. It applies to the entire territory of the Parties and covers natural, rural, urban and peri-urban areas. It concerns landscapes that might be considered outstanding as well as every day or degraded landscapes. The Convention is aimed at: the protection, management and planning of all landscapes and raising awareness of the value of a living landscape.

EPA	Environmental Protection Act 1990	An act to make provision for the improved control of pollution arising from certain industrial and other processes.
ES	Environmental Statement	The report on the results of an EIA.
EU	European Union	
F		
FAS	Flood Alleviation Scheme	Works to prevent or reduce flood risk.
FRA	Flood Risk Assessment	An assessment of the risk of flooding, particularly in relation to residential, commercial and industrial land use.
G		
GCN	Great Crested Newt	The northern crested newt, also known as the great crested newt or warty newt (<i>Triturus cristatus</i>) is a newt in the family Salamandridae, found across Europe and parts of Asia.
GHG	Greenhouse Gas	A gas that contributes to the greenhouse effect by absorbing infrared radiation. Carbon dioxide and chlorofluorocarbons are examples of greenhouse gases.
H		
HA	Highways Agency	An Executive Agency of the DfT responsible for operating, maintain and improving the SRN in England. Since 2015, this has become Highways England.
HARC	The Hereford Archive Centre	Archive of historic environment records for Herefordshire.
HAWTAT Tool	Highways Agency Water Risk Assessment Tool	A method published by the HA to assist in assessing impacts on air quality in accordance with DMRB
HBAP	Herefordshire Biodiversity Action Plan	The Herefordshire Biodiversity Action Plan sets out the steps which need to be taken, listing the 17 species and 13 habitats which are most threatened.
HBRC	Herefordshire Biological Records Centre	HBRC's main aim is to provide as wide access as possible to both species and habitat records for Herefordshire and assist in the protection of those species and habitats.
HCC	Hereford City Council	
HD	Herefordshire Local Plan Core Strategy 2011 - 2031 Place shaping policy	The council has prepared a Local Plan to guide development and change in the county up to 2031. The Local Plan is made up of a number of documents including the Core Strategy. A list of all the Local Plan documents and the timetable for their preparation are set out in the Local Development Scheme.
HER	Historic Environment Record	A database maintained by individual counties or local authorities, containing records of archaeological sites, historic buildings and other aspects of the historic environment.
HGV	Heavy Goods Vehicle	The EU Term for any lorry with a gross combination mass of over 3500 kilograms.

HMSO	Her Majesty's Stationery Office	The Office of Public Sector Information is the body responsible for the operation of Her Majesty's Stationery Office and of other public information services of the United Kingdom.
HRA	Habitats Regulations Assessment	The purpose of the Habitats Directive is to "maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest" (Habitats Directive, Article 2(2)). This relates to habitats and species, not the European sites themselves, although the sites have a significant role in delivering favourable conservation status. European sites (also called Natura 2000 sites) can be defined as actual or proposed/candidate Special Areas of Conservation (SAC) or Special Protection Areas (SPA).
HTP	Hereford Transport Package	The HTP is a suite of transport and infrastructure improvements that form a key part of the vision and objectives within the Local Transport Package and Core Strategy. The HTP includes: Hereford Bypass and walking, cycling bus and public realm improvements.
I		
IAN	Interim Advice Notes	Published by HA to modify/update guidance given within DMRB, in advance of the permanent replacement of relevant sections of DMRB.
IDB	Investment Decision Board	Herefordshire Council board which determines where, when, how, and how much capital to spend and/or debt to acquire in the pursuit of making a profit.
IEMA	Institute of Environmental Management and Assessment	A professional body that advises the Government on UK-wide and international nature conservation
IUCN	International Union for Conservation of Nature	The International Union for Conservation of Nature (IUCN; officially International Union for Conservation of Nature and Natural Resources[2]) is an international organization working in the field of nature conservation and sustainable use of natural resources.
J		
JNCC	Joint Nature Conservation Committee.	The public body that advises the Government on UK – wide and international nature conservation.
K		
KPH	Kilometres Per Hour	Is a unit of speed, expressing the number of kilometres travelled in one hour.
L		
LCT	Landscape Character Types	Landscape Character Types are generic landscapes that share similar characteristics but may occur in different parts of Devon. Landscape Character Types allow different landscapes to be compared.
LDP	Local Development Plan	The Local Development Plan (LDP) is the development plan for a county and is the basis for land use planning within the council's administrative area.
LEZ	Local Enhancement Zones	Within the Green Infrastructure Plan 2010 (Herefordshire) these are areas where the provision of green infrastructure is required

		to create the most sustainable living and working places around the key towns in the country.
LLFA	Lead Local Flood Authority	Lead Local Flood Authorities (unitary authorities or county councils) are responsible for developing, maintaining and applying a strategy for local flood risk management in their areas and for maintaining a register of flood risk assets.
LOAEL	Lowest Observed Adverse Effect Level	The lowest-observed-adverse-effect level (LOAEL) is the lowest concentration or amount of a substance found by experiment or observation that causes an adverse alteration of morphology, function, capacity, growth, development, or lifespan of a target organism.
LSCs	Local Strategic Corridors	
M		
MAFF	Former Ministry for Agriculture, Fisheries and Food	
MAGIC Maps	Geographic Information interactive map from across government	
MTs	Motorised Travellers	Persons using motor vehicles
N		
NCA	National Character Area	A National Character Area (NCA) is a natural subdivision of England based on a combination of landscape, biodiversity, geodiversity and economic activity. There are 159 National Character Areas and they follow natural, rather than administrative, boundaries.
NE	Natural England	A public body responsible for the protection of the natural environment and landscape in England and the management of the NNRs and SSSIs.
NEET	Not in Education, Employment or Training	Term used by PHE to describe a young person not in education, employment or training
NERC	Natural Environment and Rural Communities	An Act to make provision about bodies concerned with the natural environment and rural communities; to make provision in connection with wildlife, sites of special scientific interest, National Parks and the Broads; to amend the law relating to rights of way; to make provision as to the Inland Waterways Amenity Advisory Council; to provide for flexible administrative arrangements in connection with functions relating to the environment and rural affairs and certain other functions; and for connected purposes.
NGR	National Grid Reference	The Ordnance Survey National Grid reference system is a system of geographic grid references used in Great Britain, distinct from latitude and longitude.
NHLE	National Heritage List for England	The National Heritage List for England is an online database of designated heritage assets excluding conservation areas. It holds official records for: 1. Listed buildings 2. Scheduled monuments 3. Protected wreck sites 4. Registered parks and gardens 5. Registered battlefields

		It also holds a convenient collated version of the record of World Heritage Sites (the official record is held by UNESCO). It also contains details of certificates of immunity from listing and building preservation activities received by Historic England.
NIA	Noise Important Areas	These areas show 'hot spots' where properties may experience high levels of noise.
NIR	Noise Insulation Regulations	The Noise Insulation Regulations 1975 (as amended 1988) set out the requirements under which buildings may qualify for both statutory and discretionary noise insulation.
NMU	Non- Motorised Users	Includes pedestrians, cyclists and equestrians.
NO ₂	Nitrogen Dioxide	A chemical pollutant emitted from vehicle exhausts.
NOAEL	No Observed Adverse Effect Level	The no-observed-adverse-effect level (NOAEL) denotes the level of exposure of an organism, found by experiment or observation, at which there is no biologically or statistically significant (e.g. alteration of morphology, functional capacity, growth, development or life span) increase in the frequency or severity of any adverse effects in the exposed population when compared to its appropriate control. This is also known as highest no-effect level, or HNEL.
NOMIS	Official Labour Market Statistics	
NO _x	Nitrogen oxides	A chemical pollutant emitted from vehicle exhausts.
NPPF	National Planning Policy Framework	A statement of central government guidance on planning policy.
NPPG	National Planning Practice Guidance	The National Planning Practice Guidance (NPPG) is a web-based resource which brings together planning guidance on various topics into one place.
NPSE	Noise Policy Statement for England	The Noise Policy Statement for England was published on 15 March 2010. It sets out the long term vision of government noise policy, to promote good health and a good quality of life through the management of noise.
NPSNN	National Policy Statement for National Networks	The 'National networks national policy statement' sets out the: need for development of road, rail and strategic rail freight interchange projects on the national networks. the policy against which decisions on major road and rail projects will be made.
NSIPs	Nationally Significant Infrastructure Projects	Nationally Significant Infrastructure Projects (NSIPs) are large scale developments (relating to energy, transport, water, or waste) which require a type of consent known as "development consent".
NSRs	Noise Sensitive Receptors	NSR are the occupants who are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants.
O		
OAR	Options Assessment Report	Report documenting the processes carried out to develop the route options.

ONS	Office of National Statistics	The Office for National Statistics (ONS) is the executive office of the UK Statistics Authority, a non-ministerial department which reports directly to the UK Parliament.
ORS	Old Red Sandstone	The Old Red Sandstone is an assemblage of rocks in the North Atlantic region largely of Devonian age.
OS	Ordnance Survey	Ordnance Survey is a national mapping agency in the United Kingdom which covers the island of Great Britain. It is one of the world's largest producers of maps.
P		
P2CR	Phase 2 Consultation Report	Summary of the findings of the Stage 2 public consultation.
PAHs	Polycyclic aromatic hydrocarbons	Are potent atmospheric pollutants geological value.
PCBs	Polychlorinated biphenyls	A polychlorinated biphenyl (PCB) is an organic chlorine compound with the formula C ₁₂ H ₁₀ -xCl _x . Polychlorinated biphenyls were once widely deployed as dielectric and coolant fluids in electrical apparatus, carbonless copy paper and in heat transfer fluids.
PCM	Pollution Climate Mapping	The Pollution Climate Mapping (PCM) model is a collection of models designed to fulfil part of the UK's EU Directive (2008/50/EC) requirements to report on the concentrations of particular pollutants in the atmosphere. These models are run by Ricardo Energy & Environment on behalf of Defra.
PHE	Public Health England	Public Health England (PHE) is an executive agency of the Department of Health and Social Care.
PINS	Planning Inspectorates Advice Note	The Planning Inspectorate deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England and Wales.
PM10	Particulate Matter	Particulate matter (PM), also known as particle pollution, is a complex mixture of extremely small particles and liquid droplets that get into the air.
PPG	Planning Practise Guidance	Planning practice guidance is online guidance to support the policies in the National Planning Policy Framework.
PPR	Preferred Route Report	Report presenting the findings of the technical and environment assessment work, as well as the Phase 2 Public Consultation findings, which informed the selection of the preferred route.
PRoW	Public Rights of Way	Includes public footpaths, bridleways and restricted byways.
PSSR	Preliminary Sources Study Report	Report identifying geological, geotechnical, geomorphological, hydrological and geo-environmental aspects of the route options.
Q		
R		

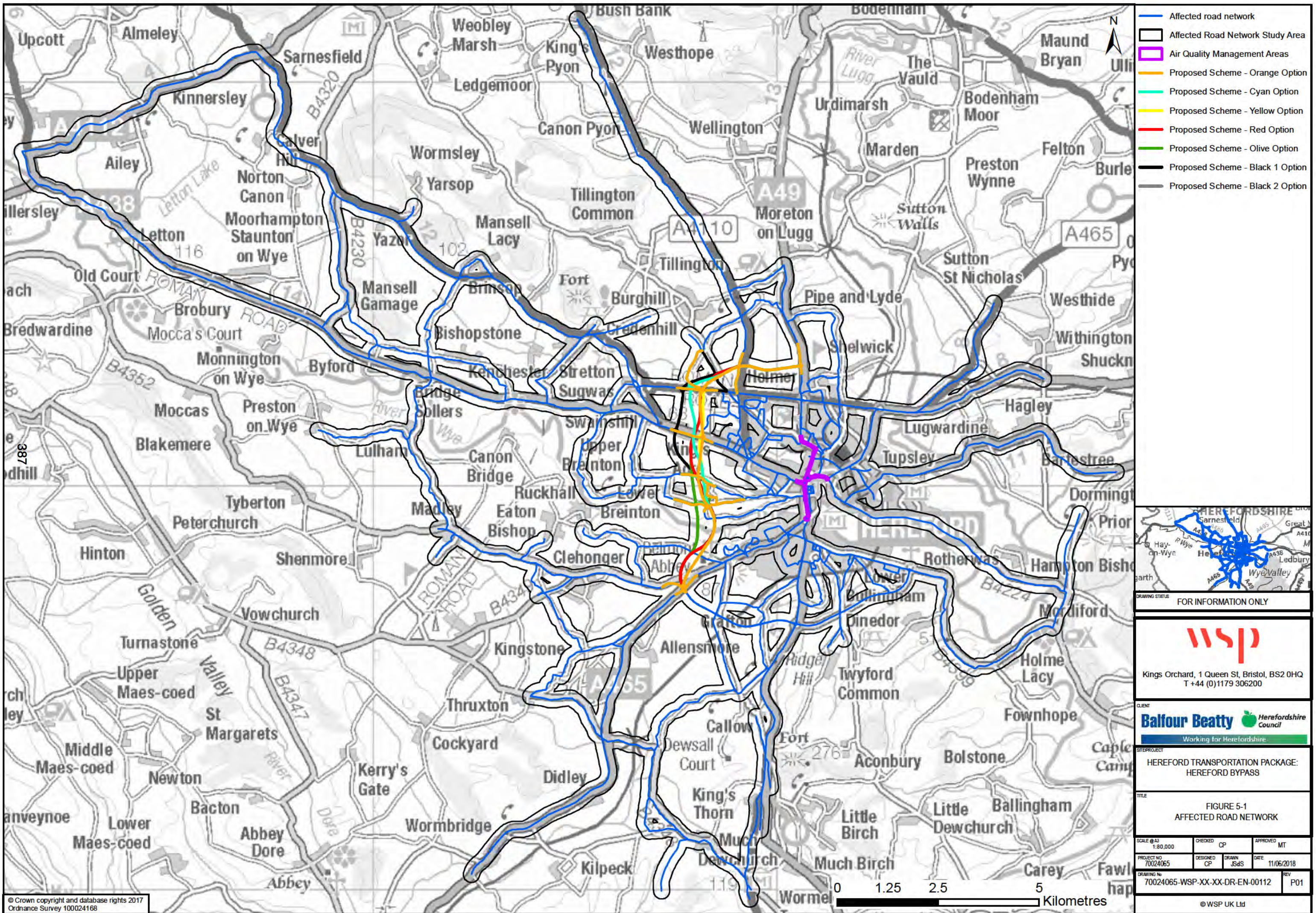
RIGS	Regionally Important Geological Sites	Selected by voluntary geoconservation groups for their educational, historic and aesthetic value. Now referred to as Local Geological Sites.
RoWIP	Rights of Way Improvement Plan	The plans set out the principle means by which local highway authorities are to identify, prioritise and plan for improvements to their local rights of way network.
RPA	Root Protection Area	Root Protection Area is defined as a layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority.
RSR	Route Selection Report	Describes how and why choices were made between the seven route options in selecting a best performing route option through the core strategy corridor.
S		
SAC	Special Area of Conservation	Strictly protected sites designated under the EU Habitats Directive, representing internationally important, high quality conservation sites that significantly contribute to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended).
SAR	Scheme Assessment Report	Presents the environmental, engineering, economic factors and the traffic advantages, disadvantages and constraints associated with the seven route options.
SFRA	Strategic Flood Risk Assessment	An SFRA takes into account the impacts of climate change and assesses the impact that land use changes and development in the area will have on flood risk.
SINC	Site of Importance for Nature Conservation	Designations used by local authorities for sites of substantive local nature conservation and geological value.
SLR	Southern Link Road	Southern Link Road (SLR) will link the A49 to the A465 and is already subject to planning permission.
SOAEL	Significant Observed Adverse Effect Level	This is the level above which significant adverse effects on health and quality of life occur.
SPA	Special Protection Area	Site of European importance for bird conservation, designated under the EC Birds Directive.
SPD	Supplementary Planning Document	SPD add further detail to the policies in the Local Plan. They can be used to provide further guidance for development on specific sites, or on particular issues, such as design.
SPG	Supplementary Planning Guidance	Builds upon and provide more detailed advice or guidance on the policies in the Local Plan. They are usually based on specific topics.
SPI	Species of Principal Importance	Section 41 of the Natural Environment and Rural Communities Act requires the Secretary of State to publish a list of species which are of principal importance for the conservation of biodiversity in England.

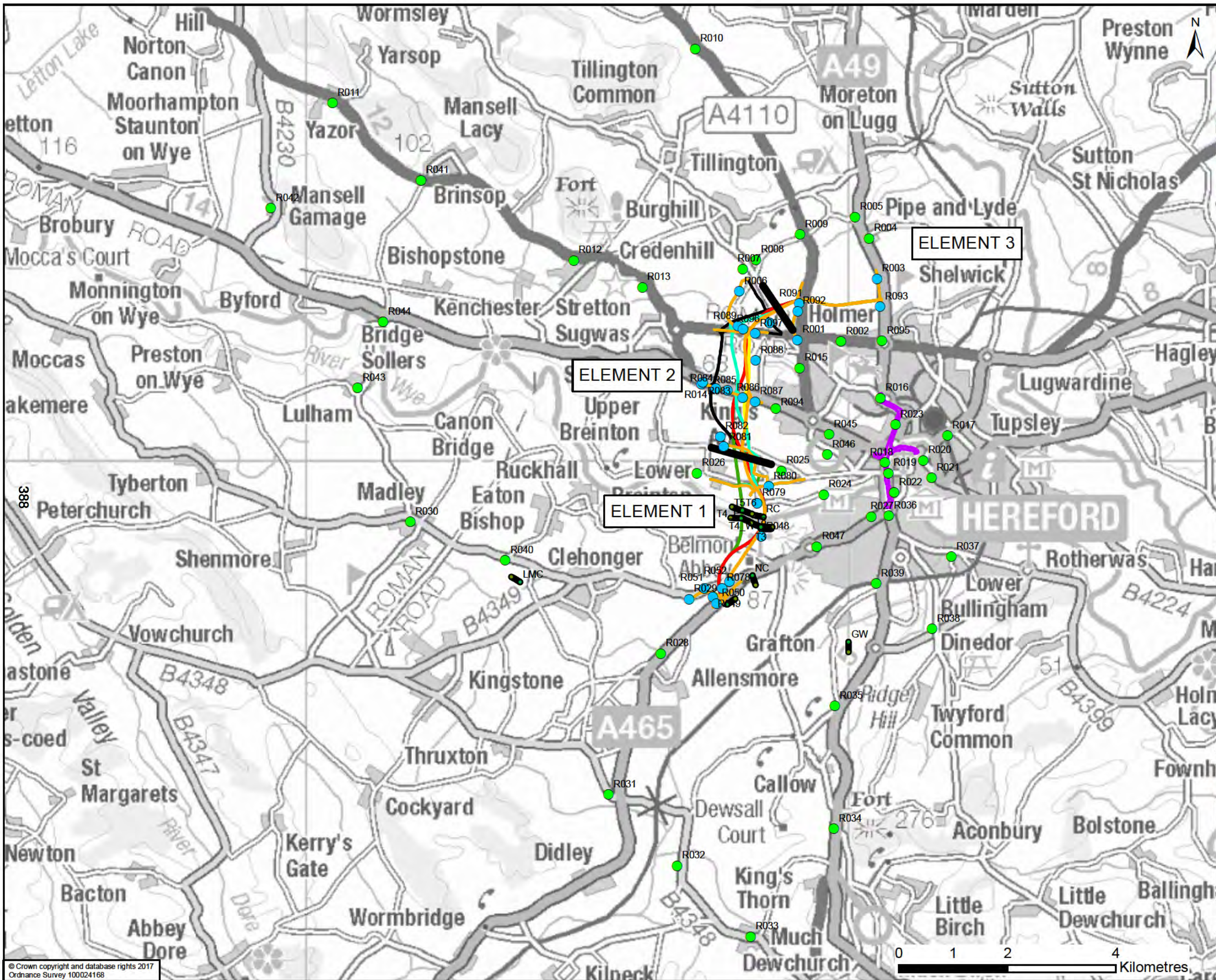
SPZ	Source Protection Zone	These zones show the risk of contamination from any activities that might cause pollution in the area of groundwater sources such as wells, boreholes and springs used for public drinking water supply.
SSSI	Site of Specific Scientific Interest	A statutory designation under the Wildlife and Countryside Act 1981 (as amended), protecting nationally important wildlife sites, habitats and geological sites.
SUDs	Sustainable Urban Drainage Systems	A system designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges
SWMP	Site Waste Management Plan	A plan required by law in England for all construction projects worth more than £300K governing the minimisation, management, storage, re-use and disposal of wastes generated through construction work.
SWS	Special Wildlife Site	SWS are considered to be the best places for wildlife in the county outside of legally protected areas such as SSSIs.
T		
TIN	Technical Information Note	Note providing technical information.
TPO	Tree Preservation Order	An order made by a Council in respect of a tree because the tree is considered to bring amenity value to the surrounding area.
TRL	Transport Research Laboratory	Is a fully independent private company offering a transport consultancy and research service to the public and private sector. Originally established in 1933; 85 years ago (1933), by the UK Government as the Road Research Laboratory (RRL), it was privatised in 1996. Its motto or tagline is 'The Future of Transport'.
U		
UAEL	Unacceptable Adverse Effect Level	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.
UDP	Unitary Development Plan	The unitary development plan (UDP) is a statutory document that sets out the council's planning policies that will be used to guide development, conservation, regeneration and environmental improvement activity in the local authority area.
UKBAP	UK Biodiversity Action Plan	The UK BAP describes the biological resources of the UK and provided detailed plans for conservation of these resources. Action plans for the most threatened species and habitats were set out to aid recovery, and national reports, produced every three- to five-years, showed how the UK BAP was contributing to the UK's progress towards the significant reduction of biodiversity loss
UKCP09	UK Climate Projections	UK Climate Projections is a climate analysis tool that forms part of the Met Office Hadley Centre Climate Programme which is supported by the Department of Business, Energy and Industrial Strategy (BEIS) and the Department for Environment, Food and Rural Affairs (Defra).

ULEVs	Ultra-Low Emission Vehicles	ULEV is the term used to describe any vehicle that: uses low carbon technologies and emits less than 75g of CO ₂ /km from the tailpipe.
V		
VRS	Vehicle Restraint System	VRS comprise safety barriers, parapets, terminals, vehicle attenuators and crash cushions which line the highway boundary.
W		
WCA	Wildlife and Countryside Act (as amended)	An Act to repeal and re-enact with amendments the Protection of Birds Acts 1954 to 1967 and the Conservation of Wild Creatures and Wild Plants Act 1975; to prohibit certain methods of killing or taking wild animals; to amend the law relating to protection of certain mammals; to restrict the introduction of certain animals and plants; to amend the Endangered Species (Import and Export) Act 1976; to amend the law relating to nature conservation, the countryside and National Parks and to make provision with respect to the Countryside Commission; to amend the law relating to public rights of way; and for connected purposes.
WFD	Water Framework Directive	The Water Framework Directive 2000/60/EC is an EU directive which commits European Union member states to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore) by 2015. It is a framework in the sense that it prescribes steps to reach the common goal rather than adopting the more traditional limit value approach. The Directive's aim for 'good status' for all water bodies will not be achieved, with 47% of EU water bodies covered by the Directive failing to achieve the aim.
WHS	World Heritage Sites	A natural or man-made site, area, or structure recognized as being of outstanding international importance and therefore as deserving special protection. Sites are nominated to and designated by the World Heritage Convention (an organization of UNESCO).
WPZ	Water Protection Zone	A Water Protection Zone is an area where certain activities (storing or using controlled substances) are banned or restricted to reduce the risk of polluting drinking water.
X		
Y		
Z		
Zol	Zone of Influence	"Zones of influence" were primarily a means of dividing land between two or more colonising nations. This enabled these nations to avoid armed conflict while acquiring more colonies. China and Afghanistan are other examples of lands divided into zones of influence.
ZVI	Zone of Visual Influence	The area within which a project may be visible and may influence the quality of views. The 'zone of visual influence' approximately covers all land from which the scheme is visible. It is limited by topographic features such as hills and valleys, and by visual barriers such as woodland and buildings.

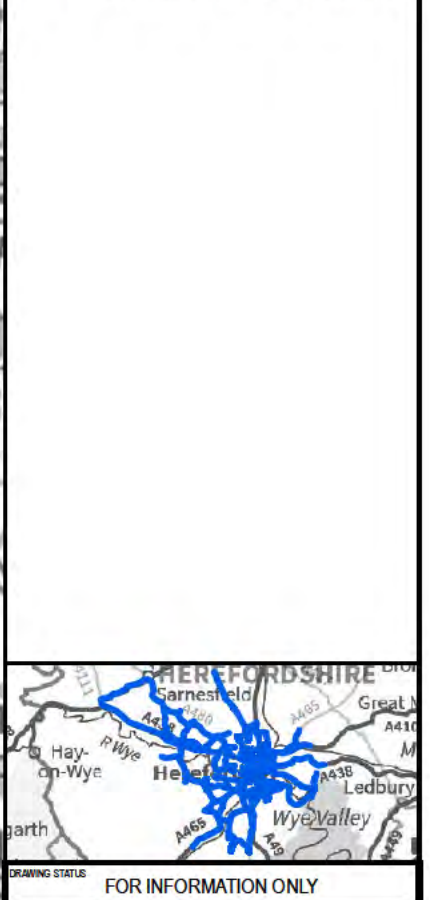
Appendix 5-1

AIR QUALITY FIGURES





- Receptors within 200m of Scheme
- Ecological Receptors
- Receptors outside 200m of Scheme
- Air Quality Management Areas
- Proposed Scheme - Orange Option
- Proposed Scheme - Cyan Option
- Proposed Scheme - Yellow Option
- Proposed Scheme - Red Option
- Proposed Scheme - Olive Option
- Proposed Scheme - Black 1 Option
- Proposed Scheme - Black 2 Option



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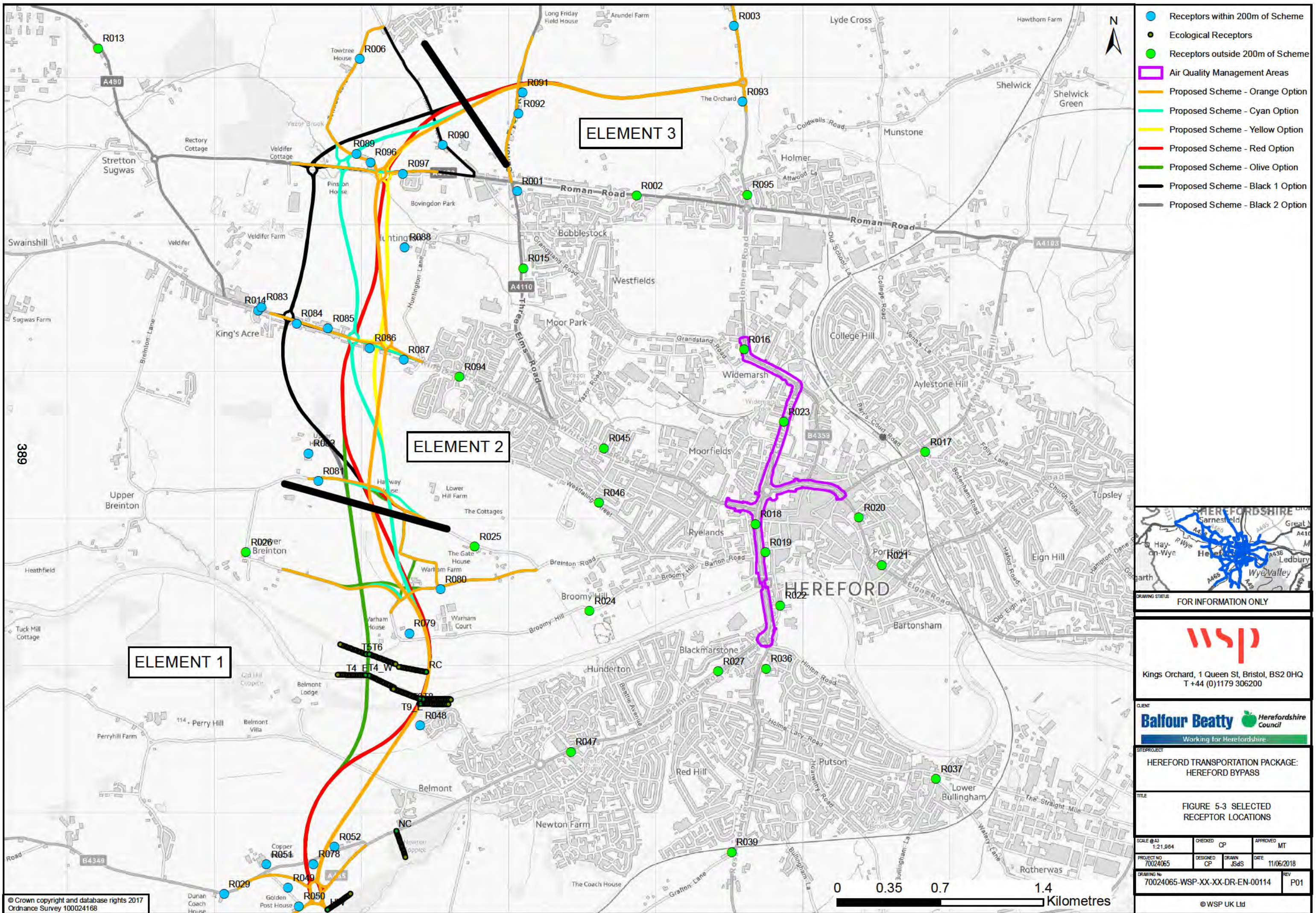
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HEREFORD TRANSPORTATION PACKAGE:
HEREFORD BYPASS

TITLE
FIGURE 5-2 SELECTED
RECEPTOR LOCATIONS

SCALE @ A3 1:63,906	CHECKED CP	APPROVED MT
PROJECT NO 70024065	DESIGNED CP	DRAWN JSdS
DATE 11/06/2018		REV P01

DRAWING No
70024065-WSP-XX-XX-DR-EN-00113

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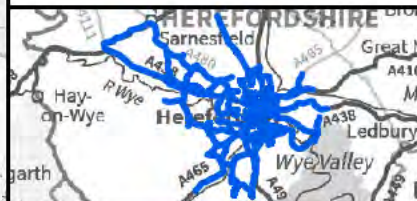
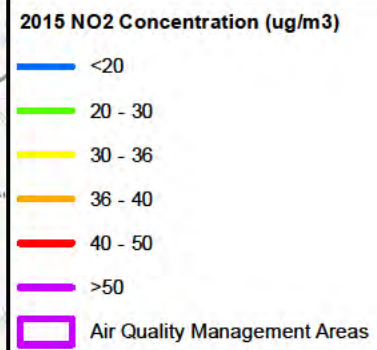
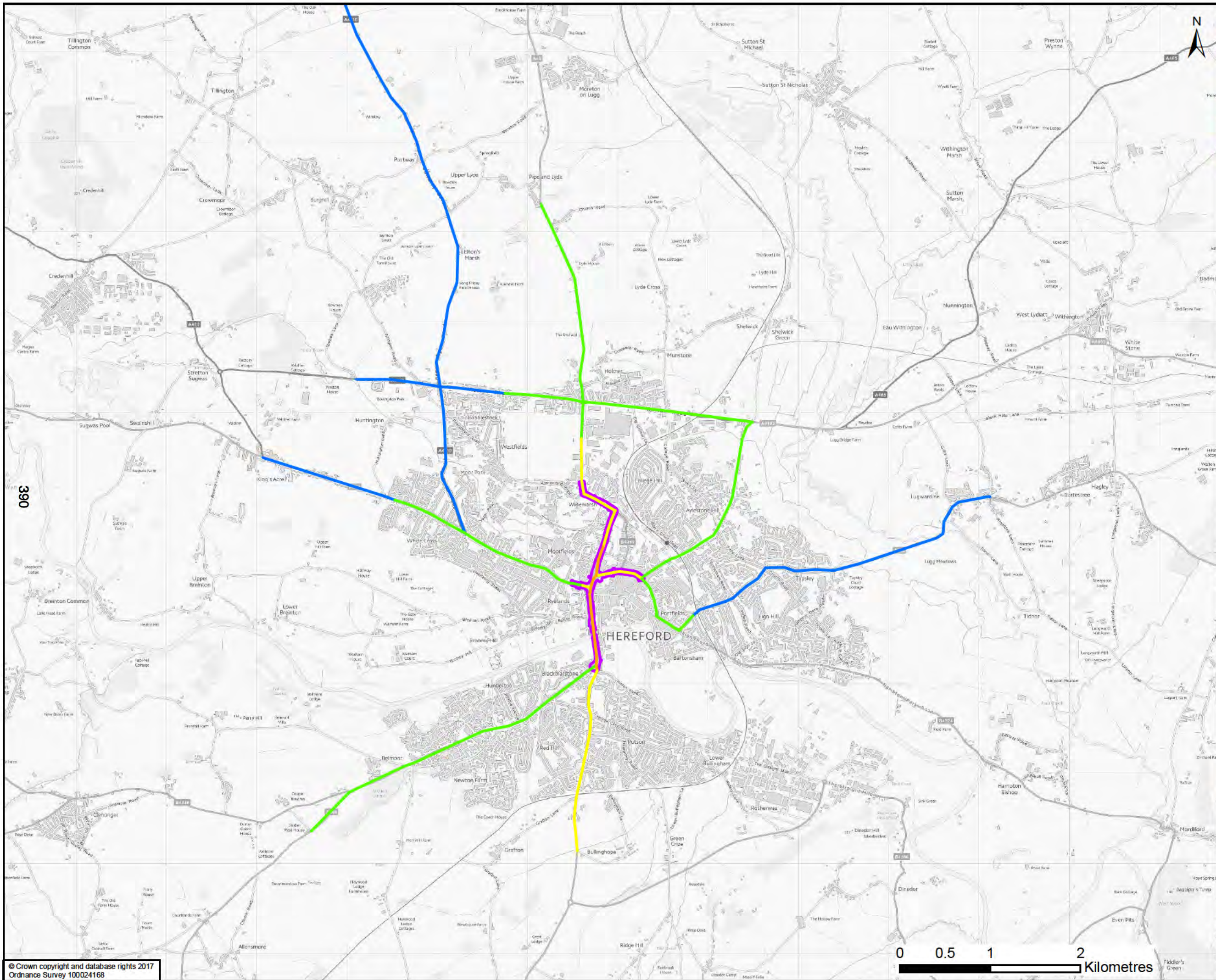
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HEREFORD TRANSPORTATION PACKAGE:
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TITLE
FIGURE 5-3 SELECTED
RECEPTOR LOCATIONS

SCALE @ A3 1:21,064	CHECKED CP	APPROVED MT
PROJECT NO 70024065	DESIGNED CP	DATE 11/06/2018
DRAWING No 70024065-WSP-XX-XX-DR-EN-00114	REV P01	

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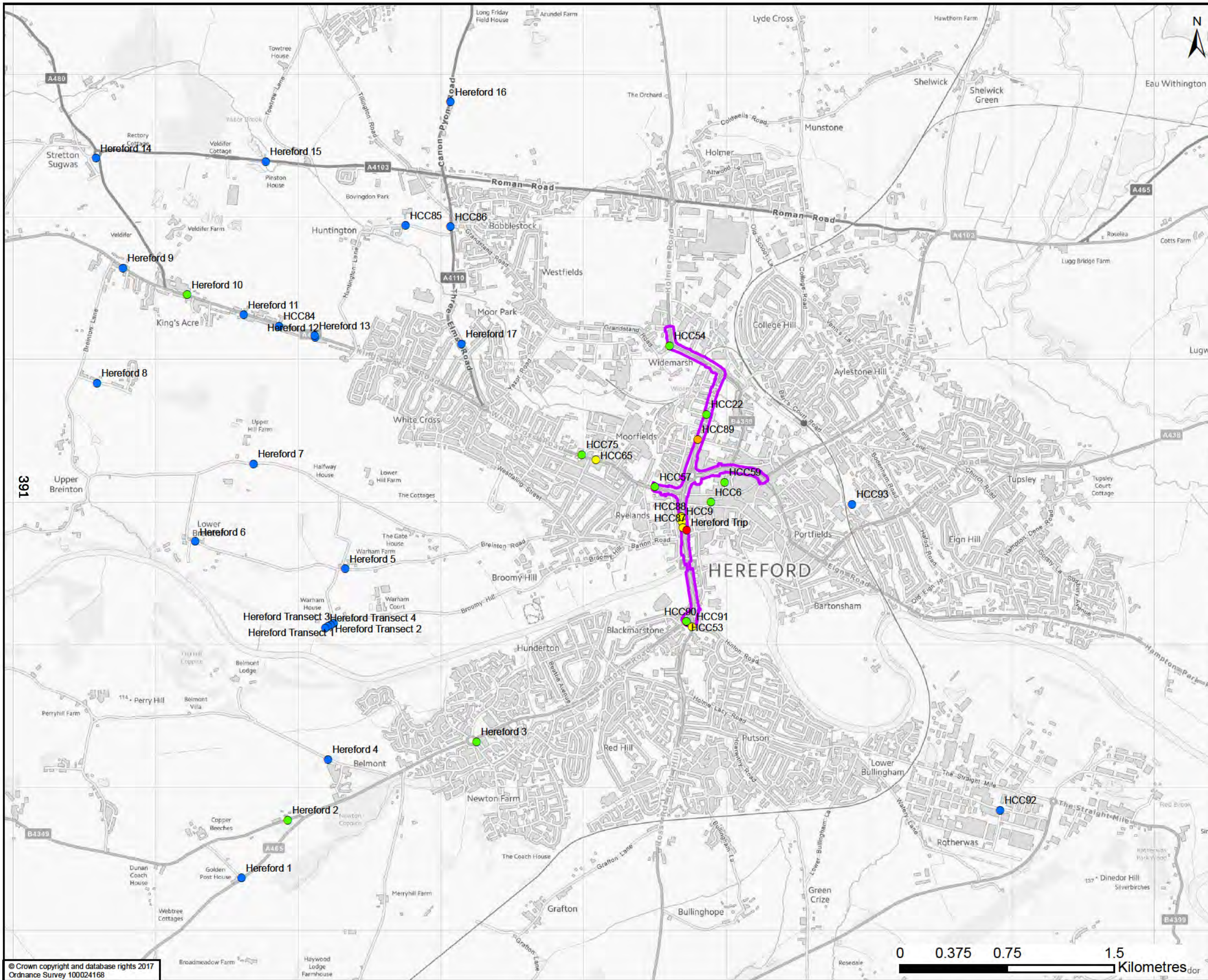
SITE/PROJECT
HEREFORD TRANSPORTATION PACKAGE:
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TITLE
FIGURE 5-4 PCM
BASELINE PROJECTIONS

SCALE @ A3 1:38,428	CHECKED CP	APPROVED MT
PROJECT NO 70024065	DESIGNED CP	DRAWN JSdS
DATE 11/06/2018	REV P01	

DRAWING NO
70024065-WSP-XX-XX-DR-EN-00115

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2017 NO2 Concentration (ug/m3)

- <20
- 20 - 30
- 30 - 36
- 36 - 40
- 40 - 50
- >50

Air Quality Management Areas

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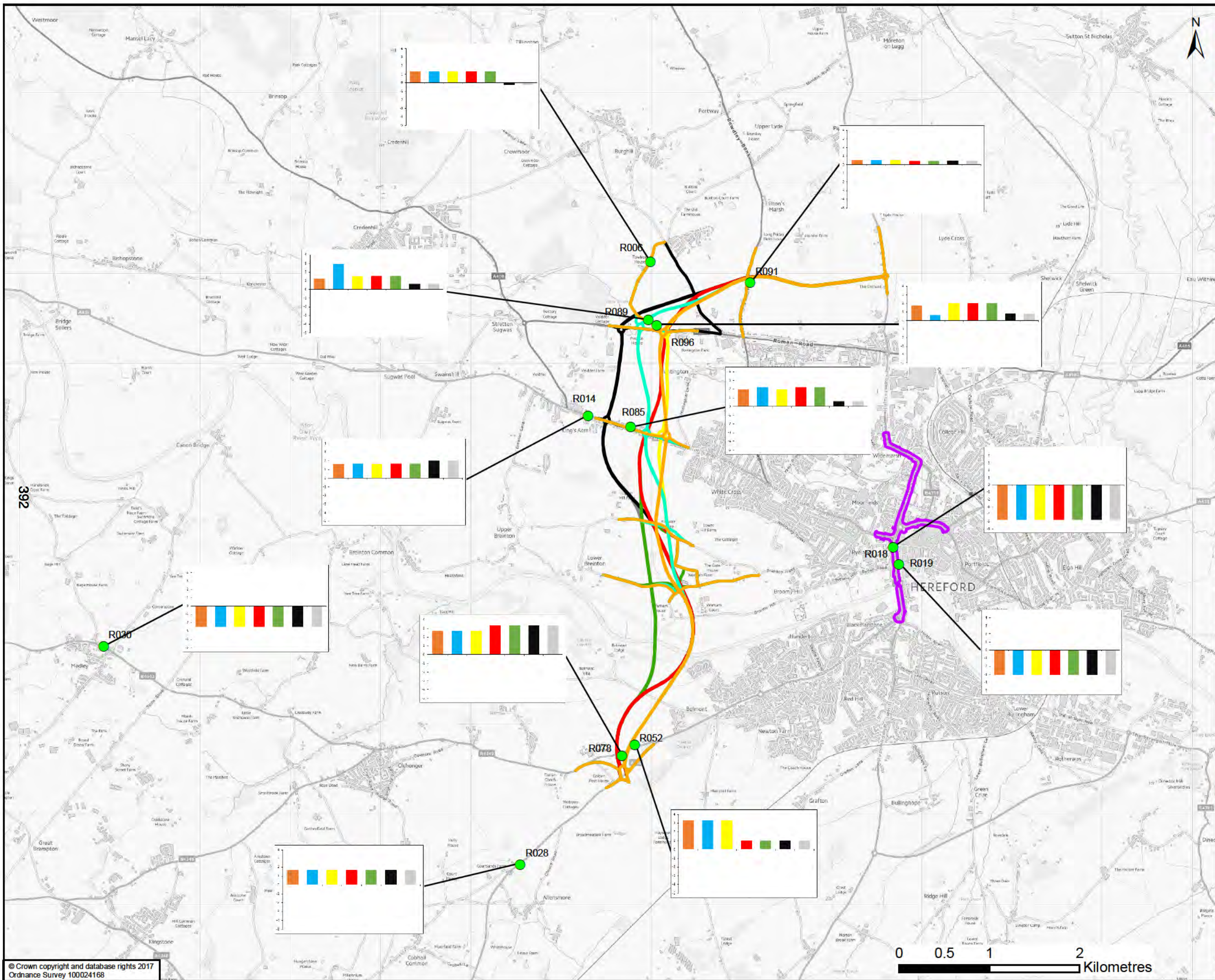
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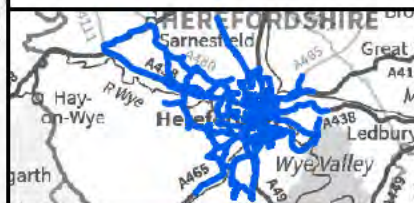
TITLE
FIGURE 5-5
2017 MONITORED ANNUAL
MEAN NO2

SCALE @ A3 1:24,336	CHECKED CP	APPROVED MT
PROJECT NO 70024065	DESIGNED CP	DRAWN JSdS
DATE 11/06/2018		REV P01

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- Receptors
- Air Quality Management Areas
- Proposed Scheme - Orange Option
- Proposed Scheme - Cyan Option
- Proposed Scheme - Yellow Option
- Proposed Scheme - Red Option
- Proposed Scheme - Olive Option
- Proposed Scheme - Black 1 Option
- Proposed Scheme - Black 2 Option



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TITLE
FIGURE 5-6 CHANGE
(DS-DM) IN NO2
CONCENTRATION (ug/m3)

SCALE @ A3 1:38,426	CHECKED CP	APPROVED MT
PROJECT NO 70024065	DESIGNED CP	DRAWN JdS
DRAWING No 70024065-WSP-XX-XX-DR-EN-00117	DATE 11/06/2018	REV P01

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Appendix 5-2

GLOSSARY OF TERMS



Nitrogen oxides (NO_x)

NO_x comprises nitrogen monoxide (NO) and nitrogen dioxide (NO₂). It is a product of fuel combustion in air. High concentrations of NO_x can damage vegetation. NO_x is also important in ozone formation and acid deposition.

Nitrogen dioxide (NO₂)

NO₂ is a product of fuel combustion and oxidation of nitrogen monoxide in air. Concentrations in excess of ambient air quality standards can harm human health by affecting the respiratory system.

Particulate matter of 10 micrometres (µm) in diameter or less (PM₁₀)

PM₁₀ is generated by fuel combustion, and from vehicle brake and tyre wear. Construction activities such as earth moving also generate PM₁₀. Concentrations in excess of ambient air quality standards can harm human health by affecting the respiratory and cardiovascular systems.

Carbon dioxide (CO₂)

CO₂ is not a local air pollutant but is an important greenhouse gas contributing to climate change. It is important at national and global scales.

Appendix 5-3

MONITORING DATA



Table 5-3.1 – WSP Diffusion Tube Monitoring Data

Site Reference	Notes	Easting	Northing	Height (m)	Undertaken by:	2017 Monitored NO ₂ (µg/m ³)
Hereford 1	Junction on A465	347601	237365	1.8	WSP	15.10
Hereford 2	B4349	347927	237769	2	WSP	25.48
Hereford 3	A465 Roundabout in Hereford	349249	238319	2	WSP	25.48
Hereford 4	Ruckhall Lane	348208	238195	1.5	WSP	7.78
Hereford 5	Breinton Road/Broomy Hill	348328	239532	3	WSP	5.90
Hereford Transect 1	Rural – on public footpath	348246	239150	1	WSP	3.63
Hereford Transect 2	Rural – on public footpath	348225	239139	1	WSP	3.58
Hereford Transect 3	Rural – on public footpath	348207	239129	1	WSP	4.91
Hereford Transect 4	Rural – on public footpath	348189	239119	1	WSP	6.09
Hereford 6	Breinton	347276	239723	2	WSP	4.90
Hereford 7	Little Breinton	347685	240269	2	WSP	4.93
Hereford 8	Green Lane	346589	240834	1.6	WSP	5.23
Hereford 9	King's Acre Road	346771	241641	2	WSP	14.80
Hereford 10	Wyevale Garden Centre, Hereford	347222	241454	2	WSP	25.34
Hereford 11	North King's Acre Road	347617	241314	2	WSP	15.94
Hereford 12	King's Acre Road	348118	241155	2	WSP	12.87
Hereford 13	King's Acre Road	348115	241169	2	WSP	16.04
Hereford 14	Stretton Sugwas	346582	242413	2	WSP	13.34
Hereford 15	Roman Road	347770	242388	2	WSP	18.50
Hereford 16	Roman Road	349067	242806	1.8	WSP	14.13
Hereford 17	Three Elms Road	349142	241109	1.8	WSP	18.37
Hereford Trip	Placed on Hereford AURN	350721	239806	2	WSP	44.84

Table 5-3.2 – Hereford County Council (HCC) Diffusion Tube Monitoring Data

Site Reference	Notes	Easting	Northing	Undertaken by:	2017 Monitored NO ₂ (µg/m ³)
HCC6	Broad St, Hereford	350890	240000	HCC	23.9
HCC9	Victoria St (duplicate 2), Hereford	350688	239864	HCC	33.2
HCC22	Façade Edgar/Moor St(Duplicate 2),Hfd	350860	240615	HCC	26.4
HCC32	House facade, Weir End	357717	223736	HCC	33.7
HCC33	House façade, Wilton	358506	224214	HCC	32.2
HCC46	Bengry's Lights, Leominster	349409	259010	HCC	36.7
HCC53	House façade, Cross St, Belmont, Hfd	350723	239163	HCC	31.3
HCC54	House façade, Holmer Rd, Hereford	350602	241097	HCC	22.1
HCC57	Shop flat façade, Eign Street, Hereford	350499	240108	HCC	28.4
HCC59	Elgars Restaurant (façade), Widemarsh St, Hfd (Shepherds)	350987	240139	HCC	23.2
HCC61a	29 Bargates, Leominster	349363	259013	HCC	44.0
HCC61b	35 Bargates, Leominster	349363	259013	HCC	44.9
HCC65	96 Whitecross Road (façade), Hereford	350086	240296	HCC	32.6
HCC74	140 Whitecross	356641	220477	HCC	19.8
HCC75	22 Barton Road, Hereford	349985	240334	HCC	25.5
HCC79	76 Belmont Road	349590	259250	HCC	30.5
HCC82	82 - Cantilupe Road 1 (Flats)	360204	224177	HCC	21.4
HCC84	84 - Kings Acre Rd, Hereford	347864	241236	HCC	13.0
HCC85	85 - Huntington Lane, Hereford	348752	241941	HCC	8.4
HCC86	86 - Three Elms Rd, Hereford	349067	241933	HCC	13.6
HCC87	54 Victoria Street, Hereford	350694	239819	HCC	33.7
HCC88	34 Victoria Street (Ro's Cottage), Hereford	350684	239900	HCC	35.3
HCC89	79 Edgar Street, Hereford	350800	240441	HCC	38.6
HCC90	3 Cross Street, Hereford	350719	239164	HCC	27.9
HCC91	Ship Inn (Meadow Close Bus stop), Hereford	350759	239125	HCC	32.1
HCC92	Rotherwas Industrial Estate (Near KGD), Hereford	352919	237840	HCC	13.6
HCC93	Rotherwas Relief Road, Hereford	351881	239984	HCC	12.6

Appendix 5-4

MODEL SETUP AND VERIFICATION





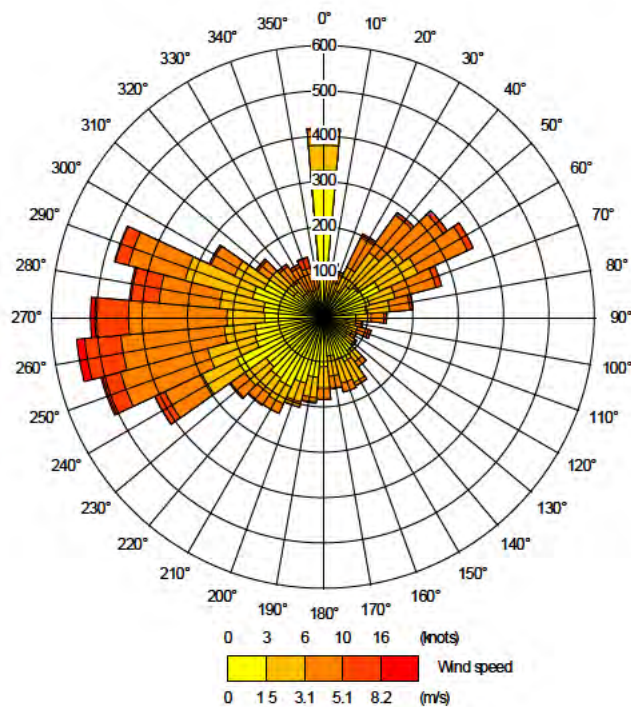
MODEL SETUP

Model: ADMS-Roads (4.1.1)

Emission Factors: UK EFT v7.0 (2 VC)

Met Data: Credenhill / Shobdon Airfield 2016 (windrose below)

Figure 1 Credenhill / Shobdon Airfield 2016



Basemap: Ordnance Survey Open Data products

Model Verification

Verification has been carried out using local authority and WSP diffusion tube data for 2017. This has been undertaken following the guidance on verification given in Defra's Technical guidance LAQM.TG(16).

Table 5-4.1 Comparison of Modelled and Measured NOx Concentrations (µg/m3)

Site Reference	Setting (R - Rural / T-Town)	Measured road NOx	Modelled Road NOx	Modelled / Measured NOx	Used in verification	Comment
DT 1	R	40.66	11.14	3.650976	N	Further back from road compared to Here 2
DT 2	R	19.93	13.48	1.478753	Y	
DT 3	R	39.62	39.93	0.992276	Y	
DT 4	R	5.97	4.67	1.277213	Y	
DT 5	R	2.47	2.10	1.174193	Y	
DT 6	R	1.11	1.45	0.764449	Y	
DT 7	R	1.02	4.20	0.24288	Y	
DT 8	R	1.83	1.37	1.335339	Y	
DT 9	R	19.44	7.97	2.439634	Y	
DT 10	R	40.46	18.59	2.17612	Y	
DT 11	R	21.39	14.16	1.510703	Y	
DT 12	R	15.33	14.36	1.067457	Y	
DT 13	R	21.39	20.19	1.0595	Y	
DT 14	R	16.73	11.89	1.407303	Y	
DT 15	R	26.24	13.89	1.888758	Y	
DT 16	R	17.1	12.87	1.328855	Y	
DT 17	R	24.69	15.26	1.617729	Y	
DT Trip	T	79.42	75.84	1.047142	Y	

HCC9	T	51.38	38.81	1.32379	Y	
HCC22	T	32.76	29.01	1.129349	Y	
HCC53	T	50.71	62.41	0.812517	N	Unable to locate tube
HCC54	T	23.24	30.63	0.758717	Y	
HCC59	T	29.11	16.20	1.797202	N	Unable to model
HCC65	T	48.83	31.31	1.559386	Y	
HCC74	T	22.8	20.68	1.102343	Y	
HCC84	R	15.65	13.45	1.163624	Y	
HCC85	R	6.37	3.79	1.681193	Y	
HCC86	R	15.69	17.97	0.873354	Y	
HCC87	T	52.8	56.76	0.930308	Y	
HCC88	T	55.71	50.51	1.102917	Y	
HCC89	T	59.31	32.27	1.837654	N	T-junction with possible queuing not accounted for in model
HCC90	T	43.32	62.69	0.691036	N	Unable to locate tube
HCC91	T	52.49	53.23	0.986081	Y	
HCC92	T	12.49	7.37	1.69428	Y	

Table 5-4.2 Adjustment factors used

Group	Modelled road NOx adjustment Factor	Comment
Rural	1.27	Receptors modelled showed a trend between those in the town (urban areas) and those in a more rural setting. Therefore 2 verification factors were used for the 2 sets of receptors.
Town	1.07	

Background Concentrations.

Background Concentrations were integrated with model outputs. Tables show annual mean concentrations in $\mu\text{g}/\text{m}^3$. Data for each receptor have been derived by interpolation from Defra 1km x 1km background map data.

Name	2016			2026		
	NO _x	NO ₂	PM ₁₀	NO _x	NO ₂	PM ₁₀
R001	8.8	6.8	13.8	6.3	4.9	13.2
R002	11.0	8.3	14.4	7.9	6.1	13.9
R003	8.7	6.7	13.8	6.1	4.8	13.2
R004	7.7	6.0	13.8	5.4	4.3	13.3
R005	7.2	5.6	13.7	5.1	4.0	13.1
R006	6.7	5.2	13.1	4.8	3.8	12.5
R007	6.2	4.9	13.1	4.5	3.6	12.5
R008	6.4	5.0	12.8	4.6	3.6	12.2
R009	6.9	5.4	13.2	4.9	3.9	12.6
R010	5.5	4.3	12.2	3.9	3.1	11.6
R011	5.0	3.9	12.7	3.6	2.8	12.2
R012	5.8	4.6	12.6	4.2	3.3	12.1
R013	6.0	4.7	13.1	4.3	3.4	12.6
R014	6.6	5.2	13.2	4.7	3.7	12.7
R015	9.0	6.9	14.0	6.4	5.0	13.4
R016	19.8	14.2	15.8	15.2	11.2	15.4
R017	14.6	10.9	13.9	10.2	7.8	13.3
R018	17.4	12.7	15.0	12.5	9.3	14.4
R019	15.6	11.5	14.7	10.9	8.2	14.1
R020	14.8	11.0	14.4	10.4	7.9	13.8
R021	13.0	9.8	14.5	9.0	7.0	13.9
R022	13.1	9.9	14.4	8.8	6.8	13.8
R023	20.1	14.4	15.3	14.9	11.0	14.7
R024	9.1	7.0	13.0	6.5	5.0	12.4
R025	7.8	6.0	13.3	5.6	4.4	12.8
R026	6.1	4.7	12.2	4.4	3.5	11.6
R027	12.5	9.5	14.3	8.3	6.4	13.7
R028	6.3	5.0	13.6	4.4	3.5	13.1
R029	6.6	5.2	13.1	4.6	3.6	12.5
R030	5.2	4.1	12.5	3.8	3.0	11.9
R031	6.2	4.8	12.8	4.3	3.4	12.2
R032	5.8	4.6	13.2	4.1	3.2	12.7
R033	5.6	4.4	13.6	3.9	3.1	13.0
R034	6.2	4.9	12.6	4.3	3.4	12.1
R035	6.7	5.2	13.5	4.6	3.6	12.9
R036	12.3	9.3	14.3	8.2	6.4	13.7
R037	10.0	7.7	13.1	7.4	5.7	12.6
R038	7.7	5.9	12.9	5.4	4.3	12.3
R039	9.6	7.4	13.9	6.4	5.0	13.3
R040	5.3	4.2	12.0	3.8	3.1	11.5
R041	5.0	4.0	12.5	3.6	2.9	12.0
R042	4.9	3.9	11.9	3.5	2.8	11.4
R043	4.9	3.9	12.7	3.6	2.9	12.2
R044	5.3	4.2	13.0	3.8	3.0	12.4
R045	12.7	9.5	14.1	9.1	6.9	13.5
R046	11.1	8.4	13.6	7.9	6.1	13.0
R047	10.1	7.7	13.4	6.8	5.3	12.8

R048	7.7	6.0	12.2	5.3	4.2	11.6
R049	7.2	5.6	13.2	4.9	3.9	12.7
R050	7.0	5.5	13.3	4.8	3.8	12.7
R051	6.9	5.4	13.0	4.7	3.7	12.5
R052	7.1	5.5	12.8	4.9	3.9	12.3
R053	7.1	5.5	13.3	4.8	3.8	12.7
R054	7.2	5.6	12.8	4.9	3.9	12.2
R055	9.4	7.3	13.1	6.4	5.0	12.5
R056	7.4	5.8	12.3	5.1	4.0	11.8
R057	7.0	5.4	13.0	5.0	3.9	12.4
R058	7.1	5.5	12.6	5.0	4.0	12.1
R059	7.1	5.5	12.6	5.0	4.0	12.0
R060	7.1	5.5	12.6	5.0	4.0	12.0
R061	7.0	5.5	12.5	5.0	3.9	12.0
R062	6.1	4.8	12.2	4.4	3.5	11.6
R063	6.4	5.0	12.9	4.6	3.7	12.4
R064	6.0	4.7	12.2	4.3	3.4	11.7
R065	6.4	5.0	12.8	4.5	3.6	12.3
R066	6.6	5.2	13.2	4.7	3.7	12.6
R067	6.8	5.3	13.4	4.8	3.8	12.8
R068	7.1	5.6	13.6	5.1	4.0	13.0
R069	7.1	5.6	13.6	5.1	4.0	13.0
R070	6.3	5.0	13.2	4.5	3.5	12.7
R071	7.1	5.5	13.0	5.0	3.9	12.5
R072	8.3	6.4	13.8	5.9	4.6	13.2
R073	9.4	7.2	14.0	6.7	5.2	13.4
R074	16.0	11.8	14.8	11.2	8.5	14.2
R078	7.1	5.5	13.0	4.9	3.8	12.4
R079	7.1	5.6	12.7	5.1	4.0	12.2
R080	7.2	5.6	13.1	5.1	4.1	12.6
R081	6.4	5.0	12.9	4.6	3.7	12.4
R082	6.4	5.0	13.0	4.6	3.6	12.4
R083	6.6	5.2	13.2	4.7	3.7	12.7
R084	6.7	5.3	13.3	4.8	3.8	12.8
R085	6.9	5.4	13.4	4.9	3.9	12.9
R086	7.1	5.5	13.5	5.0	4.0	13.0
R087	7.3	5.7	13.7	5.2	4.1	13.1
R088	7.5	5.9	13.3	5.3	4.2	12.8
R089	7.4	5.7	13.0	5.2	4.1	12.4
R090	8.2	6.3	13.0	5.8	4.5	12.4
R091	8.2	6.3	13.8	5.8	4.5	13.3
R092	8.4	6.5	13.8	5.9	4.6	13.2
R093	10.1	7.8	13.8	7.2	5.6	13.2
R094	8.0	6.2	13.9	5.7	4.4	13.4
R095	13.2	9.8	14.4	9.7	7.4	13.9
R096	7.5	5.8	13.0	5.3	4.2	12.5
R097	7.8	6.0	13.0	5.5	4.3	12.5

Appendix 5-5

RESULTS – HUMAN RECEPTORS



Table 5-5.1 Nitrogen dioxide modelling results for all receptors and all scenarios

Receptor ID	Easting	Northing	Height	Description	BS16	DM26	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
R001	349056.5	242226.1	1.5	Redcar Avenue	15.6	12.5	11.8	-0.66	11.8	-0.68	11.8	-0.65	11.8	-0.66	11.8	-0.66	11.8	-0.64	11.8	-0.64
R002	349867.6	242194.7	1.5	221 Roman Road	18.6	17.1	17.1	0.00	17.1	0.00	17.1	0.00	17.1	0.00	17.1	0.00	17.1	0.00	17.1	0.00
R003	350529.3	243351.1	1.5	Highway Cottage	15.6	12.3	12.8	0.57	12.8	0.58	12.8	0.58	12.8	0.58	12.8	0.57	12.8	0.58	12.8	0.58
R004	350383.5	244092.2	1.5	2 Church Road	8.8	6.8	6.9	0.18	6.9	0.18	6.9	0.18	6.9	0.18	6.9	0.18	6.9	0.19	6.9	0.19
R005	350123.8	244491.9	1.5	A49 nr Hitherbush	13.1	10.2	10.5	0.38	10.5	0.38	10.5	0.38	10.5	0.38	10.5	0.38	10.5	0.38	10.5	0.38
R006	347986	243122.6	1.5	Towtree House	7.1	5.5	6.8	1.34	6.8	1.35	6.8	1.34	6.8	1.34	6.8	1.34	5.2	-0.30	5.2	-0.30
R007	348054.5	243531.3	1.5	Content Cottage	9.7	7.4	7.6	0.25	7.6	0.27	7.6	0.25	7.6	0.25	7.6	0.25	7.6	0.27	7.6	0.27
R008	348296.8	243703.5	1.5	Little Burton	6.8	5.3	5.8	0.55	5.8	0.56	5.8	0.55	5.8	0.56	5.8	0.56	5.8	0.57	5.8	0.57
R009	349111.4	244168.8	1.5	Burlton Cottages	10.4	8.3	8.7	0.40	8.7	0.40	8.7	0.40	8.7	0.42	8.7	0.40	8.7	0.42	8.7	0.42
R010	347174.6	247592.1	1.5	Upper Parks	9.3	7.5	7.9	0.45	7.9	0.45	7.9	0.45	7.9	0.45	7.9	0.45	7.9	0.45	7.9	0.45
R011	340487.7	246591.1	1.5	The Old Vicarage	8.2	6.5	7.1	0.64	7.1	0.64	7.1	0.64	7.1	0.64	7.1	0.64	7.1	0.64	7.1	0.64
R012	344936	243683.7	1.5	A480 nr Credenhill	9.7	7.7	8.5	0.77	8.5	0.77	8.5	0.77	8.5	0.77	8.5	0.77	8.5	0.77	8.5	0.77
R013	346206.6	243195.3	1.5	Milfrith	11.4	9.1	9.8	0.74	9.8	0.74	9.8	0.74	9.8	0.74	9.8	0.74	9.8	0.74	9.8	0.74
R014	347293.5	241415.2	1.5	333 Kings Acre Road	14.4	11.5	13.1	1.64	13.1	1.67	13.1	1.64	13.2	1.68	13.1	1.67	13.5	2.04	13.5	2.02
R015	349097.7	241702.4	1.5	202 Three Elms Road	14.2	13.3	11.4	-1.96	11.3	-1.99	11.4	-1.95	11.4	-1.97	11.4	-1.97	11.3	-2.00	11.3	-2.01
R016	350597.6	241151.2	1.5	17 Holmer Road	26.0	20.9	19.2	-1.68	19.2	-1.68	19.2	-1.68	19.2	-1.68	19.2	-1.68	19.2	-1.68	19.2	-1.68
R017	351831.6	240452.3	1.5	1A Southbank Road	22.7	17.5	17.2	-0.37	17.2	-0.37	17.2	-0.37	17.2	-0.37	17.2	-0.37	17.2	-0.37	17.2	-0.37
R018	350676	239961	1.5	22 Victoria Street	35.5	28.8	24.1	-4.74	24.1	-4.74	24.1	-4.74	24.1	-4.74	24.1	-4.74	24.1	-4.74	24.1	-4.74
R019	350742.8	239769.3	1.5	Deens Court	35.8	28.0	24.9	-3.09	24.9	-3.09	24.9	-3.09	24.9	-3.09	24.9	-3.09	24.9	-3.09	24.9	-3.09
R020	351380.9	240005.8	1.5	Venns Close	25.3	19.4	19.0	-0.37	19.0	-0.37	19.0	-0.37	19.0	-0.37	19.0	-0.37	19.0	-0.37	19.0	-0.37
R021	351535.7	239679.9	1.5	87 Bath Street	21.8	17.7	17.4	-0.37	17.4	-0.37	17.4	-0.37	17.4	-0.37	17.4	-0.37	17.4	-0.37	17.4	-0.37

Receptor ID	Easting	Northing	Height	Description	BS16	DM26	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
R022	350844.8	239407.1	1.5	45 Martins Street	20.0	15.6	13.6	-2.02	13.6	-2.02	13.6	-2.02	13.6	-2.02	13.6	-2.02	13.6	-2.00	13.6	-2.02
R023	350869	240657.6	1.5	107 Edgar Street	28.7	27.0	23.5	-3.51	23.5	-3.51	23.5	-3.51	23.5	-3.51	23.5	-3.51	23.5	-3.51	23.5	-3.51
R024	349547.9	239371.5	1.5	Broomy Hill	8.4	6.3	6.3	-0.01	6.3	-0.01	6.3	-0.01	6.3	0.00	6.3	-0.05	6.3	0.00	6.3	-0.05
R025	348766.9	239807.5	1.5	Breinton	8.3	6.4	6.6	0.20	6.6	0.22	6.6	0.22	6.6	0.23	6.5	0.09	6.6	0.23	6.5	0.09
R026	347211.6	239768.6	1.5	Lower Breinton	5.8	4.4	4.5	0.14	4.5	0.13	4.5	0.13	4.5	0.14	4.5	0.18	4.5	0.17	4.6	0.20
R027	350424	238962	1.5	86 Belmont Road	24.0	17.9	15.4	-2.55	15.4	-2.55	15.4	-2.55	15.4	-2.55	15.4	-2.57	15.4	-2.55	15.4	-2.57
R028	346546.1	236441.8	1.5	Goose Pool	11.8	9.1	10.8	1.72	10.8	1.74	10.8	1.72	10.8	1.74	10.8	1.72	10.8	1.74	10.8	1.74
R029	347062.4	237445.6	1.5	Dunan Lodge	10.7	9.2	9.6	0.43	9.6	0.43	9.6	0.43	9.6	0.47	9.6	0.45	9.6	0.47	9.6	0.45
R030	341927.6	238865	1.5	Madley	10.0	8.4	5.8	-2.52	5.8	-2.52	5.8	-2.52	5.8	-2.52	5.8	-2.52	5.8	-2.52	5.8	-2.52
R031	345578.6	233841.2	1.5	Winnal	8.5	6.4	6.6	0.25	6.6	0.25	6.6	0.25	6.6	0.25	6.6	0.25	6.6	0.25	6.6	0.25
R032	346845.5	232522.5	1.5	Kivernoll	11.8	8.9	10.0	1.11	10.0	1.11	10.0	1.11	10.0	1.11	10.0	1.11	10.0	1.11	10.0	1.11
R033	348202.5	231218.4	1.5	Much Dewchurch	10.4	7.8	8.5	0.69	8.5	0.69	8.5	0.69	8.5	0.69	8.5	0.67	8.5	0.69	8.5	0.69
R034	349732.7	233211.2	1.5	A49 nr Cross in Hand Farm	16.6	13.0	12.6	-0.45	12.6	-0.45	12.6	-0.45	12.6	-0.45	12.6	-0.45	12.6	-0.45	12.6	-0.45
R035	349752.3	235470.9	1.5	Portway	11.3	8.2	8.0	-0.13	8.0	-0.13	8.0	-0.13	8.0	-0.13	8.0	-0.13	8.1	-0.12	8.0	-0.13
R036	350748.6	238978.7	1.5	St Martins Primary School	17.1	13.5	11.6	-1.89	11.6	-1.89	11.6	-1.89	11.6	-1.89	11.6	-1.91	11.6	-1.89	11.6	-1.91
R037	351903.8	238227.9	1.5	8 St Clares Court	11.1	8.6	8.4	-0.20	8.4	-0.20	8.4	-0.20	8.4	-0.20	8.4	-0.21	8.4	-0.20	8.4	-0.21
R038	351540.8	236896.9	1.5	Green Crize Farm	8.4	6.8	7.0	0.13	7.0	0.13	7.0	0.13	7.0	0.13	7.0	0.13	7.0	0.13	7.0	0.13
R039	350514.2	237730.7	1.5	Grafton Lane	14.6	11.6	10.0	-1.63	10.0	-1.63	10.0	-1.63	10.0	-1.63	10.0	-1.63	10.0	-1.63	10.0	-1.63
R040	343674.6	238157.6	1.5	Meadow End	10.6	8.7	7.5	-1.23	7.5	-1.23	7.5	-1.23	7.5	-1.23	7.5	-1.23	7.5	-1.23	7.5	-1.23
R041	342121.8	245162.6	1.5	Mansel Lacy	8.7	6.9	7.5	0.68	7.5	0.68	7.5	0.68	7.5	0.68	7.5	0.68	7.5	0.68	7.5	0.68
R042	339350.3	244653.7	1.5	Mansell Gamage	5.8	4.6	4.1	-0.54	4.1	-0.54	4.1	-0.54	4.1	-0.54	4.1	-0.54	4.1	-0.54	4.1	-0.54

Receptor ID	Easting	Northing	Height	Description	BS16	DM26	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
R043	340948	241335	1.5	Lulham	9.7	8.1	5.3	-2.83	5.3	-2.83	5.3	-2.83	5.3	-2.83	5.3	-2.83	5.3	-2.83	5.3	-2.83
R044	341421.5	242550.8	1.5	Bridge Sollers	9.9	8.1	6.3	-1.81	6.3	-1.81	6.3	-1.81	6.3	-1.81	6.3	-1.81	6.3	-1.81	6.3	-1.81
R045	349646.3	240476.9	1.5	Whitecross Road	17.4	14.1	12.9	-1.27	12.9	-1.27	12.9	-1.27	12.9	-1.27	12.8	-1.28	12.9	-1.27	12.8	-1.28
R046	349611.4	240106.9	1.5	117 Westfaling Street	14.5	11.5	10.5	-1.01	10.5	-1.01	10.5	-1.01	10.5	-1.01	10.5	-1.04	10.5	-1.01	10.5	-1.02
R047	349421.2	238413	1.5	22 Yarlinton Mill	25.9	18.7	16.5	-2.17	16.5	-2.18	16.5	-2.17	16.5	-2.18	16.4	-2.21	16.5	-2.18	16.4	-2.21
R048	348397	238593.6	1.5	Dorchester Way	6.8	5.2	7.2	2.04	7.2	2.04	7.2	2.04	6.9	1.73	5.6	0.37	6.9	1.73	5.6	0.37
R049	347498.9	237488.5	1.5	Pykeways	7.1	6.2	6.9	0.71	6.9	0.72	6.9	0.71	7.1	0.94	7.1	0.92	7.1	0.94	7.1	0.94
R050	347570.9	237363.1	1.5	Golden Post Cottage	9.6	8.3	9.7	1.37	9.7	1.37	9.7	1.35	9.8	1.51	9.8	1.50	9.8	1.51	9.8	1.51
R051	347350.8	237647.7	1.5	Copper Beeches	7.8	5.8	6.2	0.40	6.2	0.40	6.2	0.39	6.4	0.53	6.4	0.53	6.4	0.54	6.4	0.53
R052	347813.3	237768.9	1.5	Edgewood	9.3	6.1	9.4	3.33	9.4	3.33	9.4	3.33	7.1	0.99	7.1	1.01	7.1	0.99	7.1	1.01
R078	347672.1	237650.8	1.5	B4349 Forest View	9.4	6.2	8.9	2.70	8.9	2.70	8.9	2.70	9.6	3.36	9.6	3.36	9.6	3.36	9.6	3.36
R079	348322.9	239217.3	1.5	Broomy Hill	6.6	5.0	6.3	1.26	6.3	1.26	6.3	1.27	6.2	1.16	5.6	0.53	6.2	1.16	5.6	0.53
R080	348535.2	239519	1.5	Breinton Road	7.0	5.3	6.0	0.73	6.1	0.75	6.1	0.76	6.1	0.83	5.6	0.26	6.1	0.83	5.6	0.26
R081	347704.4	240255.5	1.5	Orchard Cottages	6.8	5.2	5.6	0.35	5.5	0.30	5.5	0.27	5.7	0.48	5.9	0.66	5.8	0.63	6.0	0.81
R082	347638.9	240441.3	1.5	Upper Hill Farm	6.1	4.7	5.0	0.31	4.9	0.29	4.9	0.27	5.1	0.46	5.2	0.52	5.5	0.88	5.6	0.96
R083	347317.4	241436	1.5	A438 Kings Acre Road	12.3	9.7	11.0	1.25	11.0	1.28	11.0	1.25	11.0	1.28	11.0	1.28	11.4	1.67	11.4	1.67
R084	347556.2	241326.7	1.5	A438 East of BOp2	13.2	10.4	12.1	1.69	12.2	1.77	12.1	1.71	12.2	1.80	12.2	1.79	12.0	1.54	11.9	1.53
R085	347769.1	241292.1	1.5	A438 Bramley Ct	13.4	10.6	12.6	1.97	12.8	2.24	12.6	1.98	12.8	2.24	12.8	2.23	11.2	0.60	11.2	0.59
R086	348053.1	241157.8	1.5	A438 West Of YOp	10.9	8.6	9.6	1.02	10.0	1.41	9.8	1.30	9.8	1.27	9.8	1.27	9.0	0.42	9.0	0.42
R087	348284.3	241081	1.5	A438 East of OOp	11.1	8.6	9.3	0.66	9.2	0.62	9.2	0.61	9.2	0.55	9.2	0.55	9.0	0.37	8.9	0.35
R088	348290.2	241844.1	1.5	HuntingtonCourt Farm	7.0	5.4	6.1	0.68	5.8	0.38	6.4	0.95	6.1	0.66	6.1	0.66	5.7	0.28	5.7	0.28
R089	347964.6	242479.2	1.5	Hunting Brook West	8.4	6.6	7.9	1.26	9.5	2.93	8.1	1.50	8.1	1.51	8.1	1.51	7.3	0.66	7.3	0.66



Receptor ID	Easting	Northing	Height	Description	BS16	DM26	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
R090	348550.8	242538	1.5	Lower Burlton Barns	10.8	8.3	8.5	0.16	8.4	0.08	8.5	0.19	8.4	0.09	8.4	0.09	9.7	1.40	9.7	1.40
R091	349092.4	242894.4	1.5	A4110 Wyncroft	10.5	8.2	8.8	0.55	8.8	0.55	8.8	0.55	8.6	0.42	8.6	0.42	8.7	0.47	8.7	0.47
R092	349065.3	242752.1	1.5	A4110 Wyncroft	11.0	8.6	9.0	0.39	9.0	0.38	9.0	0.39	9.0	0.36	9.0	0.35	9.1	0.41	9.1	0.41
R093	350586.7	242832.8	1.5	The Orchard	15.2	11.9	11.9	0.00	11.9	0.00	11.9	0.00	11.9	0.00	11.9	0.00	11.9	0.01	11.9	0.00
R094	348665.1	240963.6	1.5	Huntsmans Drive A438	14.1	11.0	11.3	0.30	11.3	0.26	11.3	0.30	11.2	0.21	11.2	0.21	11.2	0.18	11.2	0.16
R095	350621.8	242200.9	1.5	A49	30.3	25.4	22.5	-2.86	22.5	-2.86	22.5	-2.86	22.5	-2.86	22.5	-2.86	22.5	-2.86	22.5	-2.86
R096	348058.4	242421.9	1.5	Hunting Brook East	9.4	7.5	9.3	1.78	8.1	0.66	9.5	2.03	9.5	2.05	9.5	2.05	8.3	0.84	8.3	0.84
R097	348280.1	242342	1.5	Bovingdon Park	12.3	10.0	11.8	1.75	11.5	1.45	12.2	2.20	12.3	2.23	12.3	2.23	12.5	2.47	12.5	2.47
99007_990 08_5m	348183	242058.3	1.5	Yellow buffer 5m	7.0	5.4	6.6	1.19	5.9	0.44	11.8	6.41	7.0	1.60	7.0	1.60	5.8	0.36	5.8	0.36
99007_990 08_10m	348188.1	242057.8	1.5	Yellow buffer 10m	7.0	5.4	6.6	1.14	5.9	0.44	10.2	4.74	6.9	1.51	6.9	1.51	5.8	0.36	5.8	0.36
99007_990 08_15m	348193.1	242057.5	1.5	Yellow buffer 15m	7.1	5.4	6.5	1.10	5.9	0.43	9.3	3.88	6.9	1.43	6.9	1.43	5.8	0.37	5.8	0.37
99007_990 08_20m	348197.8	242057	1.5	Yellow buffer 20m	7.1	5.4	6.5	1.07	5.9	0.44	8.7	3.31	6.8	1.36	6.8	1.36	5.8	0.37	5.8	0.37
99007_990 08_30m	348208	242056.5	1.5	Yellow buffer 30m	7.1	5.4	6.4	0.96	5.9	0.41	8.0	2.54	6.7	1.21	6.7	1.21	5.8	0.35	5.8	0.35
99007_990 08_40m	348217.8	242055.6	1.5	Yellow buffer 40m	7.1	5.4	6.4	0.92	5.9	0.41	7.5	2.09	6.6	1.11	6.6	1.11	5.8	0.36	5.8	0.36
99007_990 08_50m	348227.8	242054.8	1.5	Yellow buffer 50m	7.1	5.5	6.3	0.86	5.9	0.42	7.2	1.79	6.5	1.04	6.5	1.03	5.8	0.36	5.8	0.36
99007_990 08_60m	348238	242054	1.5	Yellow buffer 60m	7.1	5.5	6.3	0.79	5.9	0.39	7.0	1.55	6.4	0.94	6.4	0.94	5.8	0.35	5.8	0.35
99007_990 08_80m	348257.7	242052.5	1.5	Yellow buffer 80m	7.1	5.5	6.2	0.73	5.9	0.39	6.7	1.25	6.3	0.83	6.3	0.83	5.8	0.35	5.8	0.35
99007_990 08_100m	348277.8	242050.5	1.5	Yellow buffer 100m	7.2	5.5	6.2	0.65	5.9	0.36	6.6	1.03	6.3	0.74	6.3	0.74	5.9	0.34	5.9	0.34

Table 5-5.2 Particulate Matter (PM₁₀) modelling results for all receptors and all scenarios

Receptor ID	Easting	Northing	Height	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
R001	349056.5	242226.1	1.5	Redcar Avenue	15.1	14.6	14.5	-0.14	14.5	-0.14	14.5	-0.14	14.5	-0.14	14.5	-0.14	14.5	-0.14	14.5	-0.14
R002	349867.6	242194.7	1.5	221 Roman Road	16.3	15.9	15.9	0.00	15.9	0.00	15.9	0.00	15.9	0.00	15.9	0.00	15.9	0.00	15.9	0.00
R003	350529.3	243351.1	1.5	Highway Cottage	15.0	14.4	14.5	0.11	14.5	0.11	14.5	0.11	14.5	0.11	14.5	0.11	14.5	0.11	14.5	0.11
R004	350383.5	244092.2	1.5	2 Church Road	14.2	13.7	13.7	0.05	13.7	0.05	13.7	0.05	13.7	0.05	13.7	0.05	13.7	0.05	13.7	0.05
R005	350123.8	244491.9	1.5	A49 nr HitherBush	14.7	14.0	14.1	0.11	14.1	0.11	14.1	0.11	14.1	0.11	14.1	0.11	14.1	0.12	14.1	0.12
R006	347986	243122.6	1.5	Towtree House	13.3	12.8	13.1	0.26	13.1	0.26	13.1	0.26	13.1	0.26	13.1	0.26	12.7	-0.05	12.7	-0.05
R007	348054.5	243531.3	1.5	Content Cottage	13.6	13.0	13.1	0.06	13.1	0.06	13.1	0.06	13.1	0.06	13.1	0.06	13.1	0.06	13.1	0.06
R008	348296.8	243703.5	1.5	Little Burton	13.0	12.5	12.6	0.11	12.6	0.11	12.6	0.11	12.6	0.11	12.6	0.11	12.6	0.12	12.6	0.12
R009	349111.4	244168.8	1.5	Burlton Cottages	13.9	13.3	13.4	0.08	13.4	0.08	13.4	0.08	13.4	0.08	13.4	0.08	13.4	0.09	13.4	0.09
R010	347174.6	247592.1	1.5	Upper Parks	12.8	12.3	12.3	0.08	12.3	0.08	12.3	0.08	12.3	0.08	12.3	0.08	12.3	0.08	12.3	0.08
R011	340487.7	246591.1	1.5	The Old Vicarage	13.2	12.7	12.8	0.14	12.8	0.14	12.8	0.14	12.8	0.14	12.8	0.14	12.8	0.14	12.8	0.14
R012	344936	243683.7	1.5	A480 nr Credenhill	13.3	12.7	12.9	0.15	12.9	0.15	12.9	0.15	12.9	0.15	12.9	0.15	12.9	0.15	12.9	0.15
R013	346206.6	243195.3	1.5	Milfrith	13.9	13.4	13.5	0.14	13.5	0.14	13.5	0.14	13.5	0.14	13.5	0.14	13.5	0.15	13.5	0.15
R014	347293.5	241415.2	1.5	333 Kings Acre Road	14.4	13.8	14.1	0.32	14.1	0.32	14.1	0.32	14.2	0.33	14.1	0.32	14.2	0.39	14.2	0.39
R015	349097.7	241702.4	1.5	202 Three Elms Road	15.2	15.0	14.6	-0.43	14.6	-0.43	14.6	-0.43	14.6	-0.43	14.6	-0.43	14.5	-0.44	14.5	-0.44
R016	350597.6	241151.2	1.5	17 Holmer Road	17.9	17.6	17.3	-0.35	17.3	-0.35	17.3	-0.35	17.3	-0.35	17.3	-0.35	17.3	-0.35	17.3	-0.35
R017	351831.6	240452.3	1.5	1A Southbank Road	15.9	15.1	15.0	-0.06	15.0	-0.06	15.0	-0.06	15.0	-0.06	15.0	-0.06	15.0	-0.06	15.0	-0.06
R018	350676	239961	1.5	22 Victoria Street	18.8	18.1	17.3	-0.85	17.3	-0.85	17.3	-0.85	17.3	-0.85	17.3	-0.86	17.3	-0.85	17.3	-0.86
R019	350742.8	239769.3	1.5	Deens Court	18.4	17.5	17.0	-0.53	17.0	-0.53	17.0	-0.53	17.0	-0.53	17.0	-0.54	17.0	-0.53	17.0	-0.54
R020	351380.9	240005.8	1.5	Venns Close	16.8	16.0	16.0	-0.06	16.0	-0.06	16.0	-0.06	16.0	-0.06	16.0	-0.06	16.0	-0.06	16.0	-0.06
R021	351535.7	239679.9	1.5	87 Bath Street	16.5	15.9	15.9	-0.07	15.9	-0.07	15.9	-0.07	15.9	-0.07	15.9	-0.07	15.9	-0.07	15.9	-0.07

Receptor ID	Easting	Northing	Height	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
R022	350844.8	239407.1	1.5	45 Martins Street	16.2	15.5	15.1	-0.42	15.1	-0.42	15.1	-0.42	15.1	-0.42	15.1	-0.42	15.1	-0.42	15.1	-0.42
R023	350869	240657.6	1.5	107 Edgar Street	17.7	17.6	17.0	-0.55	17.0	-0.55	17.0	-0.55	17.0	-0.55	17.0	-0.55	17.0	-0.55	17.0	-0.55
R024	349547.9	239371.5	1.5	Broomy Hill	13.2	12.7	12.7	0.00	12.7	0.00	12.7	0.00	12.7	0.00	12.7	-0.01	12.7	0.00	12.7	-0.01
R025	348766.9	239807.5	1.5	Breinton	13.7	13.1	13.1	0.04	13.2	0.05	13.2	0.05	13.2	0.05	13.1	0.02	13.2	0.05	13.1	0.02
R026	347211.6	239768.6	1.5	Lower Breinton	12.3	11.8	11.8	0.03	11.8	0.03	11.8	0.03	11.8	0.03	11.8	0.04	11.8	0.04	11.8	0.04
R027	350424	238962	1.5	86 Belmont Road	16.7	15.8	15.3	-0.45	15.3	-0.45	15.3	-0.45	15.3	-0.45	15.3	-0.46	15.3	-0.45	15.3	-0.46
R028	346546.1	236441.8	1.5	Goose Pool	14.5	13.9	14.2	0.29	14.2	0.30	14.2	0.29	14.2	0.30	14.2	0.29	14.2	0.30	14.2	0.30
R029	347062.4	237445.6	1.5	Dunan Lodge	13.8	13.3	13.4	0.07	13.4	0.07	13.4	0.07	13.4	0.08	13.4	0.08	13.4	0.08	13.4	0.08
R030	341927.6	238865	1.5	Madley	13.1	12.6	12.2	-0.40	12.2	-0.40	12.2	-0.40	12.2	-0.40	12.2	-0.40	12.2	-0.40	12.2	-0.40
R031	345578.6	233841.2	1.5	Winnal	13.2	12.6	12.6	0.04	12.6	0.04	12.6	0.04	12.6	0.04	12.6	0.04	12.6	0.04	12.6	0.04
R032	346845.5	232522.5	1.5	Kivernoll	14.0	13.3	13.4	0.12	13.4	0.12	13.4	0.12	13.4	0.12	13.4	0.12	13.4	0.12	13.4	0.12
R033	348202.5	231218.4	1.5	Much Dewchurch	14.3	13.7	13.8	0.07	13.8	0.07	13.8	0.07	13.8	0.07	13.8	0.07	13.8	0.07	13.8	0.07
R034	349732.7	233211.2	1.5	A49 nr Cross in Hand Farm	14.1	13.4	13.4	-0.04	13.4	-0.04	13.4	-0.04	13.4	-0.04	13.4	-0.04	13.4	-0.04	13.4	-0.04
R035	349752.3	235470.9	1.5	Portway	14.2	13.6	13.5	-0.01	13.5	-0.01	13.5	-0.01	13.5	-0.01	13.5	-0.02	13.5	-0.01	13.5	-0.01
R036	350748.6	238978.7	1.5	St Martins Primary School	15.6	15.0	14.6	-0.36	14.6	-0.36	14.6	-0.36	14.6	-0.36	14.6	-0.36	14.6	-0.36	14.6	-0.36
R037	351903.8	238227.9	1.5	8 St Clares Court	13.7	13.1	13.0	-0.04	13.0	-0.04	13.0	-0.04	13.0	-0.04	13.0	-0.04	13.0	-0.04	13.0	-0.04
R038	351540.8	236896.9	1.5	Green Crize Farm	13.2	12.8	12.8	0.02	12.8	0.02	12.8	0.02	12.8	0.02	12.8	0.02	12.8	0.02	12.8	0.02
R039	350514.2	237730.7	1.5	Grafton Lane	15.0	14.4	14.1	-0.32	14.1	-0.32	14.1	-0.32	14.1	-0.32	14.1	-0.32	14.1	-0.32	14.1	-0.32
R040	343674.6	238157.6	1.5	Meadow End	12.7	12.2	12.0	-0.19	12.0	-0.19	12.0	-0.19	12.0	-0.19	12.0	-0.19	12.0	-0.19	12.0	-0.19
R041	342121.8	245162.6	1.5	Mansel Lacy	13.0	12.5	12.6	0.15	12.6	0.15	12.6	0.15	12.6	0.15	12.6	0.15	12.6	0.15	12.6	0.15
R042	339350.3	244653.7	1.5	Mansell Gamage	12.2	11.6	11.5	-0.10	11.5	-0.10	11.5	-0.10	11.5	-0.10	11.5	-0.10	11.5	-0.10	11.5	-0.10

Receptor ID	Easting	Northing	Height	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
R043	340948	241335	1.5	Lulham	13.3	12.8	12.4	-0.47	12.4	-0.47	12.4	-0.47	12.4	-0.47	12.4	-0.47	12.4	-0.47	12.4	-0.47
R044	341421.5	242550.8	1.5	Bridge Sollers	13.6	13.1	12.8	-0.26	12.8	-0.26	12.8	-0.26	12.8	-0.26	12.8	-0.26	12.8	-0.26	12.8	-0.26
R045	349646.3	240476.9	1.5	Whitecross Road	15.5	15.0	14.7	-0.28	14.7	-0.28	14.7	-0.28	14.7	-0.28	14.7	-0.28	14.7	-0.28	14.7	-0.28
R046	349611.4	240106.9	1.5	117 Westfaling Street	14.7	14.1	13.9	-0.21	13.9	-0.21	13.9	-0.21	13.9	-0.21	13.9	-0.21	13.9	-0.21	13.9	-0.21
R047	349421.2	238413	1.5	22 Yarlington Mill	16.2	15.1	14.7	-0.39	14.7	-0.39	14.7	-0.39	14.7	-0.39	14.7	-0.39	14.7	-0.39	14.7	-0.39
R048	348397	238593.6	1.5	Dorchester Way	12.4	11.8	12.2	0.43	12.2	0.43	12.2	0.44	12.2	0.37	11.9	0.08	12.2	0.37	11.9	0.08
R049	347498.9	237488.5	1.5	Pykeways	13.5	13.1	13.2	0.12	13.2	0.12	13.2	0.12	13.2	0.16	13.2	0.16	13.2	0.16	13.2	0.16
R050	347570.9	237363.1	1.5	Golden Post Cottage	13.9	13.4	13.6	0.22	13.6	0.22	13.6	0.22	13.6	0.24	13.6	0.24	13.6	0.24	13.6	0.24
R051	347350.8	237647.7	1.5	Copper Beeches	13.4	12.8	12.9	0.07	12.9	0.07	12.9	0.07	12.9	0.10	12.9	0.10	12.9	0.10	12.9	0.10
R052	347813.3	237768.9	1.5	Edgewood	13.3	12.5	13.2	0.63	13.2	0.63	13.2	0.63	12.7	0.18	12.7	0.18	12.7	0.18	12.7	0.18
R078	347672.1	237650.8	1.5	B4349 Forest View	13.5	12.8	13.2	0.48	13.2	0.48	13.2	0.48	13.4	0.60	13.4	0.60	13.4	0.60	13.4	0.60
R079	348322.9	239217.3	1.5	Broomy Hill	12.9	12.3	12.6	0.27	12.6	0.27	12.6	0.27	12.6	0.25	12.4	0.11	12.6	0.25	12.4	0.11
R080	348535.2	239519	1.5	Breinton Road	13.3	12.8	12.9	0.15	12.9	0.16	12.9	0.16	12.9	0.17	12.8	0.05	12.9	0.17	12.8	0.05
R081	347704.4	240255.5	1.5	Orchard Cottages	13.2	12.6	12.7	0.07	12.7	0.06	12.7	0.06	12.7	0.10	12.7	0.14	12.7	0.13	12.8	0.17
R082	347638.9	240441.3	1.5	Upper Hill Farm	13.1	12.6	12.6	0.06	12.6	0.06	12.6	0.06	12.7	0.10	12.7	0.11	12.8	0.19	12.8	0.21
R083	347317.4	241436	1.5	A438 Kings Acre Road	14.2	13.6	13.8	0.24	13.8	0.25	13.8	0.24	13.8	0.25	13.8	0.25	13.9	0.33	13.9	0.33
R084	347556.2	241326.7	1.5	A438 East of BOp2	14.4	13.8	14.1	0.27	14.1	0.28	14.1	0.27	14.1	0.29	14.1	0.28	14.1	0.33	14.1	0.32
R085	347769.1	241292.1	1.5	A438 Bramley Ct	14.4	13.9	14.2	0.31	14.2	0.37	14.2	0.32	14.2	0.36	14.2	0.36	14.0	0.12	14.0	0.11
R086	348053.1	241157.8	1.5	A438 West Of YOp	14.2	13.7	13.9	0.20	13.9	0.28	13.9	0.28	13.9	0.25	13.9	0.25	13.7	0.08	13.7	0.08
R087	348284.3	241081	1.5	A438 East of OOp	14.4	13.8	14.0	0.14	13.9	0.12	13.9	0.13	13.9	0.11	13.9	0.11	13.9	0.07	13.9	0.07
R088	348290.2	241844.1	1.5	HuntingtonCourt Farm	13.5	13.0	13.2	0.15	13.1	0.08	13.2	0.20	13.1	0.14	13.1	0.14	13.1	0.06	13.1	0.06



Receptor ID	Easting	Northing	Height	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
R089	347964.6	242479.2	1.5	Hunting Brook West	13.4	12.8	13.1	0.24	13.4	0.57	13.1	0.26	13.1	0.27	13.1	0.27	13.0	0.13	13.0	0.13
R090	348550.8	242538	1.5	Lower Burlton Barns	13.6	13.0	13.1	0.03	13.0	0.01	13.1	0.04	13.0	0.02	13.0	0.02	13.3	0.24	13.3	0.24
R091	349092.4	242894.4	1.5	A4110 Wyncroft	14.4	13.8	13.9	0.11	13.9	0.11	13.9	0.11	13.9	0.09	13.9	0.09	13.9	0.10	13.9	0.10
R092	349065.3	242752.1	1.5	A4110 Wyncroft	14.4	13.8	13.9	0.08	13.9	0.08	13.9	0.08	13.9	0.07	13.9	0.07	13.9	0.08	13.9	0.08
R093	350586.7	242832.8	1.5	The Orchard	14.9	14.3	14.3	-0.01	14.3	-0.01	14.3	-0.01	14.3	-0.01	14.3	-0.01	14.3	0.00	14.3	-0.01
R094	348665.1	240963.6	1.5	Huntsmans Drive A438	15.2	14.6	14.6	0.06	14.6	0.05	14.6	0.06	14.6	0.04	14.6	0.04	14.6	0.04	14.6	0.03
R095	350621.8	242200.9	1.5	A49	17.7	17.2	16.7	-0.52	16.7	-0.52	16.7	-0.52	16.7	-0.52	16.7	-0.52	16.7	-0.52	16.7	-0.52
R096	348058.4	242421.9	1.5	Hunting Brook East	13.5	13.0	13.3	0.32	13.1	0.12	13.3	0.34	13.3	0.34	13.3	0.34	13.1	0.14	13.1	0.14
R097	348280.1	242342	1.5	Bovingdon Park	13.9	13.3	13.6	0.28	13.6	0.21	13.7	0.35	13.7	0.36	13.7	0.36	13.7	0.39	13.7	0.39

Appendix 5-6

RESULTS – ECOLOGICAL RECEPTORS



Table 5-6.1 Modelled Nitrogen oxide concentrations in µg/m3 for all scenarios. Blanks are not relevant to those options. Critical limit is 30 µg/m3 for the protection of ecosystems.

Distance from kerb	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
0	Grafton Wood																
10	Grafton Wood	6.7	6.3	8.2	1.9	8.2	1.9	8.2	1.9	8.2	1.9	8.2	1.9	8.2	1.9	8.2	1.9
20	Grafton Wood	6.7	5.7	7.0	1.3	7.0	1.3	7.0	1.3	7.0	1.3	7.0	1.3	7.0	1.3	7.0	1.3
30	Grafton Wood	6.7	5.4	6.3	1.0	6.3	1.0	6.3	1.0	6.3	1.0	6.3	1.0	6.3	1.0	6.3	1.0
40	Grafton Wood	6.7	5.2	6.0	0.8	6.0	0.8	6.0	0.8	6.0	0.8	6.0	0.8	6.0	0.8	6.0	0.8
50	Grafton Wood	6.7	5.1	5.7	0.7	5.7	0.7	5.7	0.7	5.7	0.7	5.7	0.7	5.7	0.7	5.7	0.7
60	Grafton Wood	6.7	5.0	5.5	0.6	5.5	0.6	5.5	0.6	5.5	0.6	5.5	0.6	5.5	0.6	5.5	0.6
70	Grafton Wood	6.7	4.9	5.4	0.5	5.4	0.5	5.4	0.5	5.4	0.5	5.4	0.5	5.4	0.5	5.4	0.5
80	Grafton Wood	6.7	4.9	5.3	0.5	5.3	0.5	5.3	0.5	5.3	0.5	5.3	0.5	5.3	0.5	5.3	0.5
90	Grafton Wood	6.7	4.8	5.2	0.4	5.2	0.4	5.2	0.4	5.2	0.4	5.2	0.4	5.2	0.4	5.2	0.4
100	Grafton Wood	6.7	4.8	5.1	0.4	5.1	0.4	5.1	0.4	5.1	0.4	5.1	0.4	5.1	0.4	5.1	0.4
110	Grafton Wood	6.7	4.8	5.1	0.3	5.1	0.3	5.1	0.3	5.1	0.3	5.1	0.3	5.1	0.3	5.1	0.3
120	Grafton Wood	6.7	4.7	5.0	0.3	5.0	0.3	5.0	0.3	5.0	0.3	5.0	0.3	5.0	0.3	5.0	0.3
130	Grafton Wood	6.7	4.7	5.0	0.3	5.0	0.3	5.0	0.3	5.0	0.3	5.0	0.3	5.0	0.3	5.0	0.3
140	Grafton Wood	6.7	4.7	4.9	0.3	4.9	0.3	4.9	0.3	4.9	0.3	4.9	0.3	4.9	0.3	4.9	0.3
150	Grafton Wood	6.7	4.7	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2
160	Grafton Wood	6.7	4.7	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2
170	Grafton Wood	6.7	4.7	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2	4.9	0.2
180	Grafton Wood	6.7	4.7	4.8	0.2	4.8	0.2	4.8	0.2	4.8	0.2	4.8	0.2	4.8	0.2	4.8	0.2
190	Grafton Wood	6.7	4.6	4.8	0.2	4.8	0.2	4.8	0.2	4.8	0.2	4.8	0.2	4.8	0.2	4.8	0.2
0	Hayleasow Wood																
10	Hayleasow Wood																
20	Hayleasow Wood	7.0	6.7	8.6	1.9	8.6	1.9	8.6	1.9	8.6	1.9	8.6	1.9	8.6	1.9	8.6	1.9
30	Hayleasow Wood	7.0	6.3	7.9	1.5	7.9	1.5	7.9	1.5	7.8	1.5	7.8	1.5	7.8	1.5	7.8	1.5
40	Hayleasow Wood	7.0	6.1	7.4	1.3	7.4	1.3	7.4	1.3	7.4	1.3	7.4	1.3	7.4	1.3	7.4	1.3
50	Hayleasow Wood	7.0	5.9	7.1	1.2	7.1	1.2	7.1	1.1	7.1	1.1	7.1	1.1	7.1	1.1	7.1	1.1
60	Hayleasow Wood	7.0	5.8	6.9	1.0	6.9	1.0	6.9	1.0	6.8	1.0	6.8	1.0	6.8	1.0	6.8	1.0
70	Hayleasow Wood	7.0	5.7	6.7	0.9	6.7	0.9	6.7	0.9	6.6	0.9	6.7	0.9	6.6	0.9	6.7	0.9
80	Hayleasow Wood	7.0	5.7	6.5	0.9	6.5	0.9	6.5	0.9	6.5	0.8	6.5	0.8	6.5	0.8	6.5	0.8
90	Hayleasow Wood	7.0	5.6	6.4	0.8	6.4	0.8	6.4	0.8	6.4	0.8	6.4	0.8	6.4	0.8	6.4	0.8
100	Hayleasow Wood	7.0	5.5	6.3	0.8	6.3	0.8	6.3	0.8	6.3	0.7	6.3	0.7	6.3	0.7	6.3	0.7
110	Hayleasow Wood	7.0	5.5	6.2	0.7	6.2	0.7	6.2	0.7	6.2	0.7	6.2	0.7	6.2	0.7	6.2	0.7
120	Hayleasow Wood	7.0	5.4	6.1	0.7	6.1	0.7	6.1	0.7	6.1	0.7	6.1	0.7	6.1	0.7	6.1	0.7
130	Hayleasow Wood	7.0	5.4	6.0	0.7	6.0	0.7	6.0	0.7	6.0	0.6	6.0	0.6	6.0	0.6	6.0	0.6

Distance from kerb	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
90	Littlemarsh Common	5.5	3.6	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1
100	Littlemarsh Common	5.4	3.6	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1
110	Littlemarsh Common	5.4	3.6	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1
120	Littlemarsh Common	5.4	3.6	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1
130	Littlemarsh Common	5.3	3.6	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1
140	Littlemarsh Common	5.3	3.5	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1
150	Littlemarsh Common	5.3	3.5	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1	3.5	-0.1
160	Littlemarsh Common	5.3	3.5	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.5	-0.1	3.4	-0.1
170	Littlemarsh Common	5.3	3.5	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1
180	Littlemarsh Common	5.3	3.5	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1
190	Littlemarsh Common	5.3	3.5	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1	3.4	-0.1
0	Newton Coppice																
10	Newton Coppice	16.5	10.9	11.3	0.4	11.3	0.4	11.3	0.4	11.2	0.2	11.1	0.2	11.1	0.2	11.1	0.2
20	Newton Coppice	13.1	8.7	9.1	0.4	9.1	0.4	9.1	0.4	9.0	0.3	8.9	0.2	9.0	0.3	8.9	0.2
30	Newton Coppice	11.5	7.6	8.0	0.4	8.0	0.4	8.0	0.4	7.9	0.3	7.8	0.2	7.9	0.3	7.8	0.2
40	Newton Coppice	10.5	7.0	7.4	0.4	7.4	0.4	7.4	0.4	7.3	0.3	7.2	0.2	7.3	0.3	7.2	0.2
50	Newton Coppice	9.9	6.6	6.9	0.4	6.9	0.4	6.9	0.4	6.8	0.3	6.8	0.2	6.8	0.3	6.8	0.2
60	Newton Coppice	9.4	6.3	6.6	0.4	6.6	0.4	6.6	0.4	6.5	0.3	6.5	0.2	6.5	0.3	6.5	0.2
70	Newton Coppice	9.0	6.0	6.4	0.3	6.4	0.3	6.4	0.3	6.3	0.3	6.3	0.2	6.3	0.3	6.3	0.2
80	Newton Coppice	8.7	5.8	6.2	0.3	6.2	0.3	6.2	0.3	6.1	0.3	6.1	0.2	6.1	0.3	6.1	0.2
90	Newton Coppice	8.5	5.7	6.0	0.3	6.0	0.3	6.0	0.3	5.9	0.3	5.9	0.2	5.9	0.3	5.9	0.2
100	Newton Coppice	8.3	5.6	5.9	0.3	5.9	0.3	5.9	0.3	5.8	0.3	5.8	0.2	5.8	0.3	5.8	0.2
110	Newton Coppice	8.1	5.5	5.8	0.3	5.8	0.3	5.8	0.3	5.7	0.3	5.7	0.2	5.7	0.3	5.7	0.2
120	Newton Coppice	8.0	5.4	5.7	0.3	5.7	0.3	5.7	0.3	5.6	0.3	5.6	0.2	5.6	0.3	5.6	0.2
130	Newton Coppice	7.9	5.3	5.6	0.3	5.6	0.3	5.6	0.3	5.5	0.3	5.5	0.2	5.5	0.3	5.5	0.2
140	Newton Coppice	7.7	5.2	5.5	0.3	5.5	0.3	5.5	0.3	5.5	0.3	5.4	0.2	5.5	0.3	5.4	0.2
150	Newton Coppice	7.6	5.2	5.5	0.3	5.5	0.3	5.5	0.3	5.4	0.3	5.4	0.2	5.4	0.3	5.4	0.2
160	Newton Coppice	7.6	5.1	5.4	0.3	5.4	0.3	5.4	0.3	5.3	0.3	5.3	0.2	5.3	0.3	5.3	0.2
170	Newton Coppice	7.5	5.0	5.3	0.3	5.3	0.3	5.3	0.3	5.3	0.3	5.2	0.2	5.3	0.3	5.2	0.2
180	Newton Coppice	7.4	5.0	5.3	0.3	5.3	0.3	5.3	0.3	5.2	0.3	5.2	0.2	5.2	0.3	5.2	0.2
190	Newton Coppice	7.3	4.9	5.2	0.3	5.2	0.3	5.2	0.3	5.2	0.2	5.2	0.2	5.2	0.2	5.2	0.2
0	Rough Coppice																
10	Rough Coppice	6.7	4.4	8.2	3.8	8.2	3.8	8.2	3.8	8.2	3.8	9.4	5.2	8.2	3.8	9.4	5.2
20	Rough Coppice	6.7	4.4	7.3	2.9	7.3	2.9	7.4	2.9	7.4	2.9	8.0	3.8	7.4	2.9	8.1	3.9
30	Rough Coppice	6.7	4.4	6.8	2.4	6.8	2.4	6.8	2.4	6.9	2.4	7.3	3.1	6.9	2.4	7.3	3.1

Distance from kerb	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
40	Rough Coppice	6.7	4.4	6.5	2.0	6.5	2.1	6.5	2.1	6.5	2.1	6.8	2.6	6.5	2.1	6.8	2.6
50	Rough Coppice	6.7	4.4	6.2	1.8	6.2	1.8	6.2	1.8	6.2	1.8	6.4	2.2	6.2	1.8	6.4	2.2
60	Rough Coppice	6.7	4.4	6.0	1.6	6.0	1.6	6.0	1.6	6.0	1.6	6.2	1.9	6.0	1.6	6.2	1.9
70	Rough Coppice	6.7	4.4	5.8	1.4	5.8	1.4	5.9	1.4	5.9	1.5	6.0	1.7	5.9	1.5	6.0	1.7
80	Rough Coppice	6.6	4.4	5.7	1.3	5.7	1.3	5.7	1.3	5.7	1.3	5.8	1.5	5.7	1.3	5.8	1.5
90	Rough Coppice	6.6	4.4	5.6	1.2	5.6	1.2	5.6	1.2	5.6	1.2	5.6	1.4	5.6	1.2	5.6	1.4
100	Rough Coppice	6.6	4.4	5.5	1.1	5.5	1.1	5.5	1.1	5.5	1.1	5.5	1.3	5.5	1.1	5.5	1.3
110	Rough Coppice	6.6	4.4	5.4	1.0	5.4	1.0	5.4	1.0	5.4	1.1	5.4	1.2	5.4	1.0	5.4	1.2
120	Rough Coppice	6.6	4.4	5.3	1.0	5.3	1.0	5.4	1.0	5.4	1.0	5.4	1.1	5.4	1.0	5.4	1.1
130	Rough Coppice	6.6	4.4	5.3	0.9	5.3	0.9	5.3	0.9	5.3	0.9	5.3	1.0	5.3	0.9	5.3	1.0
140	Rough Coppice	6.6	4.4	5.2	0.9	5.2	0.9	5.2	0.9	5.2	0.9	5.2	0.9	5.2	0.9	5.2	0.9
150	Rough Coppice	6.6	4.4	5.2	0.8	5.2	0.8	5.2	0.8	5.2	0.8	5.2	0.9	5.2	0.8	5.2	0.9
160	Rough Coppice	6.6	4.3	5.1	0.8	5.1	0.8	5.1	0.8	5.1	0.8	5.1	0.8	5.1	0.8	5.1	0.8
170	Rough Coppice	6.6	4.3	5.1	0.7	5.1	0.7	5.1	0.7	5.1	0.8	5.1	0.8	5.1	0.8	5.1	0.8
180	Rough Coppice	6.5	4.3	5.0	0.7	5.0	0.7	5.0	0.7	5.1	0.7	5.1	0.8	5.1	0.7	5.0	0.7
190	Rough Coppice	6.5	4.3	5.0	0.7	5.0	0.7	5.0	0.7	5.0	0.7	5.0	0.7	5.0	0.7	5.0	0.7
0	Wye Coppice	6.3	4.2									10.7	6.5			10.6	6.4
10	Wye Coppice	6.3	4.2									8.3	4.2			8.3	4.1
20	Wye Coppice	6.3	4.2									7.3	3.2			7.3	3.1
30	Wye Coppice	6.3	4.2									6.7	2.6			6.7	2.6
40	Wye Coppice	6.3	4.1									6.3	2.2			6.3	2.2
50	Wye Coppice	6.3	4.2									6.1	1.9			6.0	1.9
60	Wye Coppice	6.3	4.1									5.8	1.7			5.8	1.7
70	Wye Coppice	6.3	4.1									5.7	1.5			5.6	1.5
80	Wye Coppice	6.2	4.1									5.5	1.4			5.5	1.4
90	Wye Coppice	6.2	4.1									5.4	1.2			5.4	1.2
100	Wye Coppice	6.2	4.1									5.3	1.2			5.3	1.2
110	Wye Coppice	6.2	4.1									5.2	1.1			5.2	1.1
120	Wye Coppice	6.2	4.1									5.1	1.0			5.1	1.0
130	Wye Coppice	6.2	4.1									5.0	0.9			5.0	0.9
140	Wye Coppice	6.2	4.1									5.0	0.9			5.0	0.9
150	Wye Coppice	6.2	4.1									4.9	0.8			4.9	0.8
160	Wye Coppice	6.2	4.1									4.9	0.8			4.9	0.8
170	Wye Coppice	6.2	4.1									4.8	0.7			4.8	0.7

Distance from kerb	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
180	Wye Coppice	6.2	4.1									4.8	0.7			4.8	0.7
190	Wye Coppice	6.2	4.1									4.8	0.7			4.8	0.7
0	River Wye SAC East	6.7	4.5	19.4	15.0	19.4	15.0	19.4	15.0	12.9	8.5	12.4	8.2	12.9	8.5	12.4	8.2
10	River Wye SAC East	6.8	4.5	12.3	7.8	12.3	7.8	12.3	7.8	9.7	5.2	9.4	5.2	9.7	5.2	9.4	5.2
20	River Wye SAC East	6.8	4.5	9.5	5.0	9.5	5.0	9.5	5.0	8.4	3.9	8.1	3.9	8.4	3.9	8.1	3.9
30	River Wye SAC East	6.8	4.5	8.2	3.7	8.2	3.7	8.2	3.7	7.6	3.2	7.4	3.1	7.6	3.2	7.4	3.1
40	River Wye SAC East	6.8	4.5	7.5	3.0	7.5	3.0	7.5	3.0	7.2	2.7	6.9	2.6	7.1	2.7	6.9	2.6
50	River Wye SAC East	6.8	4.5	7.0	2.5	7.1	2.5	7.1	2.5	6.8	2.3	6.5	2.3	6.8	2.3	6.5	2.3
60	River Wye SAC East	6.8	4.5	6.7	2.2	6.7	2.2	6.7	2.2	6.5	2.0	6.2	2.0	6.5	2.0	6.2	2.0
70	River Wye SAC East	6.8	4.5	6.4	1.9	6.4	1.9	6.4	1.9	6.3	1.8	6.0	1.8	6.3	1.8	6.0	1.8
80	River Wye SAC East	6.8	4.5	6.2	1.7	6.2	1.7	6.2	1.7	6.1	1.6	5.9	1.6	6.1	1.6	5.9	1.6
90	River Wye SAC East	6.9	4.5	6.1	1.5	6.1	1.5	6.1	1.5	6.0	1.4	5.7	1.5	6.0	1.4	5.7	1.5
100	River Wye SAC East	6.9	4.5	5.9	1.4	5.9	1.4	5.9	1.4	5.9	1.3	5.6	1.3	5.8	1.3	5.6	1.3
110	River Wye SAC East	6.9	4.6	5.8	1.2	5.8	1.2	5.8	1.3	5.8	1.2	5.5	1.2	5.8	1.2	5.5	1.2
120	River Wye SAC East	6.9	4.6	5.7	1.1	5.7	1.1	5.7	1.1	5.7	1.1	5.4	1.1	5.7	1.1	5.4	1.1
130	River Wye SAC East	6.9	4.6	5.6	1.0	5.6	1.0	5.6	1.1	5.6	1.0	5.3	1.1	5.6	1.0	5.3	1.1
140	River Wye SAC East	6.9	4.6	5.6	1.0	5.6	1.0	5.6	1.0	5.5	0.9	5.3	1.0	5.5	0.9	5.3	1.0
150	River Wye SAC East	7.0	4.6	5.5	0.9	5.5	0.9	5.5	0.9	5.5	0.9	5.2	0.9	5.5	0.9	5.2	0.9
160	River Wye SAC East	7.0	4.6	5.4	0.8	5.5	0.8	5.5	0.8	5.4	0.8	5.2	0.9	5.4	0.8	5.2	0.9
170	River Wye SAC East	7.0	4.6	5.4	0.8	5.4	0.8	5.4	0.8	5.4	0.8	5.1	0.8	5.4	0.8	5.1	0.8
180	River Wye SAC East	7.0	4.6	5.4	0.7	5.4	0.7	5.4	0.7	5.4	0.7	5.1	0.8	5.4	0.7	5.1	0.8
190	River Wye SAC East	7.0	4.6	5.3	0.7	5.3	0.7	5.3	0.7	5.3	0.7	5.1	0.7	5.3	0.7	5.1	0.7
0	River Wye SAC West	6.7	4.4	8.6	4.2	8.7	4.2	8.7	4.2	10.6	6.1	10.3	6.1	10.6	6.1	10.3	6.1
10	River Wye SAC West	6.7	4.4	7.6	3.2	7.6	3.2	7.6	3.2	8.5	4.1	8.1	4.0	8.5	4.1	8.1	3.9
20	River Wye SAC West	6.7	4.4	7.0	2.6	7.0	2.6	7.0	2.6	7.5	3.1	7.2	3.0	7.5	3.1	7.2	3.0
30	River Wye SAC West	6.7	4.4	6.6	2.2	6.6	2.2	6.6	2.2	7.0	2.5	6.6	2.4	7.0	2.5	6.6	2.4
40	River Wye SAC West	6.7	4.4	6.3	1.9	6.3	1.9	6.3	1.9	6.6	2.2	6.2	2.1	6.6	2.2	6.2	2.1
50	River Wye SAC West	6.7	4.4	6.1	1.7	6.1	1.7	6.1	1.7	6.3	1.9	6.0	1.8	6.3	1.9	6.0	1.8
60	River Wye SAC West	6.7	4.4	5.9	1.5	5.9	1.5	5.9	1.5	6.1	1.7	5.7	1.6	6.1	1.7	5.7	1.6
70	River Wye SAC West	6.6	4.4	5.8	1.4	5.8	1.4	5.8	1.4	5.9	1.5	5.6	1.4	5.9	1.5	5.6	1.4
80	River Wye SAC West	6.6	4.4	5.6	1.2	5.6	1.2	5.6	1.2	5.8	1.4	5.4	1.3	5.8	1.4	5.4	1.3
90	River Wye SAC West	6.6	4.4	5.5	1.1	5.5	1.1	5.5	1.1	5.6	1.3	5.3	1.2	5.6	1.3	5.3	1.2
100	River Wye SAC West	6.6	4.4	5.4	1.1	5.4	1.1	5.4	1.1	5.5	1.2	5.2	1.1	5.5	1.2	5.2	1.1
110	River Wye SAC West	6.6	4.4	5.4	1.0	5.4	1.0	5.4	1.0	5.5	1.1	5.1	1.0	5.4	1.1	5.1	1.0
120	River Wye SAC West	6.6	4.4	5.3	0.9	5.3	0.9	5.3	0.9	5.4	1.0	5.0	0.9	5.4	1.0	5.0	0.9

Distance from kerb	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
130	River Wye SAC West	6.6	4.4	5.2	0.9	5.2	0.9	5.2	0.9	5.3	1.0	5.0	0.9	5.3	1.0	5.0	0.9
140	River Wye SAC West	6.6	4.3	5.2	0.8	5.2	0.8	5.2	0.8	5.3	0.9	4.9	0.8	5.3	0.9	4.9	0.8
150	River Wye SAC West	6.6	4.3	5.1	0.8	5.1	0.8	5.1	0.8	5.2	0.9	4.9	0.8	5.2	0.8	4.9	0.8
160	River Wye SAC West	6.5	4.3	5.1	0.8	5.1	0.7	5.1	0.7	5.2	0.8	4.8	0.7	5.1	0.8	4.8	0.7
170	River Wye SAC West	6.5	4.3	5.0	0.7	5.0	0.7	5.0	0.7	5.1	0.8	4.8	0.7	5.1	0.8	4.8	0.7
180	River Wye SAC West	6.5	4.3	5.0	0.7	5.0	0.7	5.0	0.7	5.1	0.7	4.7	0.7	5.1	0.7	4.7	0.7
190	River Wye SAC West	6.5	4.3	5.0	0.7	5.0	0.7	5.0	0.7	5.0	0.7	4.7	0.6	5.0	0.7	4.7	0.6
0	River Wye SSSI East	6.7	4.5	19.4	15.0	19.4	15.0	19.4	15.0	12.9	8.5	12.4	8.2	12.9	8.5	12.4	8.2
10	River Wye SSSI East	6.8	4.5	12.3	7.8	12.3	7.8	12.3	7.8	9.7	5.2	9.4	5.2	9.7	5.2	9.4	5.2
20	River Wye SSSI East	6.8	4.5	9.5	5.0	9.5	5.0	9.5	5.0	8.4	3.9	8.1	3.9	8.4	3.9	8.1	3.9
30	River Wye SSSI East	6.8	4.5	8.2	3.7	8.2	3.7	8.2	3.7	7.6	3.2	7.4	3.1	7.6	3.2	7.4	3.1
40	River Wye SSSI East	6.8	4.5	7.5	3.0	7.5	3.0	7.5	3.0	7.2	2.7	6.9	2.6	7.1	2.7	6.9	2.6
50	River Wye SSSI East	6.8	4.5	7.0	2.5	7.1	2.5	7.1	2.5	6.8	2.3	6.5	2.3	6.8	2.3	6.5	2.3
60	River Wye SSSI East	6.8	4.5	6.7	2.2	6.7	2.2	6.7	2.2	6.5	2.0	6.2	2.0	6.5	2.0	6.2	2.0
70	River Wye SSSI East	6.8	4.5	6.4	1.9	6.4	1.9	6.4	1.9	6.3	1.8	6.0	1.8	6.3	1.8	6.0	1.8
80	River Wye SSSI East	6.8	4.5	6.2	1.7	6.2	1.7	6.2	1.7	6.1	1.6	5.9	1.6	6.1	1.6	5.9	1.6
90	River Wye SSSI East	6.9	4.5	6.1	1.5	6.1	1.5	6.1	1.5	6.0	1.4	5.7	1.5	6.0	1.4	5.7	1.5
100	River Wye SSSI East	6.9	4.5	5.9	1.4	5.9	1.4	5.9	1.4	5.9	1.3	5.6	1.3	5.8	1.3	5.6	1.3
110	River Wye SSSI East	6.9	4.6	5.8	1.2	5.8	1.2	5.8	1.3	5.8	1.2	5.5	1.2	5.8	1.2	5.5	1.2
120	River Wye SSSI East	6.9	4.6	5.7	1.1	5.7	1.1	5.7	1.1	5.7	1.1	5.4	1.1	5.7	1.1	5.4	1.1
130	River Wye SSSI East	6.9	4.6	5.6	1.0	5.6	1.0	5.6	1.1	5.6	1.0	5.3	1.1	5.6	1.0	5.3	1.1
140	River Wye SSSI East	6.9	4.6	5.6	1.0	5.6	1.0	5.6	1.0	5.5	0.9	5.3	1.0	5.5	0.9	5.3	1.0
150	River Wye SSSI East	7.0	4.6	5.5	0.9	5.5	0.9	5.5	0.9	5.5	0.9	5.2	0.9	5.5	0.9	5.2	0.9
160	River Wye SSSI East	7.0	4.6	5.4	0.8	5.5	0.8	5.5	0.8	5.4	0.8	5.2	0.9	5.4	0.8	5.2	0.9
170	River Wye SSSI East	7.0	4.6	5.4	0.8	5.4	0.8	5.4	0.8	5.4	0.8	5.1	0.8	5.4	0.8	5.1	0.8
180	River Wye SSSI East	7.0	4.6	5.4	0.7	5.4	0.7	5.4	0.7	5.4	0.7	5.1	0.8	5.4	0.7	5.1	0.8
190	River Wye SSSI East	7.0	4.6	5.3	0.7	5.3	0.7	5.3	0.7	5.3	0.7	5.1	0.7	5.3	0.7	5.1	0.7
0	River Wye SSSI West	6.7	4.4	8.6	4.2	8.7	4.2	8.7	4.2	10.6	6.1	10.3	6.1	10.6	6.1	10.3	6.1
10	River Wye SSSI West	6.7	4.4	7.6	3.2	7.6	3.2	7.6	3.2	8.5	4.1	8.1	4.0	8.5	4.1	8.1	3.9
20	River Wye SSSI West	6.7	4.4	7.0	2.6	7.0	2.6	7.0	2.6	7.5	3.1	7.2	3.0	7.5	3.1	7.2	3.0
30	River Wye SSSI West	6.7	4.4	6.6	2.2	6.6	2.2	6.6	2.2	7.0	2.5	6.6	2.4	7.0	2.5	6.6	2.4
40	River Wye SSSI West	6.7	4.4	6.3	1.9	6.3	1.9	6.3	1.9	6.6	2.2	6.2	2.1	6.6	2.2	6.2	2.1
50	River Wye SSSI West	6.7	4.4	6.1	1.7	6.1	1.7	6.1	1.7	6.3	1.9	6.0	1.8	6.3	1.9	6.0	1.8
60	River Wye SSSI West	6.7	4.4	5.9	1.5	5.9	1.5	5.9	1.5	6.1	1.7	5.7	1.6	6.1	1.7	5.7	1.6
70	River Wye SSSI West	6.6	4.4	5.8	1.4	5.8	1.4	5.8	1.4	5.9	1.5	5.6	1.4	5.9	1.5	5.6	1.4

Distance from kerb	Description	Base 2016	DM 2026	Orange 2026	Change	Cyan 2026	Change	Yellow 2026	Change	Red 2026	Change	Olive 2026	Change	Black 1 2026	Change	Black 2 2026	Change
80	River Wye SSSI West	6.6	4.4	5.6	1.2	5.6	1.2	5.6	1.2	5.8	1.4	5.4	1.3	5.8	1.4	5.4	1.3
90	River Wye SSSI West	6.6	4.4	5.5	1.1	5.5	1.1	5.5	1.1	5.6	1.3	5.3	1.2	5.6	1.3	5.3	1.2
100	River Wye SSSI West	6.6	4.4	5.4	1.1	5.4	1.1	5.4	1.1	5.5	1.2	5.2	1.1	5.5	1.2	5.2	1.1
110	River Wye SSSI West	6.6	4.4	5.4	1.0	5.4	1.0	5.4	1.0	5.5	1.1	5.1	1.0	5.4	1.1	5.1	1.0
120	River Wye SSSI West	6.6	4.4	5.3	0.9	5.3	0.9	5.3	0.9	5.4	1.0	5.0	0.9	5.4	1.0	5.0	0.9
130	River Wye SSSI West	6.6	4.4	5.2	0.9	5.2	0.9	5.2	0.9	5.3	1.0	5.0	0.9	5.3	1.0	5.0	0.9
140	River Wye SSSI West	6.6	4.3	5.2	0.8	5.2	0.8	5.2	0.8	5.3	0.9	4.9	0.8	5.3	0.9	4.9	0.8
150	River Wye SSSI West	6.6	4.3	5.1	0.8	5.1	0.8	5.1	0.8	5.2	0.9	4.9	0.8	5.2	0.8	4.9	0.8
160	River Wye SSSI West	6.5	4.3	5.1	0.8	5.1	0.7	5.1	0.7	5.2	0.8	4.8	0.7	5.1	0.8	4.8	0.7
170	River Wye SSSI West	6.5	4.3	5.0	0.7	5.0	0.7	5.0	0.7	5.1	0.8	4.8	0.7	5.1	0.8	4.8	0.7
180	River Wye SSSI West	6.5	4.3	5.0	0.7	5.0	0.7	5.0	0.7	5.1	0.7	4.7	0.7	5.1	0.7	4.7	0.7
190	River Wye SSSI West	6.5	4.3	5.0	0.7	5.0	0.7	5.0	0.7	5.0	0.7	4.7	0.6	5.0	0.7	4.7	0.6

Table 5-6.2 Nitrogen Deposition on ecological receptors in kgN/ha/yr with percentage change.

Distance from Kerb	Description	Lowest Critical Load	Total Deposition kgN / ha / yr and Percentage change with Scheme																				
			Orange			Cyan			Yellow			Red			Olive			Black 1			Black 2		
			DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch
0	Grafton Wood	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	Grafton Wood	10	24.6	24.8	2.2%	24.6	24.8	2.2%	24.6	24.8	2.2%	24.6	24.8	2.2%	24.6	24.8	2.2%	24.6	24.8	2.2%	24.6	24.8	2.2%
20	Grafton Wood	10	24.5	24.7	1.5%	24.5	24.7	1.5%	24.5	24.7	1.5%	24.5	24.7	1.5%	24.5	24.7	1.5%	24.5	24.7	1.5%	24.5	24.7	1.5%
30	Grafton Wood	10	24.5	24.6	1.1%	24.5	24.6	1.1%	24.5	24.6	1.1%	24.5	24.6	1.1%	24.5	24.6	1.1%	24.5	24.6	1.1%	24.5	24.6	1.1%
40	Grafton Wood	10	24.5	24.6	0.9%	24.5	24.6	0.9%	24.5	24.6	0.9%	24.5	24.6	0.9%	24.5	24.6	0.9%	24.5	24.6	0.9%	24.5	24.6	0.9%
50	Grafton Wood	10	24.5	24.5	0.8%	24.5	24.5	0.8%	24.5	24.5	0.8%	24.5	24.5	0.8%	24.5	24.5	0.8%	24.5	24.5	0.8%	24.5	24.5	0.8%
60	Grafton Wood	10	24.5	24.5	0.7%	24.5	24.5	0.7%	24.5	24.5	0.7%	24.5	24.5	0.7%	24.5	24.5	0.7%	24.5	24.5	0.7%	24.5	24.5	0.7%
70	Grafton Wood	10	24.5	24.5	0.6%	24.5	24.5	0.6%	24.5	24.5	0.6%	24.5	24.5	0.6%	24.5	24.5	0.6%	24.5	24.5	0.6%	24.5	24.5	0.6%
80	Grafton Wood	10	24.5	24.5	0.5%	24.5	24.5	0.5%	24.5	24.5	0.5%	24.5	24.5	0.5%	24.5	24.5	0.5%	24.5	24.5	0.5%	24.5	24.5	0.5%
90	Grafton Wood	10	24.4	24.5	0.5%	24.4	24.5	0.5%	24.4	24.5	0.5%	24.4	24.5	0.5%	24.4	24.5	0.5%	24.4	24.5	0.5%	24.4	24.5	0.5%
100	Grafton Wood	10	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%
110	Grafton Wood	10	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%	24.4	24.5	0.4%
120	Grafton Wood	10	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%
130	Grafton Wood	10	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%
140	Grafton Wood	10	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%
150	Grafton Wood	10	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%	24.4	24.5	0.3%

Distance from Kerb	Description	Lowest Critical Load	Total Deposition kgN / ha / yr and Percentage change with Scheme																				
			Orange			Cyan			Yellow			Red			Olive			Black 1			Black 2		
			DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch
160	Grafton Wood	10	24.4	24.5	0.2%	24.4	24.5	0.2%	24.4	24.5	0.2%	24.4	24.5	0.2%	24.4	24.5	0.2%	24.4	24.5	0.2%	24.4	24.5	0.2%
170	Grafton Wood	10	24.4	24.5	0.2%	24.4	24.5	0.2%	24.4	24.5	0.2%	24.4	24.5	0.2%	24.4	24.4	0.2%	24.4	24.5	0.2%	24.4	24.4	0.2%
180	Grafton Wood	10	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%
190	Grafton Wood	10	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%	24.4	24.4	0.2%
0	Hayleasow Wood	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Hayleasow Wood	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Hayleasow Wood	10	25.4	25.6	2.2%	25.4	25.6	2.2%	25.4	25.6	2.2%	25.4	25.6	2.1%	25.4	25.6	2.2%	25.4	25.6	2.2%	25.4	25.6	2.2%
30	Hayleasow Wood	10	25.3	25.5	1.8%	25.3	25.5	1.8%	25.3	25.5	1.8%	25.3	25.5	1.7%	25.3	25.5	1.7%	25.3	25.5	1.7%	25.3	25.5	1.7%
40	Hayleasow Wood	10	25.3	25.5	1.5%	25.3	25.5	1.5%	25.3	25.5	1.5%	25.3	25.5	1.5%	25.3	25.5	1.5%	25.3	25.5	1.5%	25.3	25.5	1.5%
50	Hayleasow Wood	10	25.3	25.4	1.3%	25.3	25.4	1.3%	25.3	25.4	1.3%	25.3	25.4	1.3%	25.3	25.4	1.3%	25.3	25.4	1.3%	25.3	25.4	1.3%
60	Hayleasow Wood	10	25.3	25.4	1.2%	25.3	25.4	1.2%	25.3	25.4	1.2%	25.3	25.4	1.1%	25.3	25.4	1.1%	25.3	25.4	1.1%	25.3	25.4	1.2%
70	Hayleasow Wood	10	25.3	25.4	1.1%	25.3	25.4	1.1%	25.3	25.4	1.1%	25.3	25.4	1.0%	25.3	25.4	1.1%	25.3	25.4	1.0%	25.3	25.4	1.1%
80	Hayleasow Wood	10	25.3	25.4	1.0%	25.3	25.4	1.0%	25.3	25.4	1.0%	25.3	25.4	1.0%	25.3	25.4	1.0%	25.3	25.4	1.0%	25.3	25.4	1.0%
90	Hayleasow Wood	10	25.3	25.4	0.9%	25.3	25.4	0.9%	25.3	25.4	0.9%	25.3	25.4	0.9%	25.3	25.4	0.9%	25.3	25.4	0.9%	25.3	25.4	0.9%
100	Hayleasow Wood	10	25.3	25.3	0.9%	25.3	25.3	0.9%	25.3	25.3	0.9%	25.3	25.3	0.8%	25.3	25.3	0.8%	25.3	25.3	0.8%	25.3	25.3	0.8%
110	Hayleasow Wood	10	25.3	25.3	0.8%	25.3	25.3	0.8%	25.3	25.3	0.8%	25.3	25.3	0.8%	25.3	25.3	0.8%	25.3	25.3	0.8%	25.3	25.3	0.8%
120	Hayleasow Wood	10	25.2	25.3	0.8%	25.2	25.3	0.8%	25.2	25.3	0.8%	25.2	25.3	0.8%	25.2	25.3	0.8%	25.2	25.3	0.8%	25.2	25.3	0.8%
130	Hayleasow Wood	10	25.2	25.3	0.8%	25.2	25.3	0.8%	25.2	25.3	0.8%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%
140	Hayleasow Wood	10	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%
150	Hayleasow Wood	10	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%
160	Hayleasow Wood	10	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%
170	Hayleasow Wood	10	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.6%	25.2	25.3	0.6%	25.2	25.3	0.6%	25.2	25.3	0.6%
180	Hayleasow Wood	10	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.6%	25.2	25.3	0.6%	25.2	25.3	0.6%	25.2	25.3	0.6%
190	Hayleasow Wood	10	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.7%	25.2	25.3	0.6%	25.2	25.3	0.6%	25.2	25.3	0.6%	25.2	25.3	0.6%
0	Hunderton Wood	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Hunderton Wood	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Hunderton Wood	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Hunderton Wood	10	-	-	-	-	-	-	-	-	-	25.1	25.5	7.3%	-	-	-	25.1	25.5	7.3%	-	-	-
40	Hunderton Wood	10	-	-	-	-	-	-	-	-	-	25.1	25.4	6.1%	-	-	-	25.1	25.4	6.1%	-	-	-
50	Hunderton Wood	10	25.1	25.4	2.8%	25.1	25.4	6.1%	25.1	25.4	6.1%	25.1	25.4	5.3%	-	-	-	25.1	25.4	5.3%	-	-	-

Distance from Kerb	Description	Lowest Critical Load	Total Deposition kgN / ha / yr and Percentage change with Scheme																				
			Orange			Cyan			Yellow			Red			Olive			Black 1			Black 2		
			DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch
160	Littlemarsh Common	5	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%
170	Littlemarsh Common	5	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%
180	Littlemarsh Common	5	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%
190	Littlemarsh Common	5	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%	14.9	14.9	-0.1%
0	Newton Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Newton Coppice	5	25.8	25.9	0.4%	25.8	25.9	0.4%	25.8	25.9	0.4%	25.8	25.9	0.3%	25.8	25.9	0.2%	25.8	25.9	0.3%	25.8	25.9	0.2%
20	Newton Coppice	5	25.6	25.6	0.4%	25.6	25.6	0.4%	25.6	25.6	0.4%	25.6	25.6	0.3%	25.6	25.6	0.2%	25.6	25.6	0.3%	25.6	25.6	0.2%
30	Newton Coppice	5	25.5	25.5	0.4%	25.5	25.5	0.4%	25.5	25.5	0.4%	25.5	25.5	0.3%	25.5	25.5	0.3%	25.5	25.5	0.3%	25.5	25.5	0.3%
40	Newton Coppice	5	25.4	25.4	0.4%	25.4	25.4	0.4%	25.4	25.4	0.4%	25.4	25.4	0.3%	25.4	25.4	0.2%	25.4	25.4	0.3%	25.4	25.4	0.2%
50	Newton Coppice	5	25.3	25.4	0.4%	25.3	25.4	0.4%	25.3	25.4	0.4%	25.3	25.4	0.3%	25.3	25.4	0.2%	25.3	25.4	0.3%	25.3	25.4	0.2%
60	Newton Coppice	5	25.3	25.4	0.4%	25.3	25.4	0.4%	25.3	25.4	0.4%	25.3	25.3	0.3%	25.3	25.3	0.3%	25.3	25.3	0.3%	25.3	25.3	0.3%
70	Newton Coppice	5	25.3	25.3	0.4%	25.3	25.3	0.4%	25.3	25.3	0.4%	25.3	25.3	0.3%	25.3	25.3	0.3%	25.3	25.3	0.3%	25.3	25.3	0.3%
80	Newton Coppice	5	25.3	25.3	0.4%	25.3	25.3	0.4%	25.3	25.3	0.4%	25.3	25.3	0.3%	25.3	25.3	0.3%	25.3	25.3	0.3%	25.3	25.3	0.2%
90	Newton Coppice	5	25.2	25.3	0.4%	25.2	25.3	0.4%	25.2	25.3	0.4%	25.2	25.3	0.3%	25.2	25.3	0.3%	25.2	25.3	0.3%	25.2	25.3	0.3%
100	Newton Coppice	5	25.2	25.3	0.4%	25.2	25.3	0.4%	25.2	25.3	0.4%	25.2	25.3	0.3%	25.2	25.3	0.2%	25.2	25.3	0.3%	25.2	25.3	0.2%
110	Newton Coppice	5	25.2	25.3	0.4%	25.2	25.3	0.4%	25.2	25.3	0.4%	25.2	25.3	0.3%	25.2	25.2	0.2%	25.2	25.3	0.3%	25.2	25.2	0.2%
120	Newton Coppice	5	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%
130	Newton Coppice	5	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%
140	Newton Coppice	5	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%
150	Newton Coppice	5	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.2%	25.2	25.2	0.3%	25.2	25.2	0.2%
160	Newton Coppice	5	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%
170	Newton Coppice	5	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.4%	25.2	25.2	0.3%	25.2	25.2	0.2%	25.2	25.2	0.3%	25.2	25.2	0.2%
180	Newton Coppice	5	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.2%	25.2	25.2	0.3%	25.2	25.2	0.2%
190	Newton Coppice	5	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.3%	25.2	25.2	0.2%	25.2	25.2	0.3%	25.2	25.2	0.2%
0	Rough Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Rough Coppice	5	25.1	25.5	4.3%	25.1	25.5	4.3%	25.1	25.5	4.3%	25.1	25.5	4.4%	25.0	25.6	5.9%	25.1	25.5	4.4%	25.0	25.6	6.0%
20	Rough Coppice	5	25.1	25.4	3.3%	25.1	25.4	3.3%	25.1	25.4	3.3%	25.1	25.4	3.4%	25.0	25.5	4.4%	25.1	25.4	3.4%	25.0	25.5	4.4%
30	Rough Coppice	5	25.1	25.4	2.8%	25.1	25.4	2.8%	25.1	25.4	2.8%	25.1	25.4	2.8%	25.0	25.4	3.5%	25.1	25.4	2.8%	25.0	25.4	3.5%
40	Rough Coppice	5	25.1	25.3	2.3%	25.1	25.3	2.4%	25.1	25.3	2.4%	25.1	25.3	2.4%	25.1	25.3	3.0%	25.1	25.3	2.4%	25.1	25.3	3.0%
50	Rough Coppice	5	25.1	25.3	2.1%	25.1	25.3	2.1%	25.1	25.3	2.1%	25.1	25.3	2.1%	25.1	25.3	2.5%	25.1	25.3	2.1%	25.1	25.3	2.5%

Distance from Kerb	Description	Lowest Critical Load	Total Deposition kgN / ha / yr and Percentage change with Scheme																				
			Orange			Cyan			Yellow			Red			Olive			Black 1			Black 2		
			DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch
60	Rough Coppice	5	25.1	25.3	1.8%	25.1	25.3	1.8%	25.1	25.3	1.8%	25.1	25.3	1.9%	25.1	25.3	2.2%	25.1	25.3	1.8%	25.1	25.3	2.2%
70	Rough Coppice	5	25.1	25.3	1.6%	25.1	25.3	1.6%	25.1	25.3	1.7%	25.1	25.3	1.7%	25.1	25.2	2.0%	25.1	25.3	1.7%	25.1	25.2	2.0%
80	Rough Coppice	5	25.1	25.2	1.5%	25.1	25.2	1.5%	25.1	25.2	1.5%	25.1	25.2	1.5%	25.1	25.2	1.8%	25.1	25.2	1.5%	25.1	25.2	1.8%
90	Rough Coppice	5	25.1	25.2	1.4%	25.1	25.2	1.4%	25.1	25.2	1.4%	25.1	25.2	1.4%	25.1	25.2	1.6%	25.1	25.2	1.4%	25.1	25.2	1.6%
100	Rough Coppice	5	25.1	25.2	1.3%	25.1	25.2	1.3%	25.1	25.2	1.3%	25.1	25.2	1.3%	25.1	25.2	1.5%	25.1	25.2	1.3%	25.1	25.2	1.5%
110	Rough Coppice	5	25.1	25.2	1.2%	25.1	25.2	1.2%	25.1	25.2	1.2%	25.1	25.2	1.2%	25.1	25.2	1.4%	25.1	25.2	1.2%	25.1	25.2	1.3%
120	Rough Coppice	5	25.1	25.2	1.1%	25.1	25.2	1.1%	25.1	25.2	1.1%	25.1	25.2	1.1%	25.1	25.2	1.3%	25.1	25.2	1.1%	25.1	25.2	1.2%
130	Rough Coppice	5	25.1	25.2	1.0%	25.1	25.2	1.1%	25.1	25.2	1.1%	25.1	25.2	1.1%	25.1	25.2	1.2%	25.1	25.2	1.1%	25.1	25.2	1.2%
140	Rough Coppice	5	25.1	25.2	1.0%	25.1	25.2	1.0%	25.1	25.2	1.0%	25.1	25.2	1.0%	25.1	25.2	1.1%	25.1	25.2	1.0%	25.1	25.2	1.1%
150	Rough Coppice	5	25.1	25.2	0.9%	25.1	25.2	0.9%	25.1	25.2	0.9%	25.1	25.2	1.0%	25.1	25.2	1.0%	25.1	25.2	0.9%	25.1	25.2	1.0%
160	Rough Coppice	5	25.1	25.2	0.9%	25.1	25.2	0.9%	25.1	25.2	0.9%	25.1	25.2	0.9%	25.1	25.2	1.0%	25.1	25.2	0.9%	25.1	25.2	1.0%
170	Rough Coppice	5	25.1	25.2	0.9%	25.1	25.2	0.9%	25.1	25.2	0.9%	25.1	25.2	0.9%	25.1	25.1	0.9%	25.1	25.2	0.9%	25.1	25.1	0.9%
180	Rough Coppice	5	25.1	25.2	0.8%	25.1	25.2	0.8%	25.1	25.2	0.8%	25.1	25.2	0.8%	25.1	25.1	0.9%	25.1	25.2	0.8%	25.1	25.1	0.9%
190	Rough Coppice	5	25.1	25.2	0.8%	25.1	25.2	0.8%	25.1	25.2	0.8%	25.1	25.2	0.8%	25.1	25.1	0.8%	25.1	25.2	0.8%	25.1	25.1	0.8%
0	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.4	3.6%	-	-	-	25.0	25.4	3.6%
30	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.3	3.0%	-	-	-	25.0	25.3	2.9%
40	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.3	2.5%	-	-	-	25.0	25.3	2.5%
50	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.3	2.2%	-	-	-	25.0	25.3	2.2%
60	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.2	1.9%	-	-	-	25.0	25.2	1.9%
70	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.2	1.7%	-	-	-	25.0	25.2	1.7%
80	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.2	1.6%	-	-	-	25.0	25.2	1.6%
90	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.2	1.4%	-	-	-	25.0	25.2	1.4%
100	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.2	1.3%	-	-	-	25.0	25.2	1.3%
110	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.2	1.2%	-	-	-	25.0	25.2	1.2%
120	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.2	1.1%	-	-	-	25.0	25.2	1.1%
130	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.1	1.1%	-	-	-	25.0	25.1	1.1%
140	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.1	1.0%	-	-	-	25.0	25.1	1.0%
150	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.1	0.9%	-	-	-	25.0	25.1	0.9%

Distance from Kerb	Description	Lowest Critical Load	Total Deposition kgN / ha / yr and Percentage change with Scheme																				
			Orange			Cyan			Yellow			Red			Olive			Black 1			Black 2		
			DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch
160	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.1	0.9%	-	-	-	25.0	25.1	0.9%
170	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.1	0.8%	-	-	-	25.0	25.1	0.8%
180	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.1	0.8%	-	-	-	25.0	25.1	0.8%
190	Wye Coppice	5	-	-	-	-	-	-	-	-	-	-	-	-	25.0	25.1	0.8%	-	-	-	25.0	25.1	0.8%
0	River Wye SAC East	5	13.6	15.0	0.0%	13.6	14.5	19.4%	13.6	14.5	19.4%	13.6	14.5	19.4%	13.5	14.5	18.8%	13.6	14.5	19.4%	13.5	14.5	18.8%
10	River Wye SAC East	5	13.6	14.3	14.0%	13.6	14.2	12.0%	13.6	14.2	12.0%	13.6	14.2	12.0%	13.5	14.1	11.9%	13.6	14.2	12.0%	13.5	14.1	12.0%
20	River Wye SAC East	5	13.6	14.1	9.8%	13.6	14.0	8.9%	13.6	14.0	8.9%	13.6	14.0	9.0%	13.5	14.0	9.0%	13.6	14.0	9.0%	13.5	14.0	9.0%
30	River Wye SAC East	5	13.6	13.9	7.7%	13.6	13.9	7.1%	13.6	13.9	7.1%	13.6	13.9	7.2%	13.5	13.9	7.2%	13.6	13.9	7.2%	13.5	13.9	7.2%
40	River Wye SAC East	5	13.6	13.9	6.4%	13.6	13.9	6.0%	13.6	13.9	6.0%	13.6	13.9	6.1%	13.5	13.8	6.1%	13.6	13.9	6.1%	13.5	13.8	6.1%
50	River Wye SAC East	10	13.6	13.8	5.4%	13.6	13.8	5.1%	13.6	13.8	5.1%	13.6	13.8	5.3%	13.5	13.8	5.3%	13.6	13.8	5.3%	13.5	13.8	5.3%
60	River Wye SAC East	10	13.6	13.8	4.7%	13.6	13.8	4.5%	13.6	13.8	4.5%	13.6	13.8	4.6%	13.5	13.8	4.6%	13.6	13.8	4.6%	13.5	13.8	4.6%
70	River Wye SAC East	10	13.6	13.8	4.1%	13.6	13.8	4.0%	13.6	13.8	4.0%	13.6	13.8	4.1%	13.5	13.7	4.1%	13.6	13.8	4.1%	13.5	13.7	4.1%
80	River Wye SAC East	10	13.6	13.7	3.7%	13.6	13.7	3.6%	13.6	13.7	3.6%	13.6	13.7	3.7%	13.5	13.7	3.7%	13.6	13.7	3.7%	13.5	13.7	3.7%
90	River Wye SAC East	10	13.6	13.7	3.3%	13.6	13.7	3.2%	13.6	13.7	3.2%	13.6	13.7	3.3%	13.5	13.7	3.4%	13.6	13.7	3.3%	13.5	13.7	3.4%
100	River Wye SAC East	10	13.6	13.7	3.0%	13.6	13.7	2.9%	13.6	13.7	2.9%	13.6	13.7	3.0%	13.5	13.7	3.0%	13.6	13.7	3.0%	13.5	13.7	3.0%
110	River Wye SAC East	10	13.6	13.7	2.8%	13.6	13.7	2.7%	13.6	13.7	2.7%	13.6	13.7	2.7%	13.5	13.7	2.8%	13.6	13.7	2.7%	13.5	13.7	2.8%
120	River Wye SAC East	10	13.6	13.7	2.5%	13.6	13.7	2.4%	13.6	13.7	2.4%	13.6	13.7	2.5%	13.5	13.7	2.6%	13.6	13.7	2.5%	13.5	13.7	2.6%
130	River Wye SAC East	10	13.6	13.7	2.3%	13.6	13.7	2.2%	13.6	13.7	2.2%	13.6	13.7	2.3%	13.5	13.7	2.4%	13.6	13.7	2.3%	13.5	13.7	2.4%
140	River Wye SAC East	10	13.6	13.7	2.1%	13.6	13.7	2.1%	13.6	13.7	2.1%	13.6	13.7	2.2%	13.5	13.6	2.3%	13.6	13.7	2.2%	13.5	13.6	2.3%
150	River Wye SAC East	10	13.6	13.7	2.0%	13.6	13.7	1.9%	13.6	13.7	2.0%	13.6	13.7	2.0%	13.5	13.6	2.1%	13.6	13.7	2.0%	13.5	13.6	2.1%
160	River Wye SAC East	10	13.6	13.7	1.8%	13.6	13.7	1.8%	13.6	13.7	1.8%	13.6	13.7	1.9%	13.5	13.6	2.0%	13.6	13.7	1.9%	13.5	13.6	2.0%
170	River Wye SAC East	10	13.6	13.7	1.7%	13.6	13.7	1.7%	13.6	13.7	1.7%	13.6	13.7	1.8%	13.5	13.6	1.9%	13.6	13.7	1.8%	13.5	13.6	1.9%
180	River Wye SAC East	10	13.6	13.7	1.6%	13.6	13.7	1.6%	13.6	13.7	1.6%	13.6	13.7	1.7%	13.5	13.6	1.8%	13.6	13.7	1.7%	13.5	13.6	1.8%
190	River Wye SAC East	10	13.6	13.7	1.5%	13.6	13.7	1.5%	13.6	13.7	1.5%	13.6	13.7	1.6%	13.5	13.6	1.7%	13.6	13.7	1.6%	13.5	13.6	1.7%
0	River Wye SAC West	10	13.6	14.7	22.7%	13.6	14.2	13.9%	13.6	14.2	13.9%	13.6	14.3	14.1%	13.5	14.2	14.0%	13.6	14.3	14.1%	13.5	14.2	14.0%
10	River Wye SAC West	10	13.6	14.1	11.5%	13.6	14.0	9.1%	13.6	14.0	9.1%	13.6	14.0	9.3%	13.5	14.0	9.1%	13.6	14.0	9.3%	13.5	14.0	9.0%
20	River Wye SAC West	10	13.6	14.0	8.2%	13.6	13.9	7.0%	13.6	13.9	7.0%	13.6	13.9	7.1%	13.5	13.9	6.9%	13.6	13.9	7.1%	13.5	13.9	6.9%
30	River Wye SAC West	10	13.6	13.9	6.4%	13.6	13.8	5.7%	13.6	13.8	5.7%	13.6	13.8	5.8%	13.5	13.8	5.6%	13.6	13.8	5.8%	13.5	13.8	5.6%
40	River Wye SAC West	10	13.6	13.8	5.3%	13.6	13.8	4.9%	13.6	13.8	4.9%	13.6	13.8	5.0%	13.5	13.8	4.7%	13.6	13.8	5.0%	13.5	13.8	4.7%
50	River Wye SAC West	10	13.6	13.8	4.6%	13.6	13.8	4.2%	13.6	13.8	4.2%	13.5	13.8	4.4%	13.5	13.7	4.1%	13.5	13.8	4.3%	13.5	13.7	4.1%

Distance from Kerb	Description	Lowest Critical Load	Total Deposition kgN / ha / yr and Percentage change with Scheme																				
			Orange			Cyan			Yellow			Red			Olive			Black 1			Black 2		
			DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch
60	River Wye SAC West	10	13.6	13.8	4.0%	13.5	13.7	3.8%	13.5	13.7	3.8%	13.5	13.7	3.9%	13.5	13.7	3.6%	13.5	13.7	3.8%	13.5	13.7	3.6%
70	River Wye SAC West	10	13.5	13.7	3.6%	13.5	13.7	3.4%	13.5	13.7	3.4%	13.5	13.7	3.5%	13.5	13.7	3.2%	13.5	13.7	3.5%	13.5	13.7	3.2%
80	River Wye SAC West	10	13.5	13.7	3.2%	13.5	13.7	3.1%	13.5	13.7	3.1%	13.5	13.7	3.1%	13.5	13.7	2.9%	13.5	13.7	3.1%	13.5	13.7	2.9%
90	River Wye SAC West	10	13.5	13.7	3.0%	13.5	13.7	2.8%	13.5	13.7	2.8%	13.5	13.7	2.9%	13.5	13.7	2.7%	13.5	13.7	2.9%	13.5	13.7	2.7%
100	River Wye SAC West	10	13.5	13.7	2.7%	13.5	13.7	2.6%	13.5	13.7	2.6%	13.5	13.7	2.7%	13.5	13.6	2.5%	13.5	13.7	2.7%	13.5	13.6	2.5%
110	River Wye SAC West	10	13.5	13.7	2.5%	13.5	13.7	2.4%	13.5	13.7	2.4%	13.5	13.7	2.5%	13.5	13.6	2.3%	13.5	13.7	2.5%	13.5	13.6	2.3%
120	River Wye SAC West	10	13.5	13.7	2.3%	13.5	13.7	2.2%	13.5	13.7	2.3%	13.5	13.7	2.3%	13.5	13.6	2.1%	13.5	13.7	2.3%	13.5	13.6	2.1%
130	River Wye SAC West	10	13.5	13.7	2.2%	13.5	13.7	2.1%	13.5	13.7	2.1%	13.5	13.7	2.2%	13.5	13.6	2.0%	13.5	13.7	2.2%	13.5	13.6	2.0%
140	River Wye SAC West	10	13.5	13.6	2.0%	13.5	13.6	2.0%	13.5	13.6	2.0%	13.5	13.6	2.1%	13.5	13.6	1.8%	13.5	13.6	2.1%	13.5	13.6	1.8%
150	River Wye SAC West	10	13.5	13.6	2.0%	13.5	13.6	1.9%	13.5	13.6	1.9%	13.5	13.6	2.0%	13.5	13.6	1.7%	13.5	13.6	1.9%	13.5	13.6	1.7%
160	River Wye SAC West	10	13.5	13.6	1.8%	13.5	13.6	1.8%	13.5	13.6	1.8%	13.5	13.6	1.9%	13.5	13.6	1.7%	13.5	13.6	1.8%	13.5	13.6	1.7%
170	River Wye SAC West	10	13.5	13.6	1.8%	13.5	13.6	1.7%	13.5	13.6	1.7%	13.5	13.6	1.8%	13.5	13.6	1.6%	13.5	13.6	1.8%	13.5	13.6	1.6%
180	River Wye SAC West	10	13.5	13.6	1.7%	13.5	13.6	1.6%	13.5	13.6	1.6%	13.5	13.6	1.7%	13.5	13.6	1.5%	13.5	13.6	1.7%	13.5	13.6	1.5%
190	River Wye SAC West	10	13.5	13.6	1.6%	13.5	13.6	1.5%	13.5	13.6	1.6%	13.5	13.6	1.6%	13.5	13.6	1.4%	13.5	13.6	1.6%	13.5	13.6	1.4%
0	River Wye SSSI East	10	13.6	15.0	0.0%	13.6	14.5	19.4%	13.6	14.5	19.4%	13.6	14.5	19.4%	13.5	14.5	18.8%	13.6	14.5	19.4%	13.5	14.5	18.8%
10	River Wye SSSI East	10	13.6	14.3	14.0%	13.6	14.2	12.0%	13.6	14.2	12.0%	13.6	14.2	12.0%	13.5	14.1	11.9%	13.6	14.2	12.0%	13.5	14.1	12.0%
20	River Wye SSSI East	10	13.6	14.1	9.8%	13.6	14.0	8.9%	13.6	14.0	8.9%	13.6	14.0	9.0%	13.5	14.0	9.0%	13.6	14.0	9.0%	13.5	14.0	9.0%
30	River Wye SSSI East	10	13.6	13.9	7.7%	13.6	13.9	7.1%	13.6	13.9	7.1%	13.6	13.9	7.2%	13.5	13.9	7.2%	13.6	13.9	7.2%	13.5	13.9	7.2%
40	River Wye SSSI East	10	13.6	13.9	6.4%	13.6	13.9	6.0%	13.6	13.9	6.0%	13.6	13.9	6.1%	13.5	13.8	6.1%	13.6	13.9	6.1%	13.5	13.8	6.1%
50	River Wye SSSI East	10	13.6	13.8	5.4%	13.6	13.8	5.1%	13.6	13.8	5.1%	13.6	13.8	5.3%	13.5	13.8	5.3%	13.6	13.8	5.3%	13.5	13.8	5.3%
60	River Wye SAC East	10	13.6	13.8	4.7%	13.6	13.8	4.5%	13.6	13.8	4.5%	13.6	13.8	4.6%	13.5	13.8	4.6%	13.6	13.8	4.6%	13.5	13.8	4.6%
70	River Wye SAC East	10	13.6	13.8	4.1%	13.6	13.8	4.0%	13.6	13.8	4.0%	13.6	13.8	4.1%	13.5	13.7	4.1%	13.6	13.8	4.1%	13.5	13.7	4.1%
80	River Wye SAC East	10	13.6	13.7	3.7%	13.6	13.7	3.6%	13.6	13.7	3.6%	13.6	13.7	3.7%	13.5	13.7	3.7%	13.6	13.7	3.7%	13.5	13.7	3.7%
90	River Wye SAC East	10	13.6	13.7	3.3%	13.6	13.7	3.2%	13.6	13.7	3.2%	13.6	13.7	3.3%	13.5	13.7	3.4%	13.6	13.7	3.3%	13.5	13.7	3.4%
100	River Wye SAC East	10	13.6	13.7	3.0%	13.6	13.7	2.9%	13.6	13.7	2.9%	13.6	13.7	3.0%	13.5	13.7	3.0%	13.6	13.7	3.0%	13.5	13.7	3.0%
110	River Wye SAC East	10	13.6	13.7	2.8%	13.6	13.7	2.7%	13.6	13.7	2.7%	13.6	13.7	2.7%	13.5	13.7	2.8%	13.6	13.7	2.7%	13.5	13.7	2.8%
120	River Wye SSSI East	10	13.6	13.7	2.5%	13.6	13.7	2.4%	13.6	13.7	2.4%	13.6	13.7	2.5%	13.5	13.7	2.6%	13.6	13.7	2.5%	13.5	13.7	2.6%
130	River Wye SSSI East	10	13.6	13.7	2.3%	13.6	13.7	2.2%	13.6	13.7	2.2%	13.6	13.7	2.3%	13.5	13.7	2.4%	13.6	13.7	2.3%	13.5	13.7	2.4%
140	River Wye SSSI East	10	13.6	13.7	2.1%	13.6	13.7	2.1%	13.6	13.7	2.1%	13.6	13.7	2.2%	13.5	13.6	2.3%	13.6	13.7	2.2%	13.5	13.6	2.3%
150	River Wye SSSI East	10	13.6	13.7	2.0%	13.6	13.7	1.9%	13.6	13.7	2.0%	13.6	13.7	2.0%	13.5	13.6	2.1%	13.6	13.7	2.0%	13.5	13.6	2.1%

Distance from Kerb	Description	Lowest Critical Load	Total Deposition kgN / ha / yr and Percentage change with Scheme																				
			Orange			Cyan			Yellow			Red			Olive			Black 1			Black 2		
			DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch	DM	DS	% Ch
160	River Wye SSSI East	10	13.6	13.7	1.8%	13.6	13.7	1.8%	13.6	13.7	1.8%	13.6	13.7	1.9%	13.5	13.6	2.0%	13.6	13.7	1.9%	13.5	13.6	2.0%
170	River Wye SSSI East	10	13.6	13.7	1.7%	13.6	13.7	1.7%	13.6	13.7	1.7%	13.6	13.7	1.8%	13.5	13.6	1.9%	13.6	13.7	1.8%	13.5	13.6	1.9%
180	River Wye SSSI East	10	13.6	13.7	1.6%	13.6	13.7	1.6%	13.6	13.7	1.6%	13.6	13.7	1.7%	13.5	13.6	1.8%	13.6	13.7	1.7%	13.5	13.6	1.8%
190	River Wye SSSI East	10	13.6	13.7	1.5%	13.6	13.7	1.5%	13.6	13.7	1.5%	13.6	13.7	1.6%	13.5	13.6	1.7%	13.6	13.7	1.6%	13.5	13.6	1.7%
0	River Wye SSSI West	10	13.6	14.7	22.7%	13.6	14.2	13.9%	13.6	14.2	13.9%	13.6	14.3	14.1%	13.5	14.2	14.0%	13.6	14.3	14.1%	13.5	14.2	14.0%
10	River Wye SSSI West	10	13.6	14.1	11.5%	13.6	14.0	9.1%	13.6	14.0	9.1%	13.6	14.0	9.3%	13.5	14.0	9.1%	13.6	14.0	9.3%	13.5	14.0	9.0%
20	River Wye SSSI West	10	13.6	14.0	8.2%	13.6	13.9	7.0%	13.6	13.9	7.0%	13.6	13.9	7.1%	13.5	13.9	6.9%	13.6	13.9	7.1%	13.5	13.9	6.9%
30	River Wye SSSI West	10	13.6	13.9	6.4%	13.6	13.8	5.7%	13.6	13.8	5.7%	13.6	13.8	5.8%	13.5	13.8	5.6%	13.6	13.8	5.8%	13.5	13.8	5.6%
40	River Wye SSSI West	10	13.6	13.8	5.3%	13.6	13.8	4.9%	13.6	13.8	4.9%	13.6	13.8	5.0%	13.5	13.8	4.7%	13.6	13.8	5.0%	13.5	13.8	4.7%
50	River Wye SSSI West	10	13.6	13.8	4.6%	13.6	13.8	4.2%	13.6	13.8	4.2%	13.5	13.8	4.4%	13.5	13.7	4.1%	13.5	13.8	4.3%	13.5	13.7	4.1%
60	River Wye SSSI West	10	13.6	13.8	4.0%	13.5	13.7	3.8%	13.5	13.7	3.8%	13.5	13.7	3.9%	13.5	13.7	3.6%	13.5	13.7	3.8%	13.5	13.7	3.6%
70	River Wye SSSI West	10	13.5	13.7	3.6%	13.5	13.7	3.4%	13.5	13.7	3.4%	13.5	13.7	3.5%	13.5	13.7	3.2%	13.5	13.7	3.5%	13.5	13.7	3.2%
80	River Wye SSSI West	10	13.5	13.7	3.2%	13.5	13.7	3.1%	13.5	13.7	3.1%	13.5	13.7	3.1%	13.5	13.7	2.9%	13.5	13.7	3.1%	13.5	13.7	2.9%
90	River Wye SSSI West	10	13.5	13.7	3.0%	13.5	13.7	2.8%	13.5	13.7	2.8%	13.5	13.7	2.9%	13.5	13.7	2.7%	13.5	13.7	2.9%	13.5	13.7	2.7%
100	River Wye SSSI West	5	13.5	13.7	2.7%	13.5	13.7	2.6%	13.5	13.7	2.6%	13.5	13.7	2.7%	13.5	13.6	2.5%	13.5	13.7	2.7%	13.5	13.6	2.5%
110	River Wye SSSI West	5	13.5	13.7	2.5%	13.5	13.7	2.4%	13.5	13.7	2.4%	13.5	13.7	2.5%	13.5	13.6	2.3%	13.5	13.7	2.5%	13.5	13.6	2.3%
120	River Wye SSSI West	5	13.5	13.7	2.3%	13.5	13.7	2.2%	13.5	13.7	2.3%	13.5	13.7	2.3%	13.5	13.6	2.1%	13.5	13.7	2.3%	13.5	13.6	2.1%
130	River Wye SSSI West	5	13.5	13.7	2.2%	13.5	13.7	2.1%	13.5	13.7	2.1%	13.5	13.7	2.2%	13.5	13.6	2.0%	13.5	13.7	2.2%	13.5	13.6	2.0%
140	River Wye SSSI West	5	13.5	13.6	2.0%	13.5	13.6	2.0%	13.5	13.6	2.0%	13.5	13.6	2.1%	13.5	13.6	1.8%	13.5	13.6	2.1%	13.5	13.6	1.8%
150	River Wye SSSI West	5	13.5	13.6	2.0%	13.5	13.6	1.9%	13.5	13.6	1.9%	13.5	13.6	2.0%	13.5	13.6	1.7%	13.5	13.6	1.9%	13.5	13.6	1.7%
160	River Wye SSSI West	5	13.5	13.6	1.8%	13.5	13.6	1.8%	13.5	13.6	1.8%	13.5	13.6	1.9%	13.5	13.6	1.7%	13.5	13.6	1.8%	13.5	13.6	1.7%
170	River Wye SSSI West	5	13.5	13.6	1.8%	13.5	13.6	1.7%	13.5	13.6	1.7%	13.5	13.6	1.8%	13.5	13.6	1.6%	13.5	13.6	1.8%	13.5	13.6	1.6%
180	River Wye SSSI West	5	13.5	13.6	1.7%	13.5	13.6	1.6%	13.5	13.6	1.6%	13.5	13.6	1.7%	13.5	13.6	1.5%	13.5	13.6	1.7%	13.5	13.6	1.5%
190	River Wye SSSI West	5	13.5	13.6	1.6%	13.5	13.6	1.5%	13.5	13.6	1.6%	13.5	13.6	1.6%	13.5	13.6	1.4%	13.5	13.6	1.6%	13.5	13.6	1.4%

Appendix 6-1

GLOSSARY OF TERMS

Glossary of Acoustics Terminology

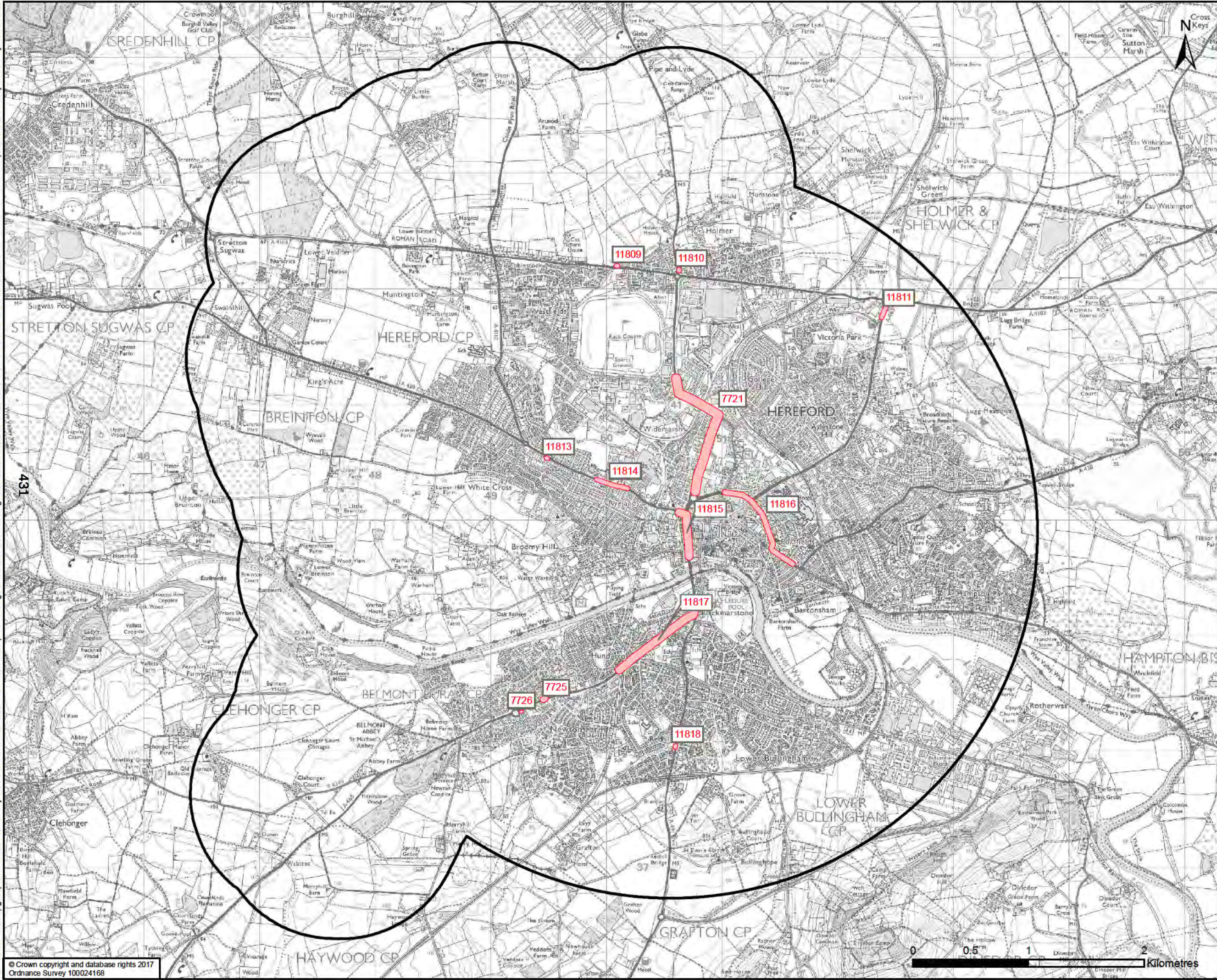
Glossary of Acoustics Terminology

Decibel (dB)	The decibel scale is used in relation to sound because it is a logarithmic rather than a linear scale. The decibel scale compares the level of a sound relative to another. The human ear can detect a wide range of sound pressures, typically between 2×10^{-5} and 200 Pa, so the logarithmic scale is used to quantify these levels using a more manageable range of values.
Sound Pressure Level (SPL)	The Sound Pressure Level has units of decibels, and compares the level of a sound to the smallest sound pressure generally perceptible by the human ear, or the reference pressure. It is defined as follows: $\text{SPL (dB)} = 20 \log_{10}(P/P_{\text{ref}}) \text{ where } P = \text{Sound Pressure (in Pa)}$ $P_{\text{ref}} = \text{Reference Pressure } 2 \times 10^{-5} \text{ Pa}$ An SPL of 0dB suggests the Sound Pressure is equal to the reference pressure. This is known as the <i>threshold of hearing</i>. An SPL of 140dB represents the <i>threshold of pain</i>.
A-Weighting	The human ear can detect a wide range of frequencies, from 20Hz to 20kHz, but it is more sensitive to some frequencies than others. Generally, the ear is most sensitive to frequencies in the range 1 to 4 kHz. The A-weighting is a filter that can be applied to measured results at varying frequencies, to mimic the frequency response of the human ear, and therefore better represent the likely perceived loudness of the sound. SPL readings with the A-weighting applied are represented in dB(A).
L ₁₀ or L _{A10} and percentile measures	This represents the SPL which is exceeded 10% of the time, expressed in dB or dB(A). L_{A10} is used to quantify road noise levels. Other percentiles exist and are used for various types of noise assessment. These include L₀₁, L₅₀, L₉₀, L₉₉.
Noise	A noise can be described as an unwanted sound. Noise can cause nuisance.
Noise Sensitive Receptors (NSR's)	Any identified receptor likely to be affected by noise. These are generally human receptors, which may include residential dwellings, work places, schools, hospitals, and recreational spaces.

Appendix 6-2

NOISE FIGURES

File name: \\uk.wspgroup.com\central data\Projects\70024065- Hereford Transportation Package\E Models and Drawings\GIS\Map\Acoustics\70024065-WSP-XX-XX-DR-EN-00055.mxd
printed on: 04 May 2018 by: DeSouza



Study Area

Noise Important Areas

0

0.5

1

2

Kilometres

0

0.5

1

2

Kilometres

FOR INFORMATION ONLY

wsp

Kings Orchard, 1 Queen St, Bristol, BS2 0HQ

T +44 (0)1179 306200

CLIENT

Balfour Beatty

Herefordshire Council

Working for Herefordshire

SITE/PROJECT

HEREFORD TRANSPORTATION PACKAGE:
HEREFORD BYPASS

TITLE

FIGURE 6-1
NOISE STUDY AREA &
NOISE IMPORTANT AREAS

SCALE @ A3

CHECKED EO

APPROVED MT

PROJECT NO
70024065

DESIGNED LT

DRAWN JdS

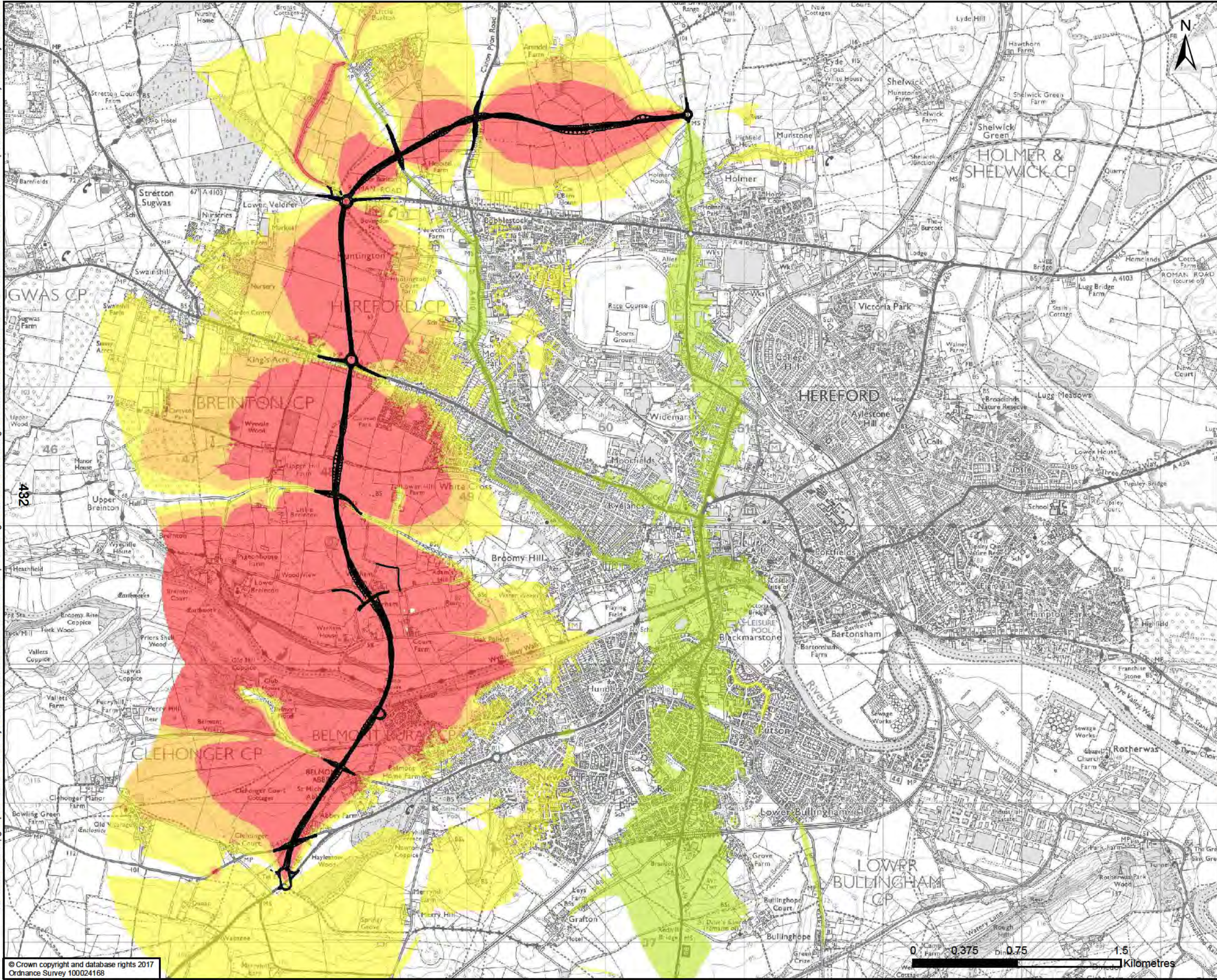
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Proposed Orange Option

Option 1: Short Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- Negligible / No Change
- Minor Adverse
- Moderate Adverse
- Major Adverse

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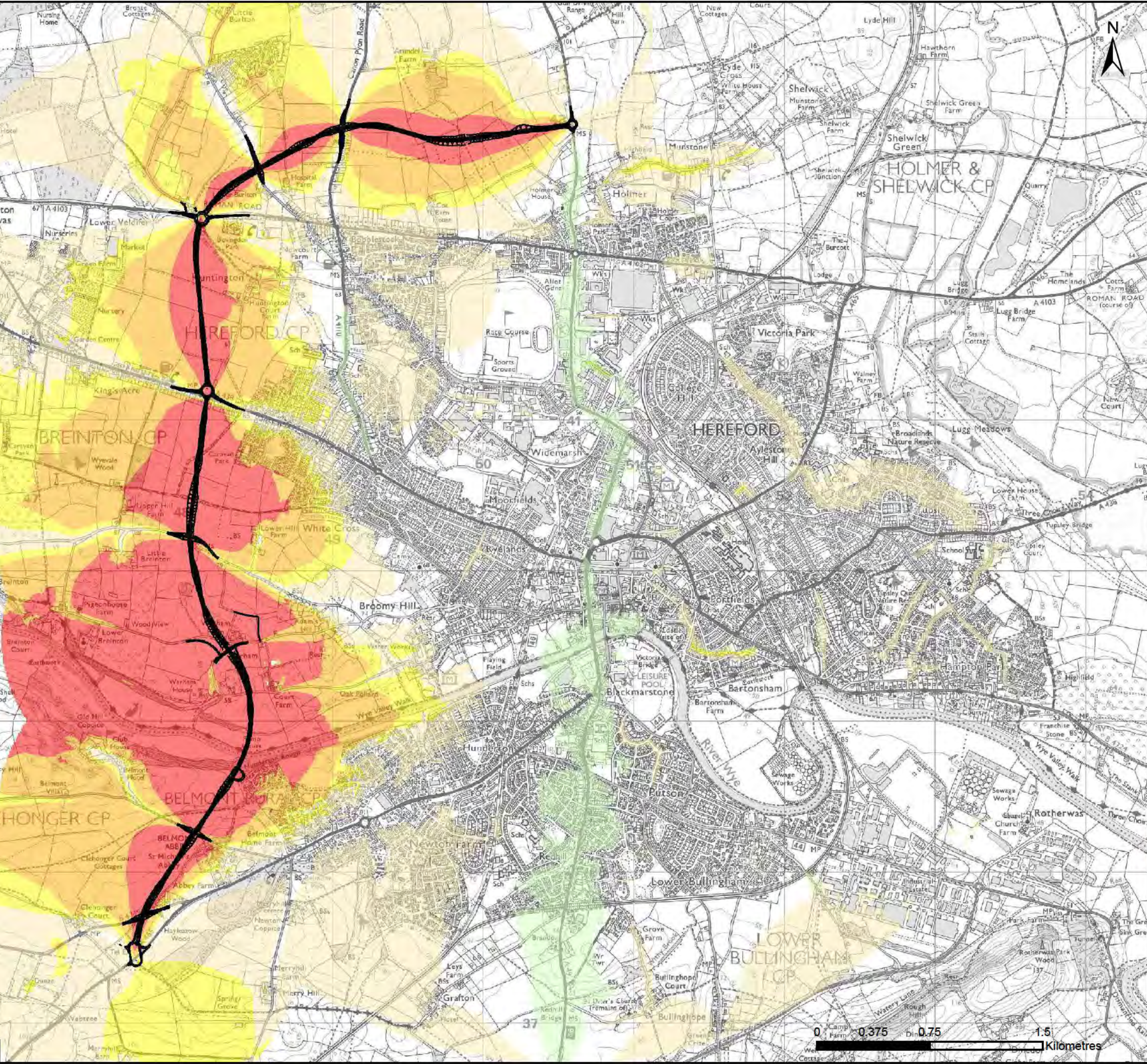
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ORANGE OPTION
SHORT TERM NOISE IMPACT

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Proposed Orange Option

Option 1: Long Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- 3 to -1 dB change in noise levels
- Negligible / No Change
- 1 to 3 dB change in noise levels
- Minor Adverse
- Moderate Adverse
- Major Adverse

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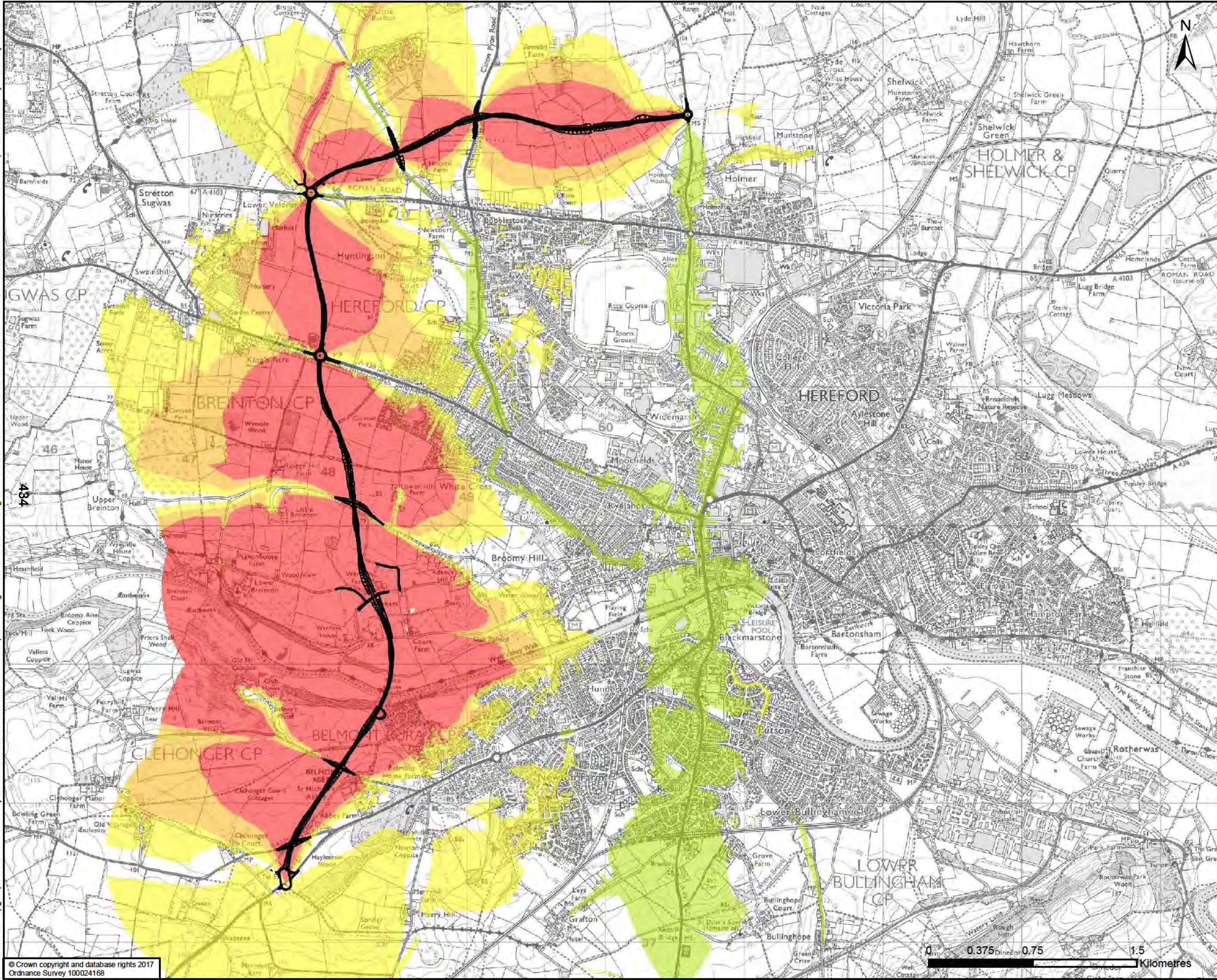
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Proposed Cyan Option

Option 2: Short Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- Negligible / No Change
- Minor Adverse
- Moderate Adverse
- Major Adverse

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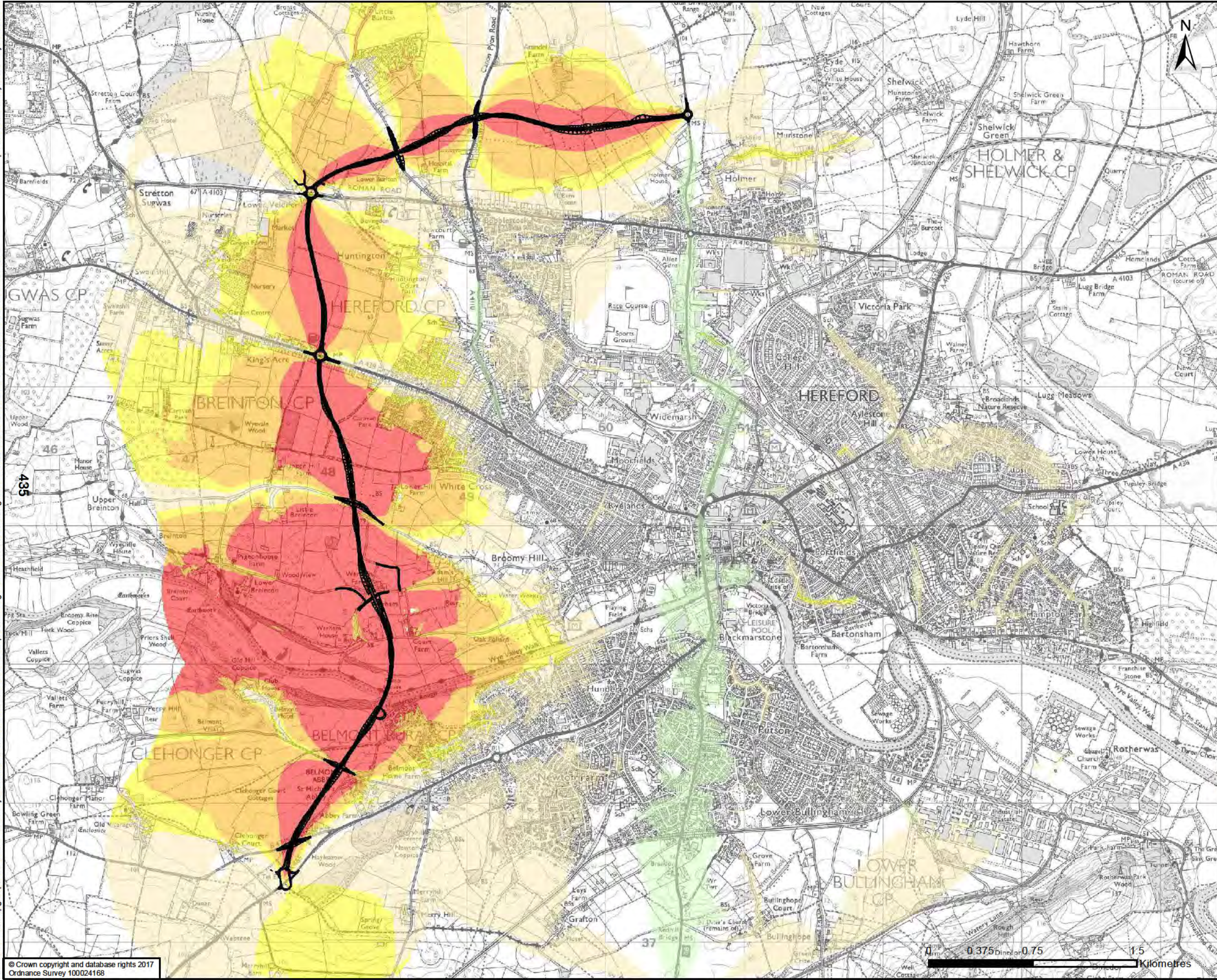
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CYAN OPTION
SHORT TERM NOISE IMPACT

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0 0.375 0.75 1.5 Kilometres

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— Proposed Cyan Option

Option 2: Long Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- 3 to -1 dB change in noise levels
- Negligible / No Change
- 1 to 3 dB change in noise levels
- Minor Adverse
- Moderate Adverse
- Major Adverse

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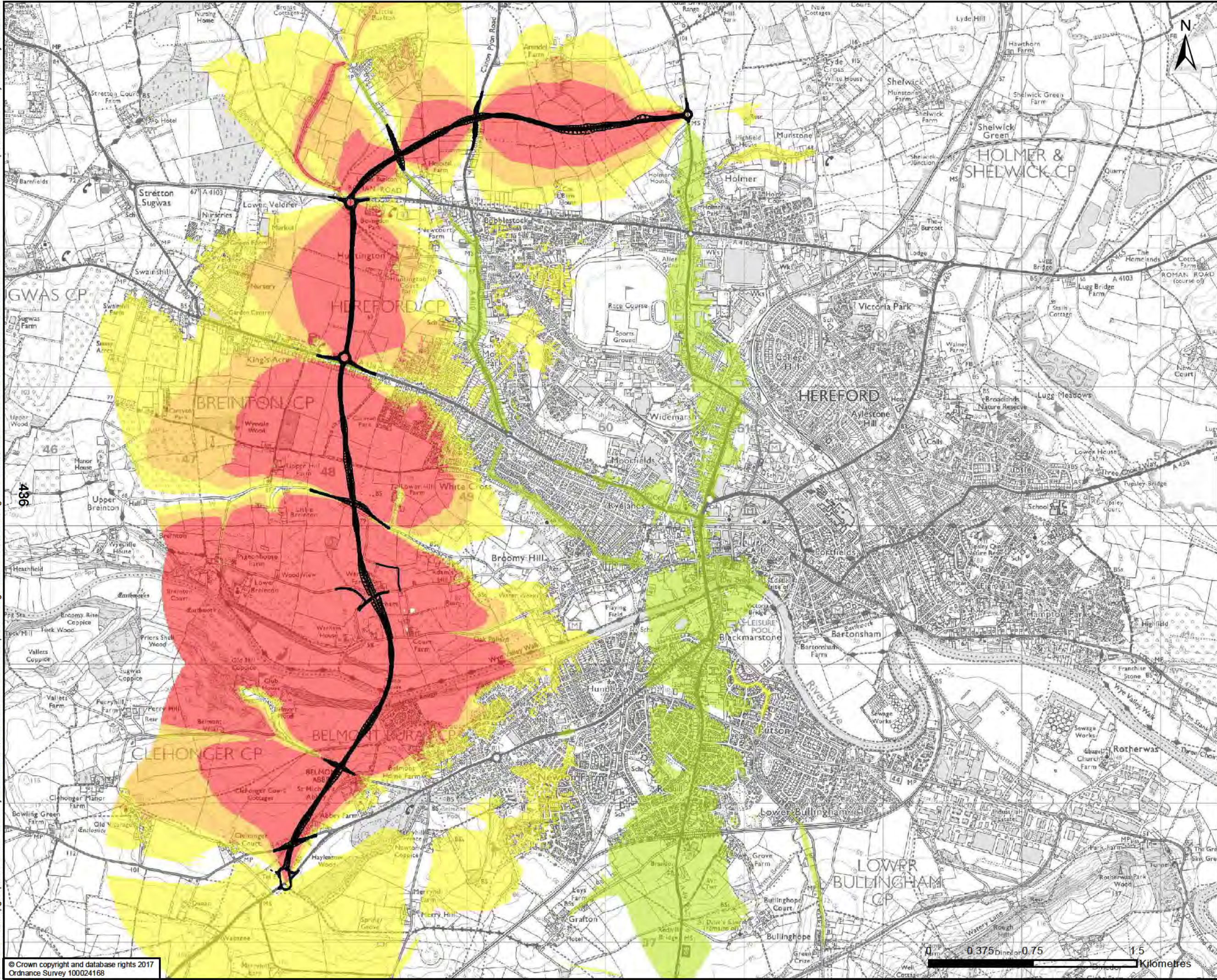
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TITLE: FIGURE 6-5
CYAN OPTION
LONG TERM NOISE IMPACT

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— Proposed Yellow Option

Option 3: Short Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- Negligible / No Change
- Minor Adverse
- Moderate Adverse
- Major Adverse

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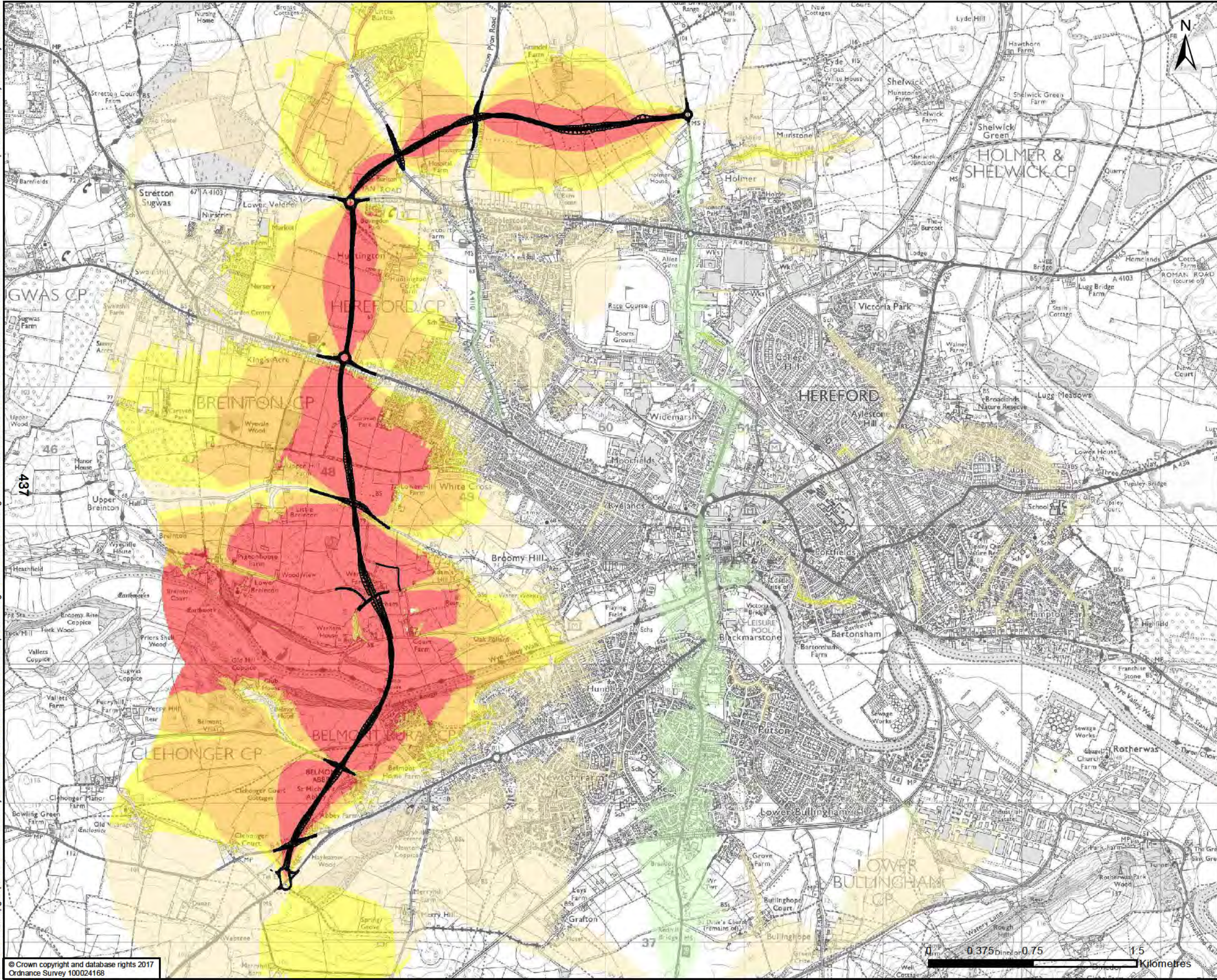
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TITLE: FIGURE 6-6
YELLOW OPTION
SHORT TERM NOISE IMPACT

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— Proposed Yellow Option

Option 3: Long Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- 3 to -1 dB change in noise levels
- Negligible / No Change
- 1 to 3 dB change in noise levels
- Minor Adverse
- Moderate Adverse
- Major Adverse

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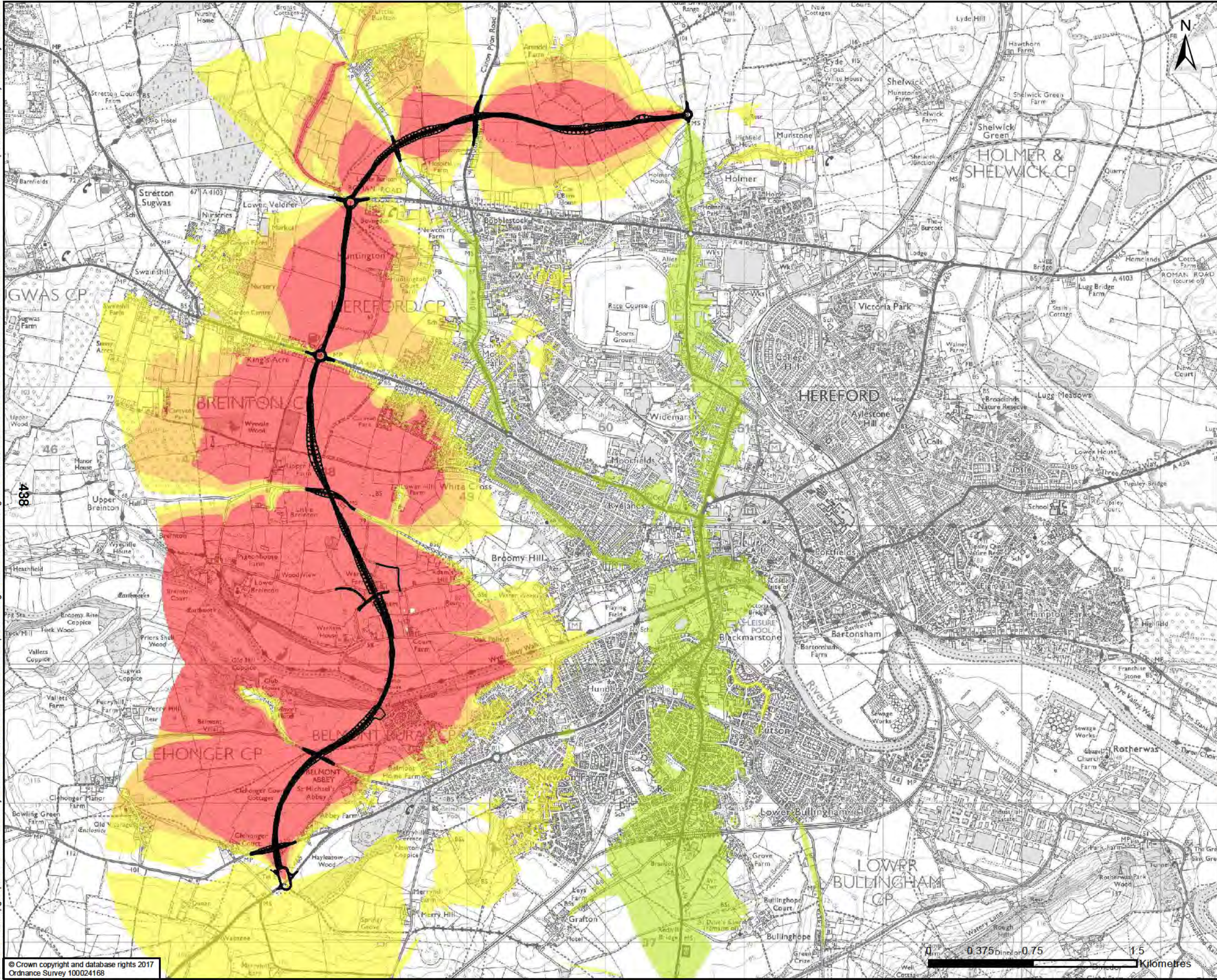
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TITLE: FIGURE 6-7
YELLOW OPTION
LONG TERM NOISE IMPACT

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— Proposed Red Option

Option 4: Short Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- Negligible / No Change
- Minor Adverse
- Moderate Adverse
- Major Adverse

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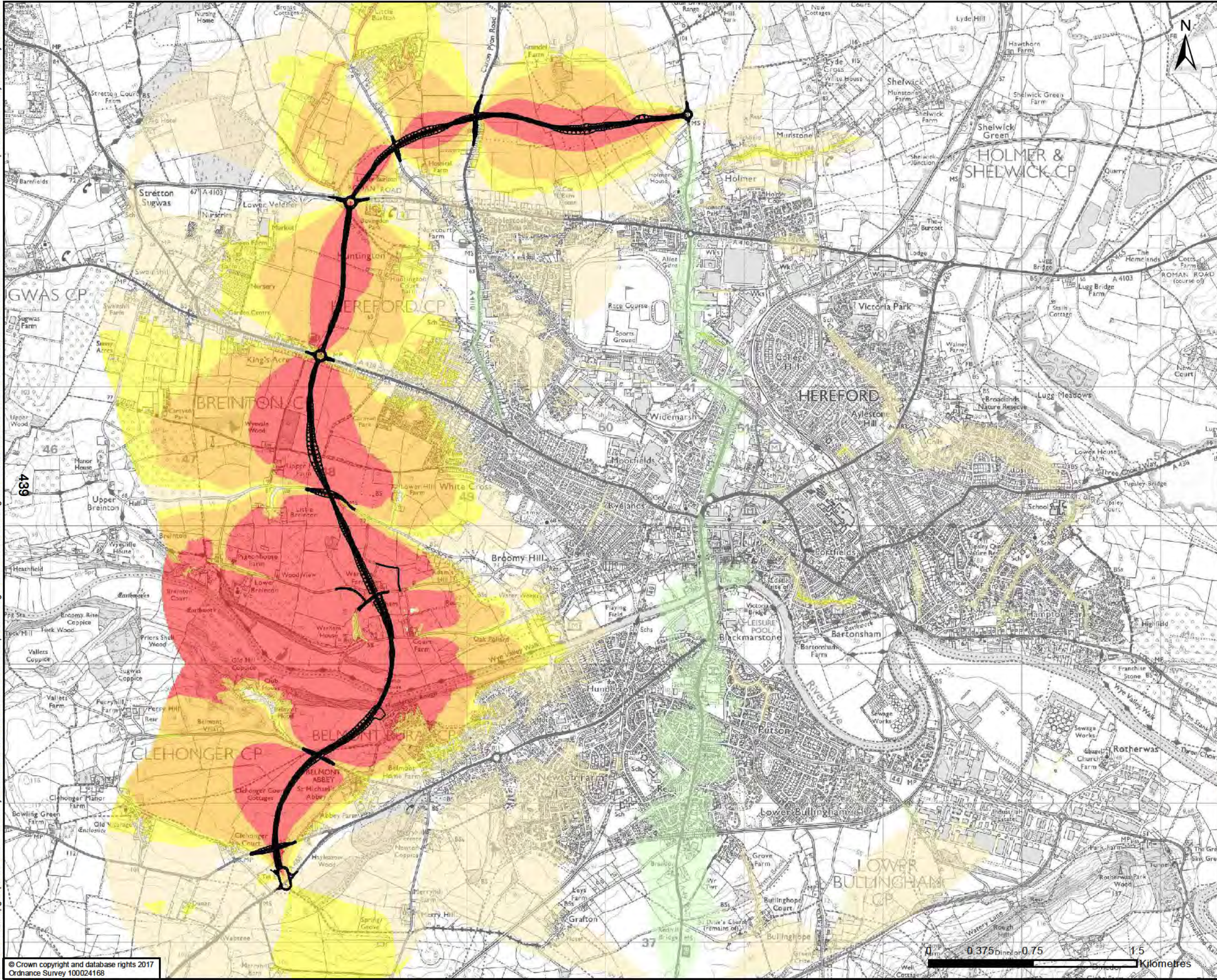
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TITLE: FIGURE 6-8
RED OPTION
SHORT TERM NOISE IMPACT

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— Proposed Red Option

Option 4: Long Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- 3 to -1 dB change in noise levels
- Negligible / No Change
- 1 to 3 dB change in noise levels
- Minor Adverse
- Moderate Adverse
- Major Adverse

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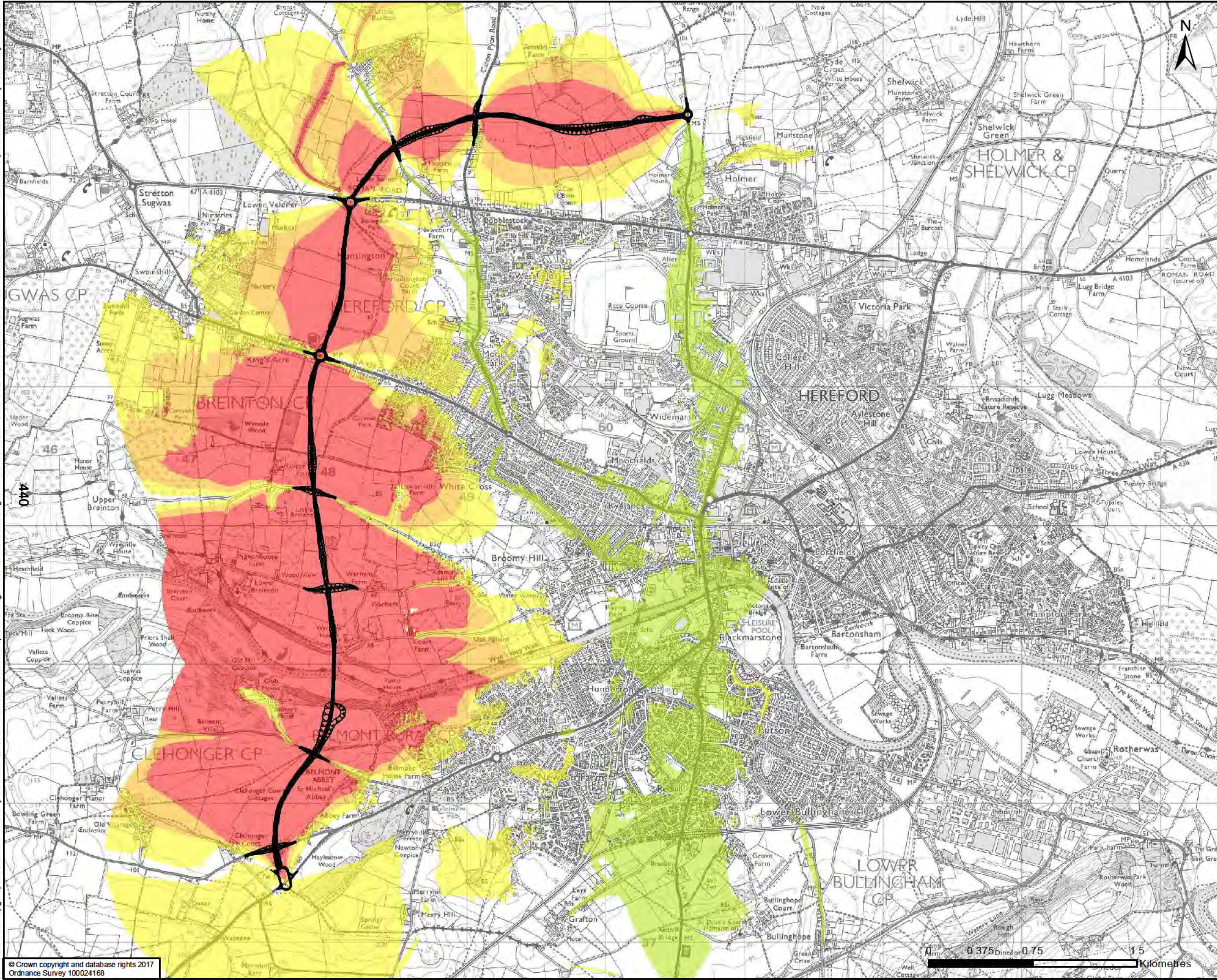
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RED OPTION
LONG TERM NOISE IMPACT

SCALE @ A3	CHECKED EO	APPROVED MT
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0 0.375 0.75 1.5 Kilometres

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— Proposed Olive Option

Option 5: Short Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- Negligible / No Change
- Minor Adverse
- Moderate Adverse
- Major Adverse

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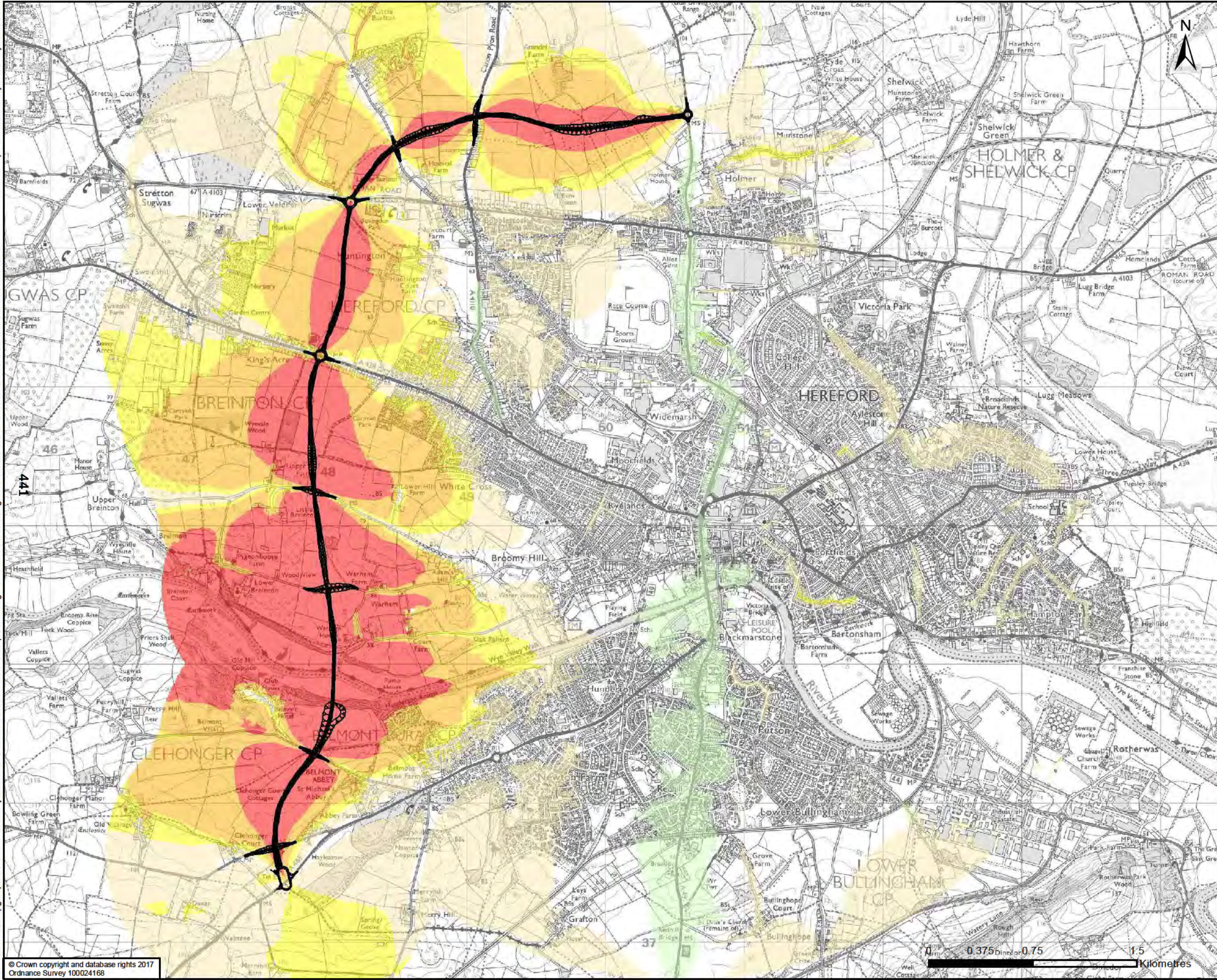
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TITLE: FIGURE 6-10
OLIVE OPTION
SHORT TERM NOISE IMPACT

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— Proposed Olive Option

Option 5: Long Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- 3 to -1 dB change in noise levels
- Negligible / No Change
- 1 to 3 dB change in noise levels
- Minor Adverse
- Moderate Adverse
- Major Adverse

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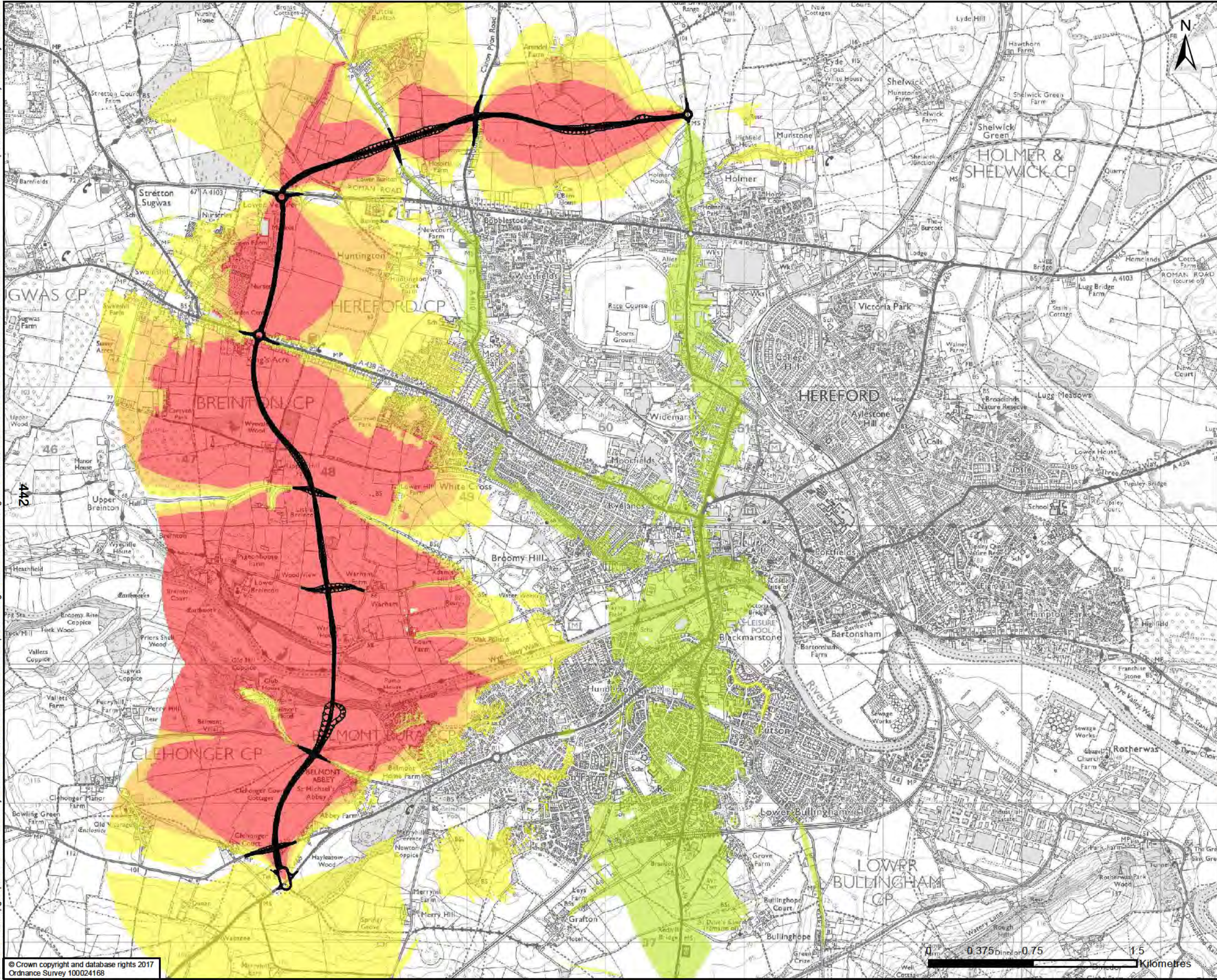
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TITLE: **FIGURE 6-11
OLIVE OPTION
LONG TERM NOISE IMPACT**

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— Proposed Black 1 Option

Option 6: Short Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- Negligible / No Change
- Minor Adverse
- Moderate Adverse
- Major Adverse

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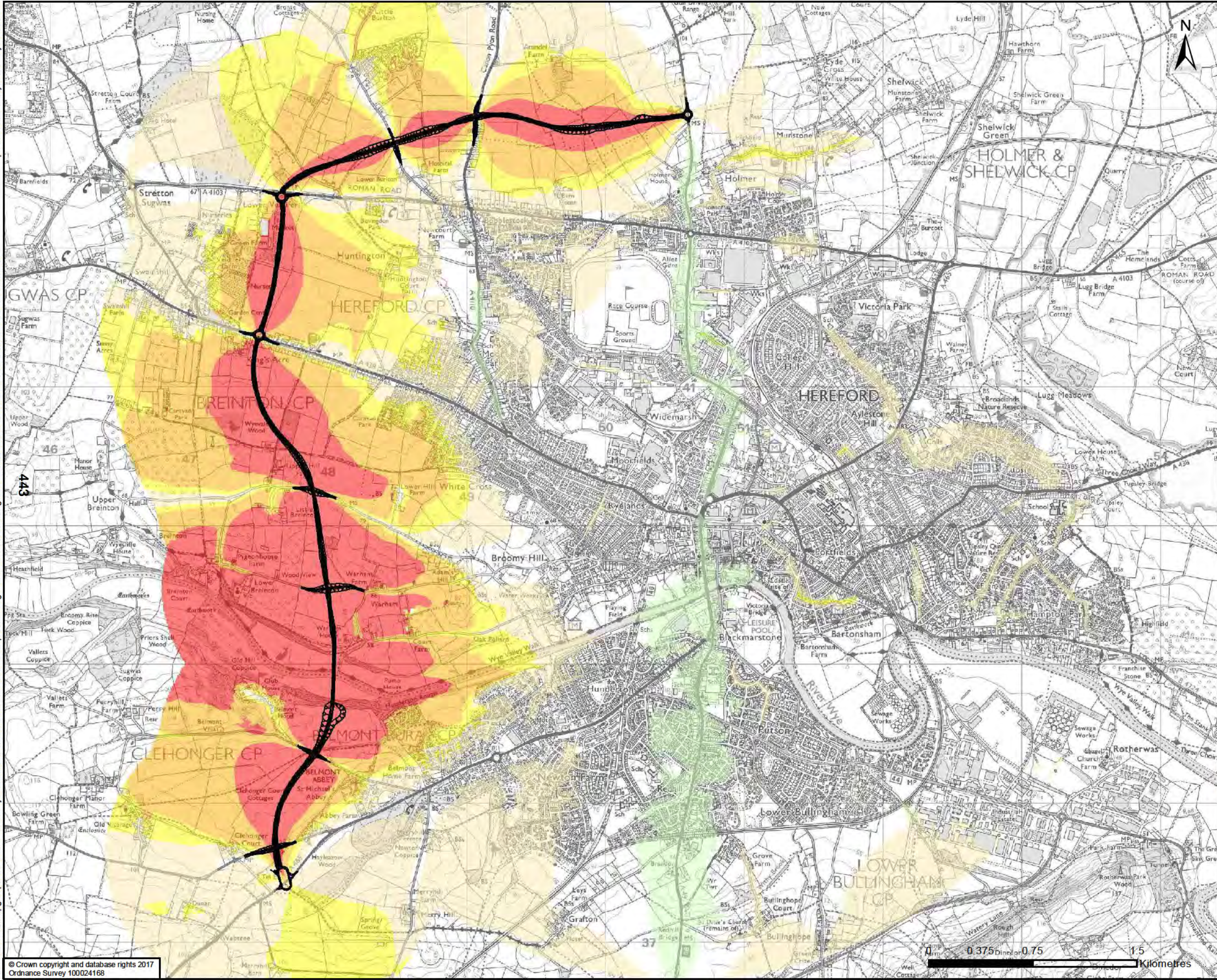
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TITLE: FIGURE 6-12
BLACK 1 OPTION
SHORT TERM NOISE IMPACT

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— Proposed Black 1 Option

Option 6: Long Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- 3 to -1 dB change in noise levels
- Negligible / No Change
- 1 to 3 dB change in noise levels
- Minor Adverse
- Moderate Adverse
- Major Adverse

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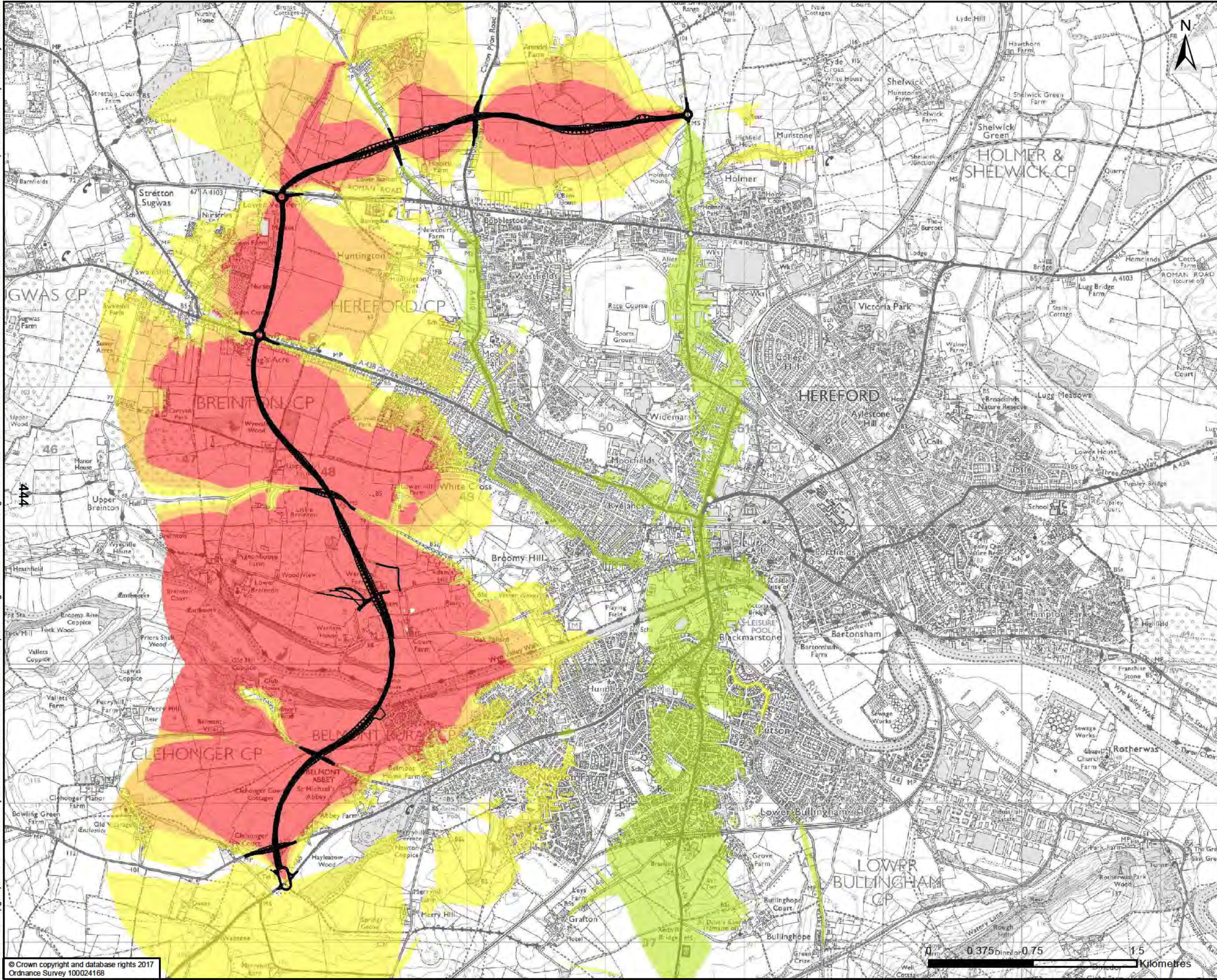
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BLACK 1 OPTION
LONG TERM NOISE IMPACT

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— Proposed Black 2 Option

Option 7: Short Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- Negligible / No Change
- Minor Adverse
- Moderate Adverse
- Major Adverse

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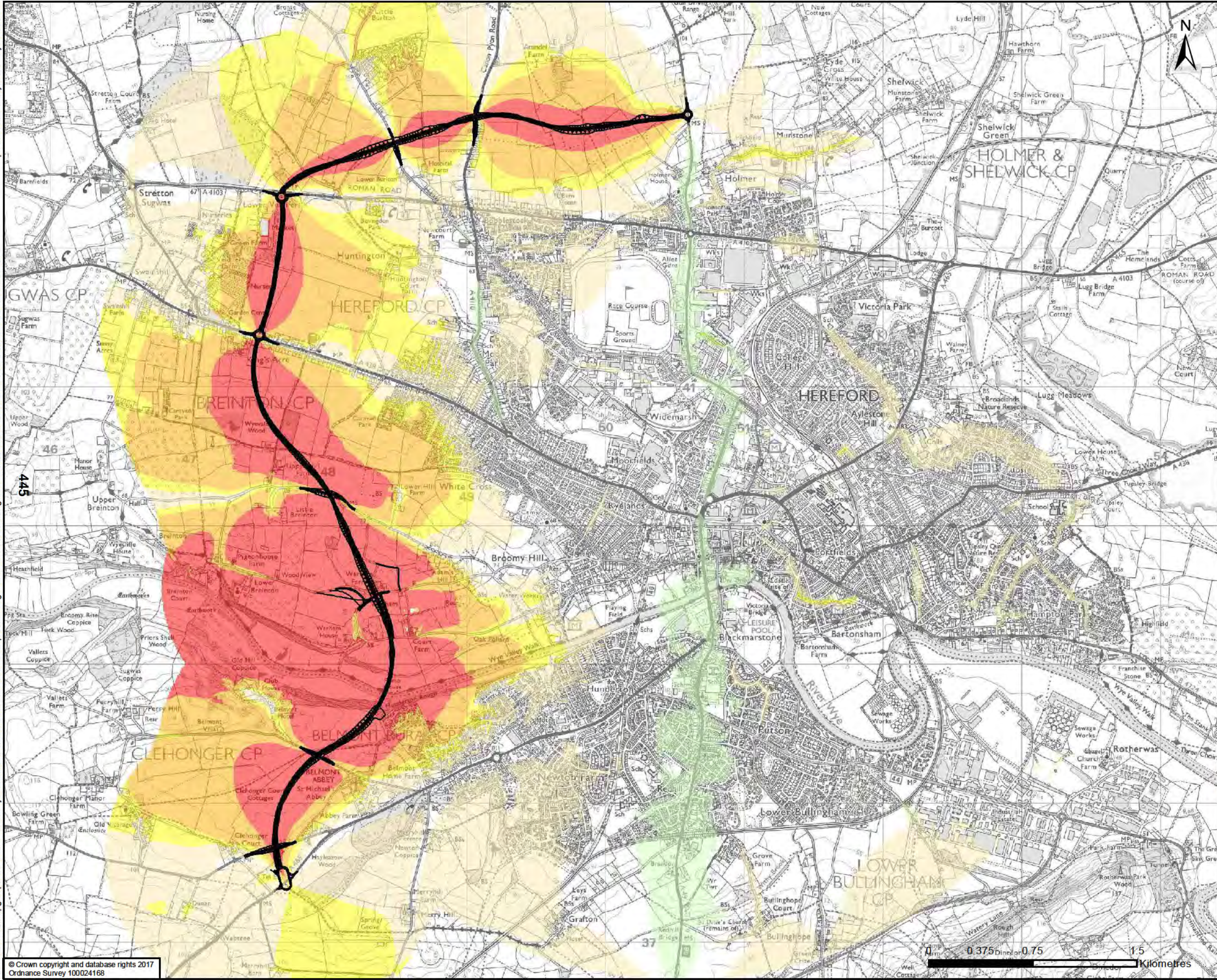
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SHORT TERM NOISE IMPACT**

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0 0.375 0.75 1.5 Kilometres

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— Proposed Black 2 Option

Option 7: Long Term

- Major Beneficial
- Moderate Beneficial
- Minor Beneficial
- 3 to -1 dB change in noise levels
- Negligible / No Change
- 1 to 3 dB change in noise levels
- Minor Adverse
- Moderate Adverse
- Major Adverse

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TITLE: FIGURE 6-15
BLACK 2 OPTION
LONG TERM NOISE IMPACT

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Appendix 6-3

BASELINE NOISE SURVEY

REPORT N° 70024065-610-01

HEREFORD TRANSPORT PACKAGE

BASELINE NOISE SURVEY

MARCH 2017

HEREFORD TRANSPORT PACKAGE

BASELINE NOISE SURVEY

Balfour Beatty Living Places

Confidential

Project no: 70024065

Date: March 2017

WSP | Parsons Brinckerhoff

Kings Orchard

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Bristol

BS2 0HQ

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Project number	70024065	
Report number	70024065-610-01	

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APPENDIX B	NOISE MONITORING FORMS
APPENDIX C	WEATHER DATA
APPENDIX D	CALIBRATION CERTIFICATES

1 INTRODUCTION

1.1 BACKGROUND

- 1.1.1 WSP | Parsons Brinckerhoff has been appointed to advise Balfour Beatty Living Places (BBLP) in relation to the proposed western relief road scheme which forms part of the Hereford Transport Package (HTP) outlined in the Herefordshire Local Plan Core Strategy 2011-2031 ¹.
- 1.1.2 A noise assessment will be prepared in due course in support of the scheme. In the first instance a baseline noise survey has been undertaken to determine the current noise environment within the Core Strategy area and surroundings and to inform future noise modelling and a noise assessment.
- 1.1.3 This report describes the methodology and results of a baseline noise survey carried out between 7th March and 10th March 2017, which included measurements made at four long-term locations and five short-term locations.
- 1.1.4 A glossary of acoustic terminology used in this report is provided in Appendix A.

1.2 LOCAL AUTHORITY CONSULTATION

- 1.2.1 Prior to undertaking the baseline noise survey, WSP | Parsons Brinckerhoff contacted Bruce Chartres, Environmental Protection Manager at Herefordshire Council (HC), by email and telephone, to discuss and agree the survey methodology. The following approach was agreed:
- Noise survey to be carried out according to the principles of BS7445 (1991-2003) and Calculation of Road Traffic Noise (CRTN) (1988);
 - Long-term measurements to be made at four locations to determine source noise levels of primary roads within the Core Strategy Area;
 - Short-term measurements to be made at a minimum of four locations to determine source noise levels of additional primary roads or to determine general ambient noise levels at built-up residential locations close to the Core Strategy Area.
- 1.2.2 Prior to the survey, a Method Statement was issued to Bruce Chartres and other members of the Herefordshire Environmental Health team outlining the proposed long-term and short-term measurement locations. No further comments were received.

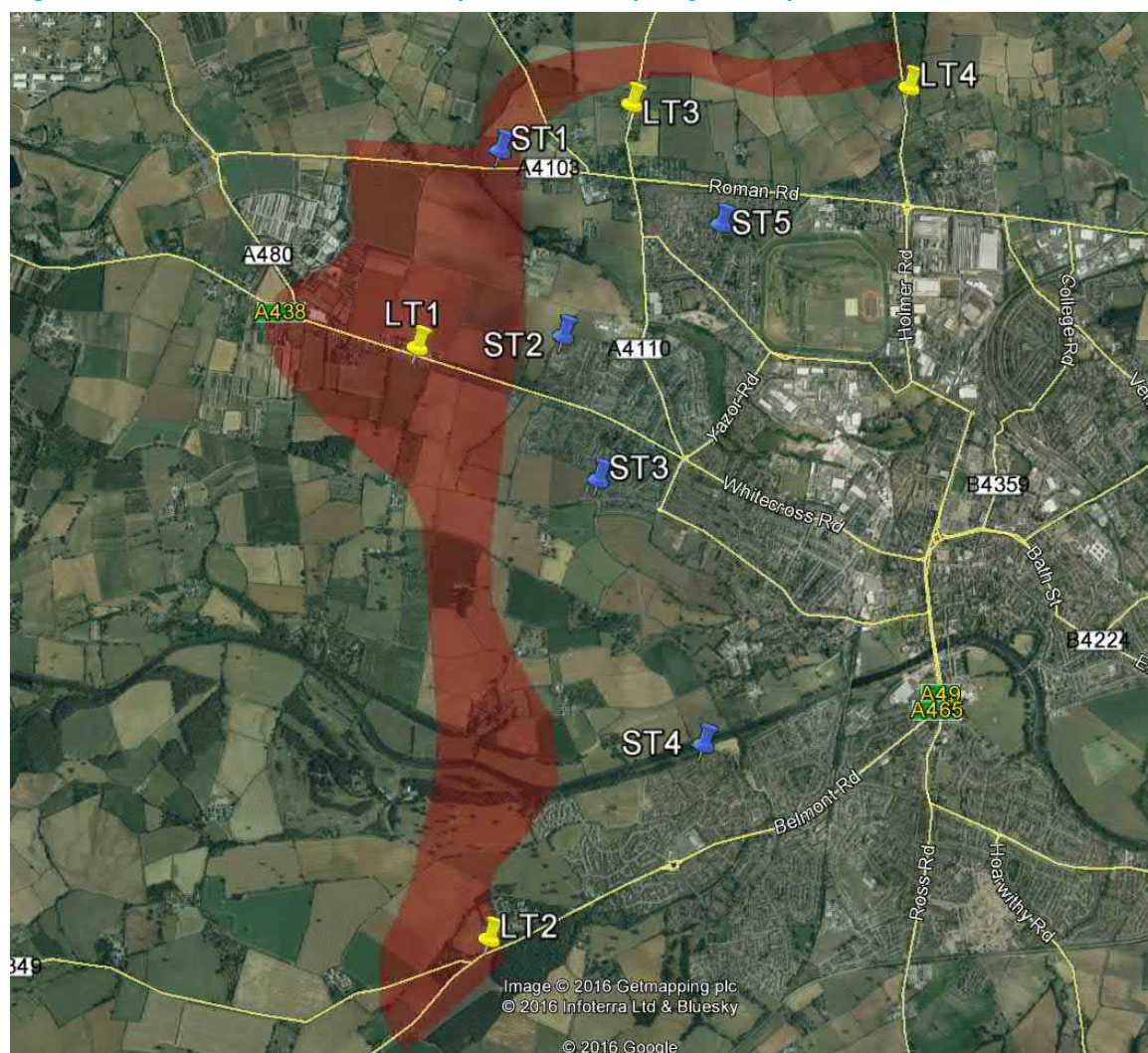
¹ https://www.herefordshire.gov.uk/downloads/file/1788/core_strategy_sections_combined

2 NOISE SURVEY METHODOLOGY

2.1 OVERVIEW

- 2.1.1 The baseline noise survey was carried out between Tuesday 7th March and Friday 10th March 2017.
- 2.1.2 Long-term unattended measurements were made at four positions (LT1-LT4) continuously over the entire survey period. Weather data comprising wind speed, wind direction and rainfall was measured over the entire survey period at LT3 using an anemometer and a rain gauge.
- 2.1.3 Short-term attended measurements were made at five positions (ST1-ST5). Measurements were made at ST1, ST2 and ST3 on Wednesday 8th March and at ST4 and ST5 on Thursday 9th March.
- 2.1.4 The long-term and short-term measurement positions are shown graphically in Figure 1 and are described in more detail in Sections 2.2 and 2.3.

Figure 1: Site and Noise Sensitive Receptor Locations (Google Earth)



- 2.1.5 Noise Monitoring Forms (NMFs) are provided in Appendix B for all long-term and short-term positions. Weather data is provided in Appendix C and calibration certificates for all equipment used are provided in Appendix D.

2.2 LONG-TERM MEASUREMENTS

- 2.2.1 The long-term measurement locations are detailed in Table 1 below. The land parcel reference, nearest road and distance from the measurement position to the road are also indicated. Measurements were made in consecutive 15-minute periods to allow data to be filtered for weather events.

Table 1: Long-term measurement positions

LONG-TERM MEASUREMENT POSITION	LAND PARCEL REFERENCE	NEAREST ROAD	DISTANCE TO ROAD	LATITUDE	LONGITUDE
LT1	HE7330	A438	60m	52° 4'0.69"N	2°45'50.22"W
LT2	HE42800	A465	8m	52° 2'10.69"N	2°45'27.91"W
LT3	HE472	A4110	9m	52° 4'46.49"N	2°44'44.83"W
LT4	HE43971	A49	10m	52° 4'49.75"N	2°43'20.00"W

- 2.2.2 Measurements were made at the long-term positions using Rion NL52, Class 1 Sound Level Meters (SLMs). The measurement microphones were half inch microphone type UC-53A, which were fitted with a double skin foam ball wind shield type WS-15. The microphones were mounted at a height of 1.2m from the local ground level.

- 2.2.3 The meters were calibrated on site using a Rion NC-74 calibrator - calibration was carried out during setup on 7th March and upon collection on 10th March. The calibration levels were within accepted tolerances following all calibration procedures.

2.3 SHORT-TERM MEASUREMENTS

- 2.3.1 The short-term measurement locations are shown in Table 2 below.

- 2.3.2 Short-term measurements were made with a Rion NL52, Class 1 SLM mounted on a tripod 1.2m above local ground level. A calibration check was performed to the meter prior to and following measurements on the 8th and 9th March using a Rion NC-74 calibrator, with no drift noted in the calibration level.

- 2.3.3 Measurements were made at ST1 in accordance with the shortened measurement procedure outlined in CRTN (1988, pg. 31), which requires measurements to be made over three consecutive one-hourly periods between 1000 and 1700.

- 2.3.4 Measurements were made at ST2, ST3, ST4 and ST5 for three separate 15-minute periods at each position. The approach adopted was to measure at ST2 and ST3 alternately on 8th March and at ST4 and ST5 on 9th March, to ensure a representative sample of daytime measurements was made at each location. Positions ST2 – ST5 were located in built-up residential areas and the purpose of measurements was to determine the general ambient noise levels.

Table 2: Short-term measurement positions

SHORT-TERM MEASUREMENT POSITION	LOCATION	LATITUDE	LONGITUDE
ST1	A4103 (4m from carriageway)	52° 4'37.71"N	2°45'25.21"W
ST2	Bredon Drive	52° 4'2.70"N	2°45'5.88"W
ST3	Westfaling Street	52° 3'35.75"N	2°44'55.15"W
ST4	Wyedean Rise	52° 2'46.47"N	2°44'23.42"W
ST5	Sandown Drive	52° 4'23.73"N	2°44'17.77"W

2.4 METEOROLOGICAL MEASUREMENTS

2.4.1 A Logic Energy weather station which was set up adjacent to the noise monitoring equipment at LT3 at a height of 1.2m above local ground level. The weather station setup is shown in Figure 2.

Figure 2: Weather station equipment at LT3



2.4.2 The weather station was set up to measure average wind speed, average wind direction and instances of rainfall in consecutive 15-minute periods. The weather station included an anemometer, wind vane and tipping bucket rain gauge.

2.4.3 The weather station time setting was synchronised to the sound level meters at the long-term measurement positions, to allow any unsuitable data periods to be excluded for analysis purposes.

2.4.4 Rainfall was measured during between 2100 on 7th March and 2400 on 8th March. Rainfall was not measured at any other times during the survey period. The noise level data measured during this period has been excluded from the assessment.

2.4.5 Wind speeds were below 5ms^{-1} throughout the entire survey period, with the highest measured wind speed of 4.6ms^{-1} occurring at 0300 on 8th March.

2.4.6 The wind direction throughout the survey period was generally southerly/south-westerly, with some northerly/north-easterly/easterly winds occurring on 10th March.

2.4.7 The weather data measured during the survey period is shown in Appendix C.

3 NOISE SURVEY RESULTS

3.1 LONG-TERM MEASUREMENT RESULTS

- 3.1.1 The noise levels measured at the long-term measurement positions are summarised in Table 3. Noise levels measured during the two full 24-hour periods between 8th and 9th March have been shown, as these are the most representative of the baseline conditions. Furthermore, these 24-hour periods were unaffected by rainfall or wind speeds in excess of 4.6ms^{-1} .
- 3.1.2 Noise levels are summarised in terms of the $L_{A10, 18h}$, $L_{Aeq, 16h}$ and $L_{Aeq, 8h}$. The $L_{A10, 18h}$ is the arithmetically averaged L_{A10} noise levels measured between 0600-2400 hours. The $L_{Aeq, 16h}$ and $L_{Aeq, 8h}$ are the logarithmically averaged L_{Aeq} noise levels measured between 0700-2300 hours and between 2300-0700 hours respectively.
- 3.1.3 The $L_{A10, 18h}$ over both days have been arithmetically averaged and the $L_{Aeq, 16h}$ and $L_{Aeq, 8h}$ over both days have been logarithmically averaged to provide averaged values at each position.
- 3.1.4 Time history plots showing the L_{Aeq} , L_{A10} , L_{AFmax} and L_{A90} noise levels measured at each long-term position over the whole survey period are provided in Appendix B.

Table 3: Long-term measurement results

POSITION	DATE	$L_{A10, 18h}$ DB (0600-2400)	$L_{Aeq, 16h}$ DB (0700 – 2300)	$L_{Aeq, 8h}$ DB (2300 – 0700)
LT1	08/03/2017	47.4	46.8	44.1
	09/03/2017	49.1	48.6	43.9
	<i>Averaged values</i>	48.2	47.8	44.0
LT2	08/03/2017	68.2	65.7	59.8
	09/03/2017	68.1	65.6	59.7
	<i>Averaged values</i>	68.1	65.7	59.8
LT3	08/03/2017	65.7	62.2	55.5
	09/03/2017	65.3	61.6	55.4
	<i>Averaged values</i>	65.5	61.9	55.5
LT4	08/03/2017	73.9	71.1	63.9
	09/03/2017	73.7	70.7	64.0
	<i>Averaged values</i>	73.8	70.9	64.0

3.2 SHORT-TERM MEASUREMENT RESULTS

- 3.2.1 As previously discussed, noise levels were measured at ST1 in accordance with the CRTN shortened measurement procedure methodology which allows the $L_{A10,18h}$ noise levels to be derived from $L_{A10,3h}$ noise levels. This is determined through implementation of the following expression:

$$L_{A10,18h} = L_{A10,3h} - 1dB \quad (1)$$

- 3.2.2 The measured $L_{A10,3h}$ and derived $L_{A10,18h}$ noise levels at ST1 are summarised in Table 4.

Table 4: Short-term measurement results at ST1

POSITION	DATE	MEASURED $L_{A10,3h}$ DB (1000-1300)	DERIVED $L_{A10,18h}$ DB
ST1	08/03/2017	78.4	77.4

- 3.2.3 The noise levels measured at short-term positions ST2 – ST5 are summarised in Table 5, in terms of the range of measured L_{Aeq} , L_{A10} and L_{A90} noise levels.

Table 5: Short-term measurement results at ST2 – ST5

POSITION	DATE	TIME PERIOD	L_{Aeq} RANGE, DB	L_{A10} RANGE, DB	L_{A90} RANGE, DB
ST2	08/03/2017	1403 - 1600	43 - 48	45 - 52	40 - 41
ST3	08/03/2017	1433 – 1627	49 - 53	52 - 55	35 - 37
ST4	09/03/2017	1015 - 1401	41 - 50	43 - 50	32 - 37
ST5	09/03/2017	1105 - 1450	59 - 60	61 - 63	40 - 42

4 SUMMARY

- 4.1.1 WSP | Parsons Brinckerhoff have undertaken a baseline noise survey in Hereford to inform a noise assessment for the proposed western relief road scheme outlined in the Herefordshire Local Plan Core Strategy 2011-2031.
- 4.1.2 The baseline noise survey included noise level measurements made at four long-term locations and five short-term locations and meteorological measurements of wind speed, wind direction and rainfall at one location. The survey took place between Tuesday 7th March and Friday 10th March 2017.
- 4.1.3 The results of the noise survey have been summarised in this report and will inform a later noise modelling exercise and noise assessment.

Appendix A

GLOSSARY OF ACOUSTIC TERMINOLOGY

Glossary of Acoustics Terminology

Glossary of Acoustics Terminology

Decibel (dB)	The decibel scale is used in relation to sound because it is a logarithmic rather than a linear scale. The decibel scale compares the level of a sound relative to another. The human ear can detect a wide range of sound pressures, typically between 2×10^{-5} and 200 Pa, so the logarithmic scale is used to quantify these levels using a more manageable range of values.
Sound Pressure Level (SPL)	The Sound Pressure Level has units of decibels, and compares the level of a sound to the smallest sound pressure generally perceptible by the human ear, or the reference pressure. It is defined as follows: $\text{SPL (dB)} = 20 \log_{10}(P/P_{\text{ref}}) \text{ where } \begin{array}{l} P = \text{Sound Pressure (in Pa)} \\ P_{\text{ref}} = \text{Reference Pressure } 2 \times 10^{-5} \text{ Pa} \end{array}$ An SPL of 0dB suggests the Sound Pressure is equal to the reference pressure. This is known as the <i>threshold of hearing</i>. An SPL of 140dB represents the <i>threshold of pain</i>.
A-Weighting	The human ear can detect a wide range of frequencies, from 20Hz to 20kHz, but it is more sensitive to some frequencies than others. Generally, the ear is most sensitive to frequencies in the range 1 to 4 kHz. The A-weighting is a filter that can be applied to measured results at varying frequencies, to mimic the frequency response of the human ear, and therefore better represent the likely perceived loudness of the sound. SPL readings with the A-weighting applied are represented in dB(A).
L ₁₀ or L _{A10} and other percentile measures	This represents the SPL which is exceeded 10% of the time, expressed in dB or dB(A). L _{A10} is used to quantify road noise levels. Other percentiles exist and are used for various types of noise assessment. These include L ₀₁ , L ₅₀ , L ₉₀ , L ₉₉ .
Noise	A noise can be described as an unwanted sound. Noise can cause nuisance.
Noise Sensitive Receptors (NSR's)	Any identified receptor likely to be affected by noise. These are generally human receptors, which may include residential dwellings, work places, schools, hospitals, and recreational spaces.

Appendix B

NOISE MONITORING FORMS

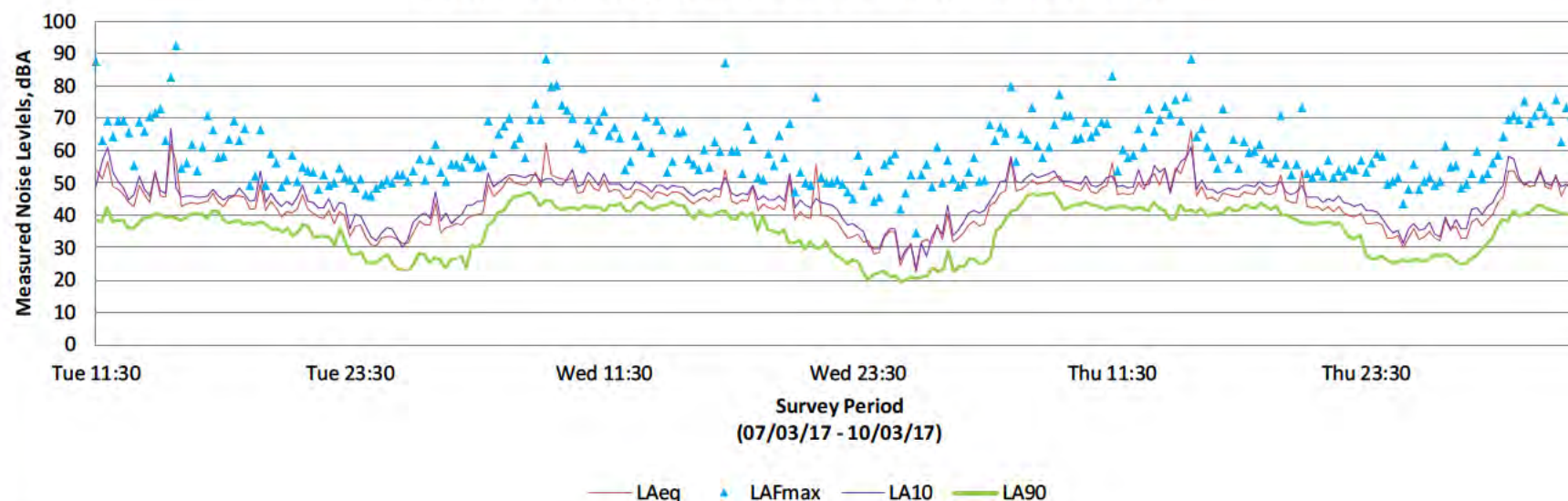
Noise Monitoring Form



Project:	Hereford Transport Package	Job Number:	70024065
Location:	LT1		
Equipment:	Rion NL52 Kit A	Engineer:	Paul Doyle
Pre-Calibration Level:	94.0	General Weather Description: Sunny and dry during setup, overcast and dry during collection	
Post-Calibration Level:	94.0		

Measurement Period			Description of Measurement Position and Audible Noise
Date	Start / Stop Time	Measurement Period	Measurement position located in field behind housing on Kings Acre Road (A438), approximately 60m from carriageway edge. Main noise sources: distant road traffic on A438, birds in trees, general neighbourhood noise from housing.
07/03/17	11:30	15 minutes	
10/03/17	10:12		

Time History of Noise Levels Measured at LT1



Noise Monitoring Form

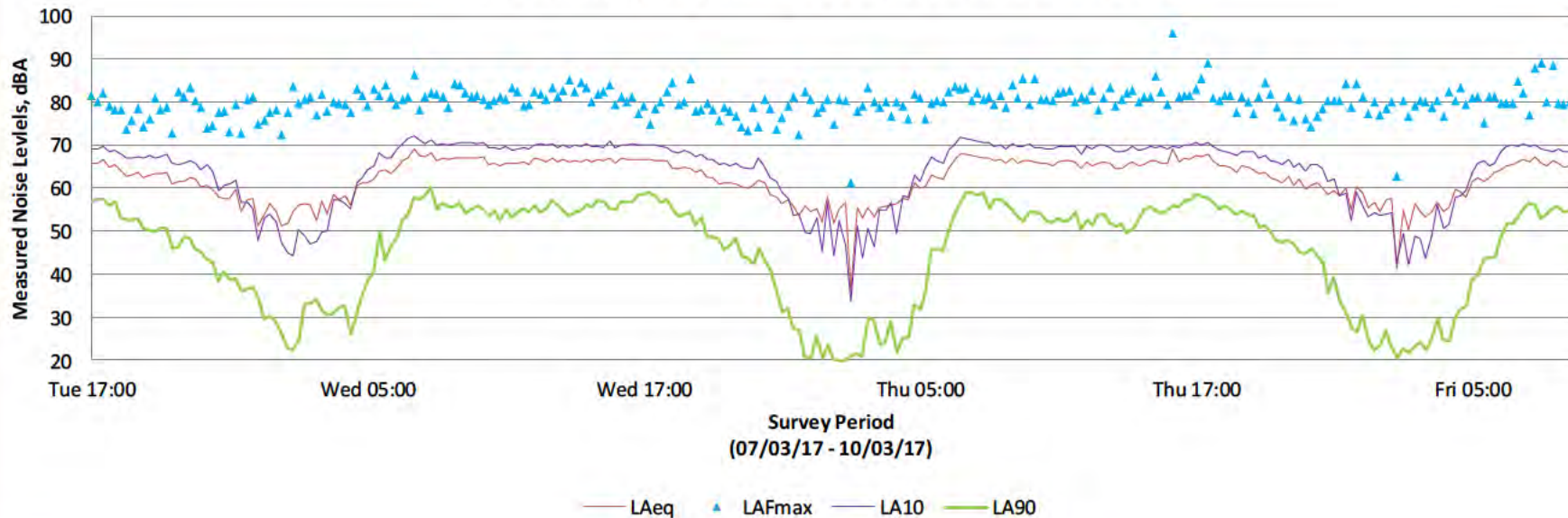


PARSONS
BRINCKERHOFF

Project:	Hereford Transport Package	Job Number:	70024065
Location:	LT2		
Equipment:	Rion NL52 Kit B	Engineer:	Paul Doyle
Pre-Calibration Level:	94.0	General Weather Description:	Sunny and dry during setup, overcast and dry during collection
Post-Calibration Level:	94.0		

Measurement Period		Measurement Period	Description of Measurement Position and Audible Noise
Date	Start / Stop Time		
07/03/17	17:00	15 minutes	Measurement position located in field adjacent to A465. Approximately 8m from carriageway edge. Main noise source: road traffic on A465 (dominant noise source).
10/03/17	09:31		

Time History of Noise Levels Measured at LT2



Noise Monitoring Form



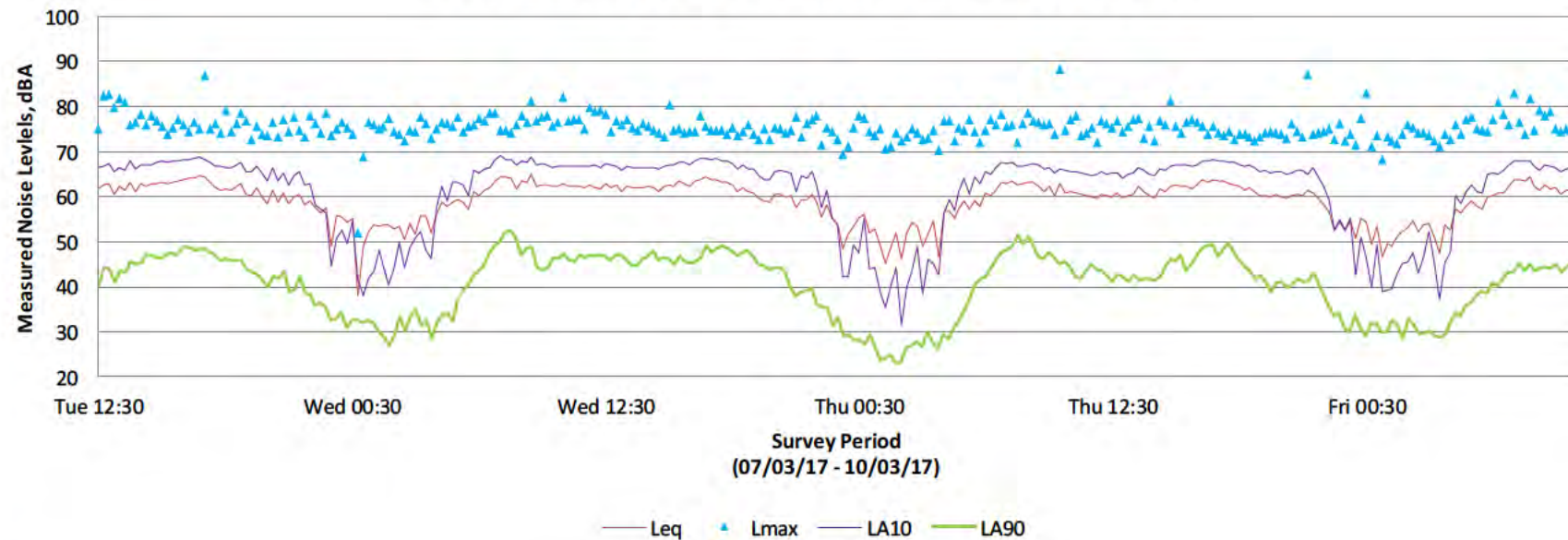
PARSONS
BRINCKERHOFF

Project:	Hereford Transport Package	Job Number:	70024065
Location:	LT3		
Equipment:	Rion NL52 Kit C	Engineer:	Paul Doyle
Pre-Calibration Level:	94.0	General Weather Description:	Sunny and dry during setup, overcast and dry during collection
Post-Calibration Level:	94.0		

Measurement Period			Description of Measurement Position and Audible Noise
Date	Start / Stop Time	Measurement Period	
07/03/17	12:30	15 minutes	
10/03/17	10:38		

Measurement position located in field adjacent to A4110. Approximately 9m from carriageway edge. Main noise sources: road traffic on A4110 (dominant noise source), burds in trees.

Time History of Noise Levels Measured at LT3



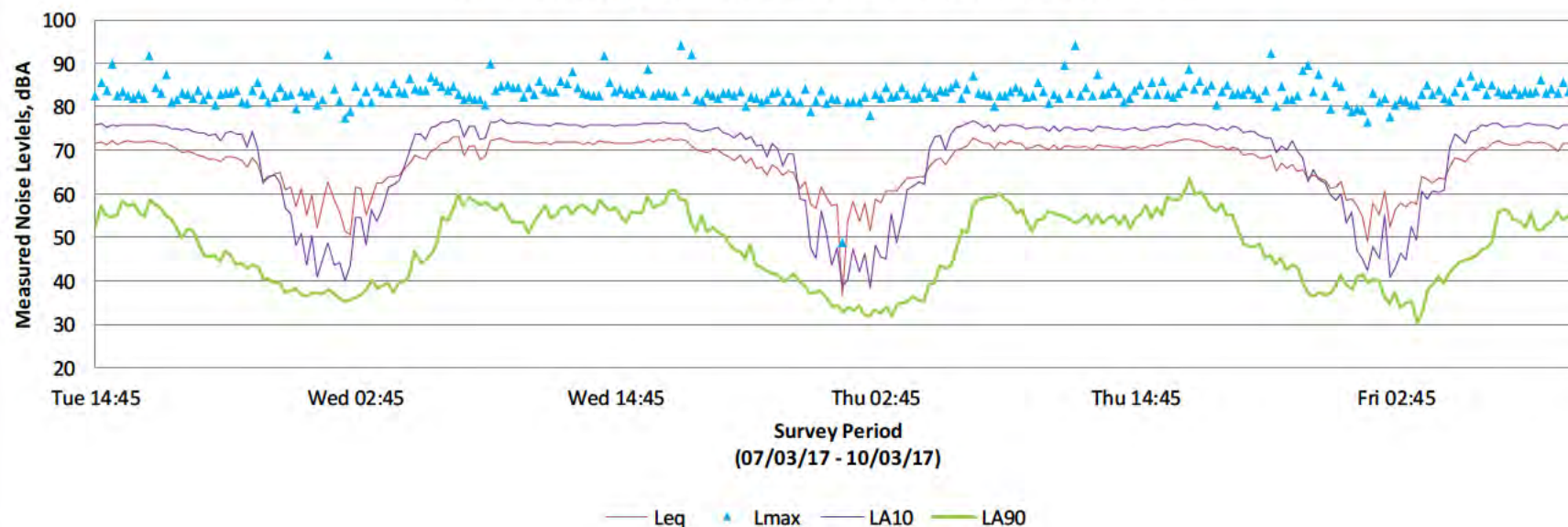
Noise Monitoring Form



Project:	Hereford Transport Package	Job Number:	70024065
Location:	LT4		
Equipment:	Rion NL52 Kit D	Engineer:	Paul Doyle
Pre-Calibration Level:	94.0	General Weather Description: Sunny and dry during setup, overcast and dry during collection	
Post-Calibration Level:	94.0		

Measurement Period			Description of Measurement Position and Audible Noise
Date	Start / Stop Time	Measurement Period	Measurement position located in field adjaent to A49. Approximately 10m from carriageway edge. Main noise sources: road traffic on A49 (dominant noise source), birds in trees.
07/03/17	14:45	15 minutes	
10/03/17	11:42		

Time History of Noise Levels Measured at LT4



Noise Monitoring Form										 	
Project: Hereford Transport Package					Job Number: 70024065						
Equipment: Rion NL-52 Kit E					Engineer: Paul Doyle						
Pre-Calibration Level: 94.0					General Weather Description: Overcast, dry						
Post-Calibration Level: 94.0					Location: ST1						
Measurement Period		Weather			Statistical Noise Levels / dB				Description of Audible Noise		
Date/Time	Elapsed Minutes	Wind Speed (m/s)	Wind Direction (from)	Temperature (°C)	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}			
08/03/2017 10:00	15:00	2.4	SW	10	73.3	88.5	78.4	48.3	CRTN shortened 3-hour procedure. Approximately 4m from carriageway edge. Dominant noise source road traffic on A4103		
08/03/2017 10:15	15:00	2.4	SW	10	73.4	88.5	78.6	49.2			
08/03/2017 10:30	15:00	2.4	SW	10	72.7	86.1	78.0	50.6			
08/03/2017 10:45	15:00	2.4	SW	11	73.6	86.6	78.6	52.0			
08/03/2017 11:00	15:00	2.9	SW	11	73.1	86.6	78.3	52.7			
08/03/2017 11:15	15:00	2.9	SW	11	72.9	85.6	78.1	50.3			
08/03/2017 11:30	15:00	2.9	SW	11	73.1	86.9	78.2	51.6			
08/03/2017 11:45	15:00	2.9	SW	12	73.0	85.9	78.3	51.0			
08/03/2017 12:00	15:00	3.1	SW	12	73.4	86.5	78.6	50.8			
08/03/2017 12:15	15:00	3.1	SW	12	73.4	87.3	78.6	51.5			
08/03/2017 12:30	15:00	3.1	SW	12	73.5	85.6	78.6	51.3			
08/03/2017 12:45	15:00	3.1	SW	12	73.6	88.4	78.7	48.2			





Noise Monitoring Form										 	
Project: Hereford Transport Package					Job Number: 70024065						
Equipment: Rion NL-52 Kit E					Engineer: Paul Doyle						
Pre-Calibration Level: 94.0					General Weather Description: Overcast, dry						
Post-Calibration Level: 94.0					Location: ST2						
Measurement Period		Weather			Statistical Noise Levels / dB				Description of Audible Noise		
Date/Time	Elapsed Minutes	Wind Speed (m/s)	Wind Direction (from)	Temperature (°C)	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}			
08/03/2017 14:03	15:00	2.6	SW	9	43.4	63.1	45.3	40.1	Residential area (Bredon Drive) - distant road traffic noise from A438. Birds in trees.		
08/03/2017 14:54	15:00	2.6	SW	8	48.1	63.6	51.4	41.3			
08/03/2017 15:45	15:00	2.6	SW	8	48.2	61.5	51.8	40.5			
  											

Noise Monitoring Form										WSP	PARSONS BRINCKERHOFF
Project: Hereford Transport Package					Job Number: 70024065						
Equipment: Rion NL-52 Kit E					Engineer: Paul Doyle						
Pre-Calibration Level: 94.0					General Weather Description: Overcast, dry						
Post-Calibration Level: 94.0					Location: ST3						
Measurement Period		Weather			Statistical Noise Levels / dB				Description of Audible Noise		
Date/Time	Elapsed Minutes	Wind Speed (m/s)	Wind Direction (from)	Temperature (°C)	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}			
08/03/2017 14:33	15:00	2.6	SW	8	53.1	71.1	55.0	36.8	Residential area (Westfaling Street) - distant road traffic noise from A438 to the north. Birds in trees.		
08/03/2017 15:22	15:00	2.7	SW	8	48.5	63.9	52.3	34.7			
08/03/2017 16:12	15:00	1.4	SW	8	52.5	71.2	53.4	37.0			
 											

Noise Monitoring Form



Project:	Hereford Transport Package	Job Number:	70024065
Equipment:	Rion NL-52 Kit E	Engineer:	Paul Doyle
Pre-Calibration Level:	94.0	General Weather Description:	Sunny, dry
Post-Calibration Level:	94.0	Location:	ST4

Measurement Period		Weather			Statistical Noise Levels / dB				Description of Audible Noise
Date/Time	Elapsed Minutes	Wind Speed (m/s)	Wind Direction (from)	Temperature (°C)	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}	
09/03/2017 10:15	15:00	3.9	SW	14	50.2	67.3	49.6	36.8	Residential area (Wyedean Rise) - only very distant road traffic noise from A465 to the south. Birds in trees.
09/03/2017 12:02	15:00	3.3	SW	14	43.5	60.4	46.3	33.2	
09/03/2017 13:46	15:00	3.4	SW	14	40.8	59.0	42.9	32.0	



Noise Monitoring Form



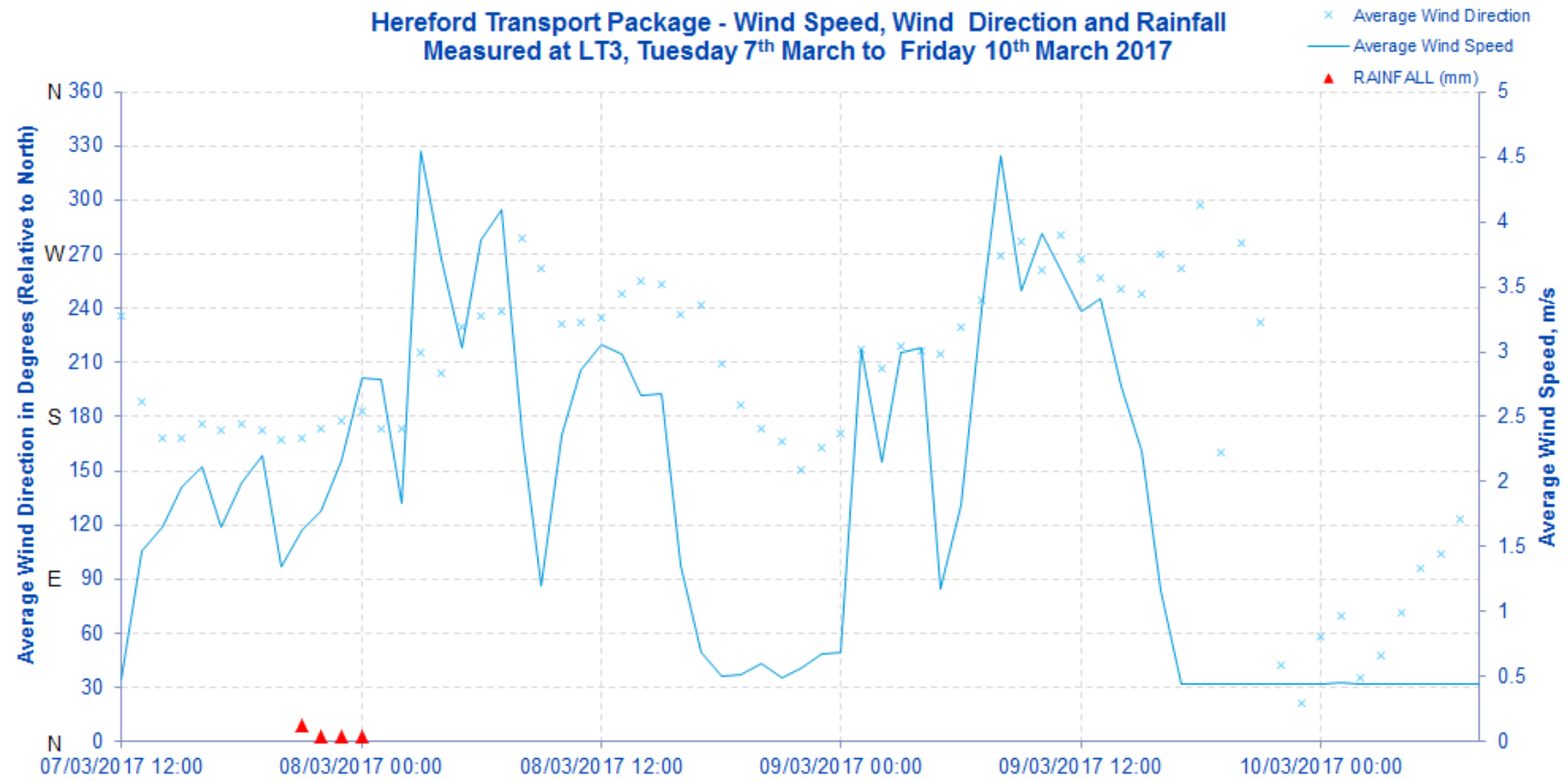
Project:	Hereford Transport Package	Job Number:	70024065
Equipment:	Rion NL-52 Kit E	Engineer:	Paul Doyle
Pre-Calibration Level:	94.0	General Weather Description:	Sunny, dry
Post-Calibration Level:	94.0	Location:	ST5

Measurement Period		Weather			Statistical Noise Levels / dB				Description of Audible Noise
Date/Time	Elapsed Minutes	Wind Speed (m/s)	Wind Direction (from)	Temperature (°C)	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}	
09/03/2017 11:05	15:00	3.6	SW	14	59.2	78.7	60.8	41.6	Residential area (Sandown Drive) - distant road traffic noise from A4103 to the north. Traffic in nearby roads (cars, vans, motorbikes). Birds in trees.
09/03/2017 12:55	15:00	3.3	SW	14	60.2	82.1	62.5	42.1	
09/03/2017 14:35	15:00	2.7	SW	15	60.0	82.8	61.7	40.3	



Appendix C

WEATHER DATA



Appendix D

CALIBRATION CERTIFICATES



CERTIFICATE OF CALIBRATION

Date of Issue: 04 November 2015

Certificate Number: TCRT15/1301

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustic Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

M. Breslin []

K. Mistry []

J. Harman []

Customer: Parsons Brinckerhoff Ltd
Kings Orchard
1 Queen Street
Bristol
BS2 0HQ

Order No. 87442

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NL-52	01021288
	Rion	Firmware		1.5
	Rion	Pre Amplifier	NH-25	21330
	Rion	Microphone	UC-59	08198
	Rion	Calibrator	NC-74	34536109
		Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 21 October 2015

ANV Job No. TRAC15/10152

Date Calibrated 04 November 2015

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	24 January 2013	TCRT13/1021	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT15/1301

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable	N/A	
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	29 October 2015	
Calibrator cert. number	UCRT15/1286	
Calibrator cal cert issued by	ANV Measurement Systems	
Calibrator SPL @ STP	94.02	dB Calibration reference sound pressure level
Calibrator frequency	1001.89	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - None

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.74	23.00	± 0.20 °C
Humidity	48.2	49.0	± 3.00 %RH
Ambient Pressure	100.26	100.25	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	93.9	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±			0.10		dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device - UR = Under Range Indicated

Weighting	A	C	Z
	11.8	16.9	22.5
	dB	dB	dB
	UR	UR	UR

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12, of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

R.1

Additional Comments

Prior to calibration, instrument's damaged microphone was replaced.



CERTIFICATE OF CALIBRATION



Date of Issue: 18 January 2016

Certificate Number: UCRT16/1036

Issued by:

ANV Measurement Systems

Beaufort Court

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Milton Keynes MK5 8HL

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Web: www.noise-and-vibration.co.uk

Acoustic Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory
M. Breslin [] K. Mistry [] J. Harriman []

Customer WSP Environmental Ltd
3rd Floor
Kings Orchard
1 Queen St
Bristol
BS2 0HQ

Order No 20016308

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NL-52	00320637
	Rion	Firmware		1.5
	Rion	Pre Amplifier	NH-25	10645
	Rion	Microphone	UC-59	05708
	Rion	Calibrator	NC-74	35125825
		Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES **Approval Number** 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 14 January 2016

ANV Job No. UKAS16/01010

Date Calibrated 18 January 2016

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	27 January 2014	TCRT14/1029	ANV Measurement Systems

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

Certificate Number

UCRT16/1036

UKAS Accredited Calibration Laboratory No. 7623

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data	Manufacturer	
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	15 January 2016	
Calibrator cert. number	UCRT16/1034	
Calibrator cal cert issued by	7623	
Calibrator SPL @ STP	94.03	dB Calibration reference sound pressure level
Calibrator frequency	1001.90	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Wind Shield WS-10

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.57	22.06	± 0.20 °C
Humidity	37.2	34.0	± 3.00 %RH
Ambient Pressure	100.26	100.23	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.2	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB

Microphones replaced with electrical input device - UR = Under Range Indicated

Weighting	A	C	Z
	10.7	15.5	20.7
	dB	dB	dB
	UR	UR	UR

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12, of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

R 2

Additional Comments

None



CERTIFICATE OF CALIBRATION

Date of Issue: 17 September 2015

Certificate Number: TCRT15/1254

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

M. Breslin []

K. Mistry []

J. Harriman [✓]

Customer
Parsons Brinckerhoff Ltd
Amber Court
William Armstrong Drive
Newcastle Business Park
Newcastle upon Tyne
NE4 7YQ

Order No. 87404

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00832043
Rion	Firmware		1.5
Rion	Pre Amplifier	NH-25	32071
Rion	Microphone	UC-59	05210
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES **Approval Number** 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 16 September 2015

ANV Job No. TRAC15/09134

Date Calibrated 17 September 2015

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	18 September 2013	TCRT13/1292	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.



CERTIFICATE OF CALIBRATION

Date of Issue: 17 September 2015

Certificate Number: TCRT15/1254

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustic Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

M. Breslin []

K. Mistry []

J. Harriman [✓]

Customer
Parsons Brinckerhoff Ltd
Amber Court
William Armstrong Drive
Newcastle Business Park
Newcastle upon Tyne
NE4 7YQ

Order No. 87404

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NL-52	00632043
	Rion	Firmware		1.5
	Rion	Pre Amplifier	NH-25	32071
	Rion	Microphone	UC-59	05210
	Rion	Calibrator	NC-74	34536109
		Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests;

Type Approved to IEC 61672-1:2002 YES **Approval Number** 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 16 September 2015

ANV Job No.

TRAC15/09134

Date Calibrated 17 September 2015

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	18 September 2013	TCRT13/1292	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT15/1254

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable	N/A	
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	15 September 2015	
Calibrator cert. number	UCRT15/1239	
Calibrator cal cert issued by	ANV Measurement Systems	
Calibrator SPL @ STP	94.03	dB Calibration reference sound pressure level
Calibrator frequency	1001.86	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Wind Shield WS-10

Note - If a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.89	22.94	± 0.20 °C
Humidity	49.4	49.1	± 3.00 %RH
Ambient Pressure	98.81	98.92	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.3	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than N/A dB A Weighting

Uncertainty of the microphone installed self generated noise ± N/A dB

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A	C	Z
	10.5	15.3	20.9
	dB	dB	dB
	UR	UR	UR

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

Additional Comments

None

R 1



CERTIFICATE OF CALIBRATION

Date of Issue: 06 September 2016

Certificate Number: TCRT16/1239

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustic Noise and Vibration Ltd (trading as ANV Measurement Systems)

Page 1 of 2 Pages

Approved Signatory

M. Breslin []

K. Mistry [✓]

J. Harriman []

Customer
WSP Environmental Ltd
WSP UK Ltd
3rd Floor, Kings Orchard
1 Queen Street
Bristol
BS2 0HQ

Order No. 20030801

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NL-52	01021292
	Rion	Firmware		1.7
	Rion	Pre Amplifier	NH-25	21334
	Rion	Microphone	UC-59	04348
	Rion	Calibrator	NC-74	34536109
		Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 05 September 2016

ANV Job No. TRAC16/09148

Date Calibrated 06 September 2016

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	24 January 2013	TCRT13/1020	ANV Measurement Systems

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CERTIFICATE OF CALIBRATION



Certificate Number

TCRT16/1239

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable	N/A	
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	05 September 2016	
Calibrator cert. number	UCRT16/1277	
Calibrator cal cert issued by	ANV Measurement Systems	
Calibrator SPL @ STP	94.01	dB Calibration reference sound pressure level
Calibrator frequency	1001.92	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Wind Shield WS-10

Note - If a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.34	22.72	± 0.20 °C
Humidity	42.5	41.3	± 3.00 %RH
Ambient Pressure	101.32	101.35	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.0	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than N/A dB A Weighting

Uncertainty of the microphone installed self generated noise ± N/A dB

Microphone replaced with electrical input device - UR = Under Range Indicated

Weighting	A	C	Z
	10.9	15.6	20.9
	dB	dB	dB
	UR	UR	UR

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11. of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

Additional Comments

Prior to calibration, instrument's main PCB was replaced.

R 1



CERTIFICATE OF CALIBRATION



Date of Issue: 10 January 2017

Certificate Number: UCRT17/1010

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustic Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory
M. Breslin [] K. Mistry [] J. Hamman []

Customer WSP Environmental Ltd
 3rd floor
 Kings Orchard
 1 Queen Street
 Bristol
 BS2 0HQ

Order No. 20038807
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	01021291
Rion	Firmware		1.8
Rion	Pre Amplifier	NH-25	21333
Rion	Microphone	UC-59	04347
Rion	Calibrator	NC-74	35125825
	Calibrator adaptor type if applicable:		NC-74-002

Performance Class 1

Test Procedure TP 2 SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2008 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 09 January 2017

ANV Job No. UKAS17/01002

Date Calibrated 10 January 2017

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	<i>Dated</i>	<i>Certificate No.</i>	<i>Laboratory</i>
	15 January 2015	17762	Campbell Associates

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CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 7623

Certificate Number

UCRT17/1010

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable	N/A	
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	10 January 2017	
Calibrator cert. number	UCRT17/1008	
Calibrator cal cert issued by	7623	
Calibrator SPL @ STP	93.99	dB Calibration reference sound pressure level
Calibrator frequency	1001.92	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Wind Shield WS-10

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.92	22.92	± 0.20 °C
Humidity	36.4	35.1	± 3.00 %RH
Ambient Pressure	100.02	100.07	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.1	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than N/A dB A Weighting

Uncertainty of the microphone installed self generated noise ± N/A dB

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A	C	Z
	10.4	15.3	21.0
	dB	dB	dB

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

Additional Comments

None

R 1



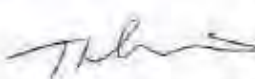
CERTIFICATE OF CALIBRATION



Date of Issue: 20 June 2016

Certificate Number: UCRT16/1202

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk

Page 1 of 2 Pages
Approved Signatory
 M. Breslin [] K. Mistry [] J. Harriman [✓]

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer WSP Environmental Ltd
3rd Floor
Kings Orchard
1 Queen Street
Bristol
BS2 0HQ

Order No. 20026175

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Rion	Calibrator	NC-74	35173440

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. UKAS16/06122

Date Received 17 June 2016

Date Calibrated 20 June 2016

Previous Certificate

Dated	17 June 2015
Certificate No.	1506353
Laboratory	AV Calibration

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 7623

Certificate Number

UCRT16/1202

Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	Manufacturer	Type
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

94.01 $\pm$ 0.10 dB ref 20 μ Pa

Functional Tests and Observations

The frequency of the sound produced was	1002.78 Hz	$\pm$	0.13 Hz
The total distortion was	1.28 %	$\pm$	6.7 % of Reading

During the measurements environmental conditions were

Temperature	23	to	24	°C
Relative Humidity	43	to	51	%
Barometric Pressure	99.9	to	100.1	kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

END

Note:

Calibrator adjusted prior to calibration?	NO
Initial Level	N/A dB
Initial Frequency	N/A Hz

Additional Comments

None

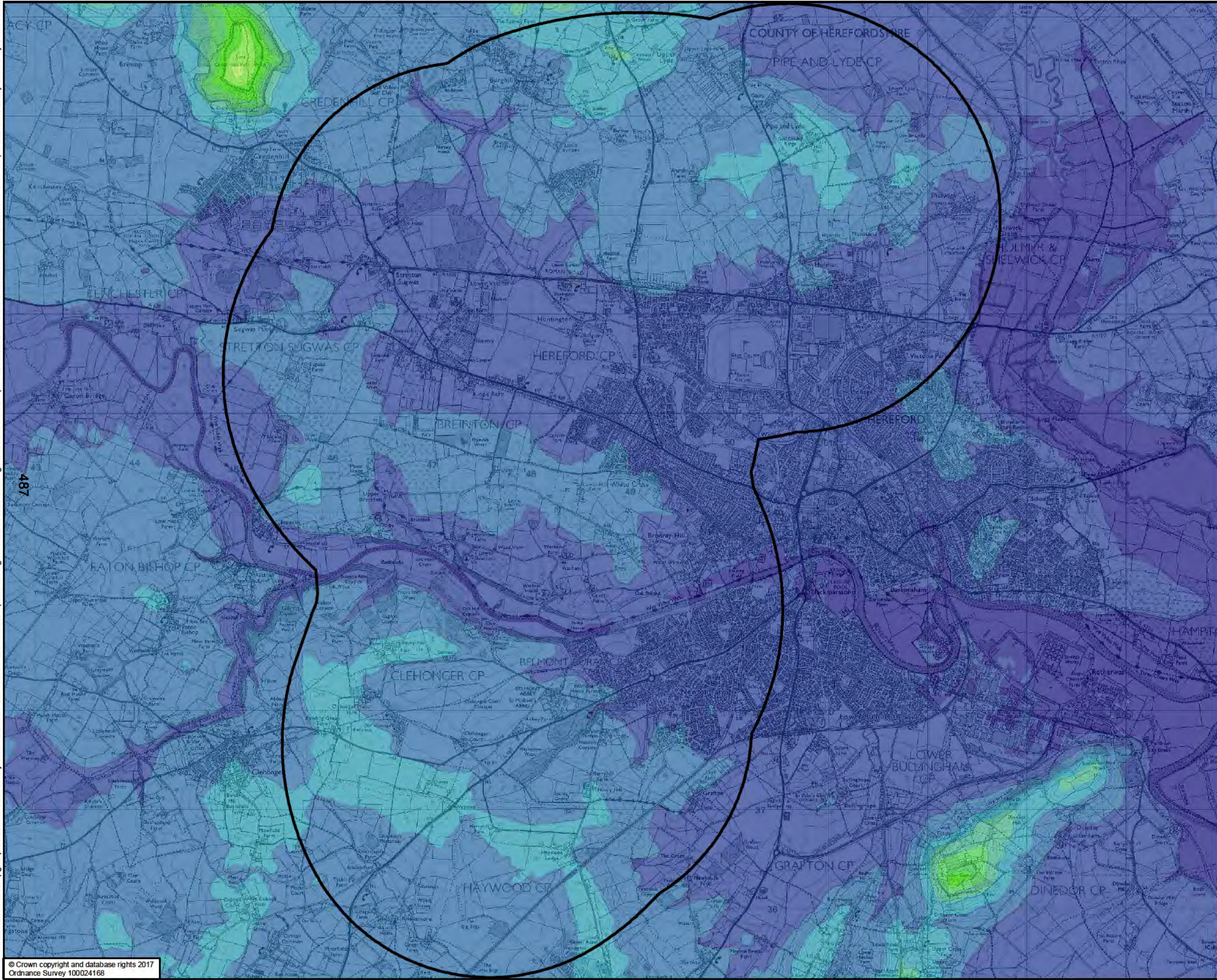
Calibrated by: A Patel

R 1

Appendix 7-1

LANDSCAPE FIGURES

File name: \\uk.wspgroup.com\central data\Projects\70024065\70024065 - Hereford Transport Package\E Models and Drawings\GISMxd\Landcape\70024065-WSP-XX-XX-DR-EN-00087.mxd
printed on: 04 May 2018 by: DeSouza



2km study area from Core Strategy Area

Topography

- 0-41m AOD
- 50-75m AOD
- 75-100m AOD
- 100-125m AOD
- 125-150m AOD
- 150-175m AOD
- 175-200m AOD
- 200-215m AOD
- 215-250m AOD

DRAWING STATUS: FOR INFORMATION ONLY

wsp

Kings Orchard, 1 Queen St, Bristol, BS2 0HQ
T +44 (0)1179 306200

CLIENT: **Balfour Beatty** **Herefordshire Council**
Working for Herefordshire

SITE/PROJECT: HEREFORD TRANSPORTATION PACKAGE:
HEREFORD BYPASS

TITLE: FIGURE 7-1
TOPOGRAPHY

SCALE @ A3 1:35,000	CHECKED CP	APPROVED MT
PROJECT NO 70024065	DESIGNED KM	DRAWN JSdS
DATE 04/05/2018		REV P01

DRAWING No: 70024065-WSP-XX-XX-DR-EN-00087

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File name: \\uk.wspgroup.com\central data\Projects\70024065 - Hereford Transport Package\Drawings\GIS\Map\Short List Options\GIS\Map\Short List Options\70024065-WSP-XX-XX-DR-EN-00104.mxd
printed on: 14 June 2018 by: DeSouzaJ



Proposed Scheme - Orange Option
Proposed Scheme - Cyan Option
Proposed Scheme - Yellow Option
Proposed Scheme - Red Option
Proposed Scheme - Olive Option
Proposed Scheme - Black 1 Option
Proposed Scheme - Black 2 Option

Arbicultural Survey Results

- Ancient tree
- Notable tree
- Veteran tree
- Ancient Woodland
- Category A Tree Groups
- Traditional Orchard
- Hereford Listed Traditional Orchard
- Noise Action Planning
- National Trust Ownership boundary
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens
- Local Nature Reserve (Eng)
- Site of Special Scientific Interest (Eng)
- Special Area of Conservation (Eng)
- Ponds

GCN Presence/absence

- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Grade II*
- Bridleway
- Byway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

ereford

DRAWING STATUS

FOR INFORMATION ONLY

Kings Orchard, 1 Queen St, Bristol, BS2 0HQ
T +44 (0)1179 306200

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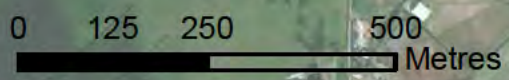
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FIGURE 7-2 ENVIRONMENTAL
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Proposed Scheme - Orange Option

Proposed Scheme - Cyan Option

Proposed Scheme - Yellow Option

Proposed Scheme - Red Option

Proposed Scheme - Olive Option

Proposed Scheme - Black 1 Option

Proposed Scheme - Black 2 Option

Arbicultural Survey Results

Category A tree

Ancient tree

Notable tree

Veteran tree

Tree with preservation order

Ancient Woodland

Group of Trees with TPO

Traditional Orchard

Pippin Trust Orchard

Drovers Wood (Woodland Trust)

Hereford Listed Traditional Orchard

Noise Action Planning

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

PSCA - medium population

PSCA - small population

Scoped in - presence assumed

Scoped out - absence assumed

Greenbank Meadow

Site of Importance for Nature Conservation

Listed Buildings

Grade II

Scheduled Monument

Local Green Space

Bridleway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Source Protection Zone

Zone I - Inner Protection Zone

Zone II - Outer Protection Zone

Zone III - Total Catchment

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FIGURE 7-2 ENVIRONMENTAL
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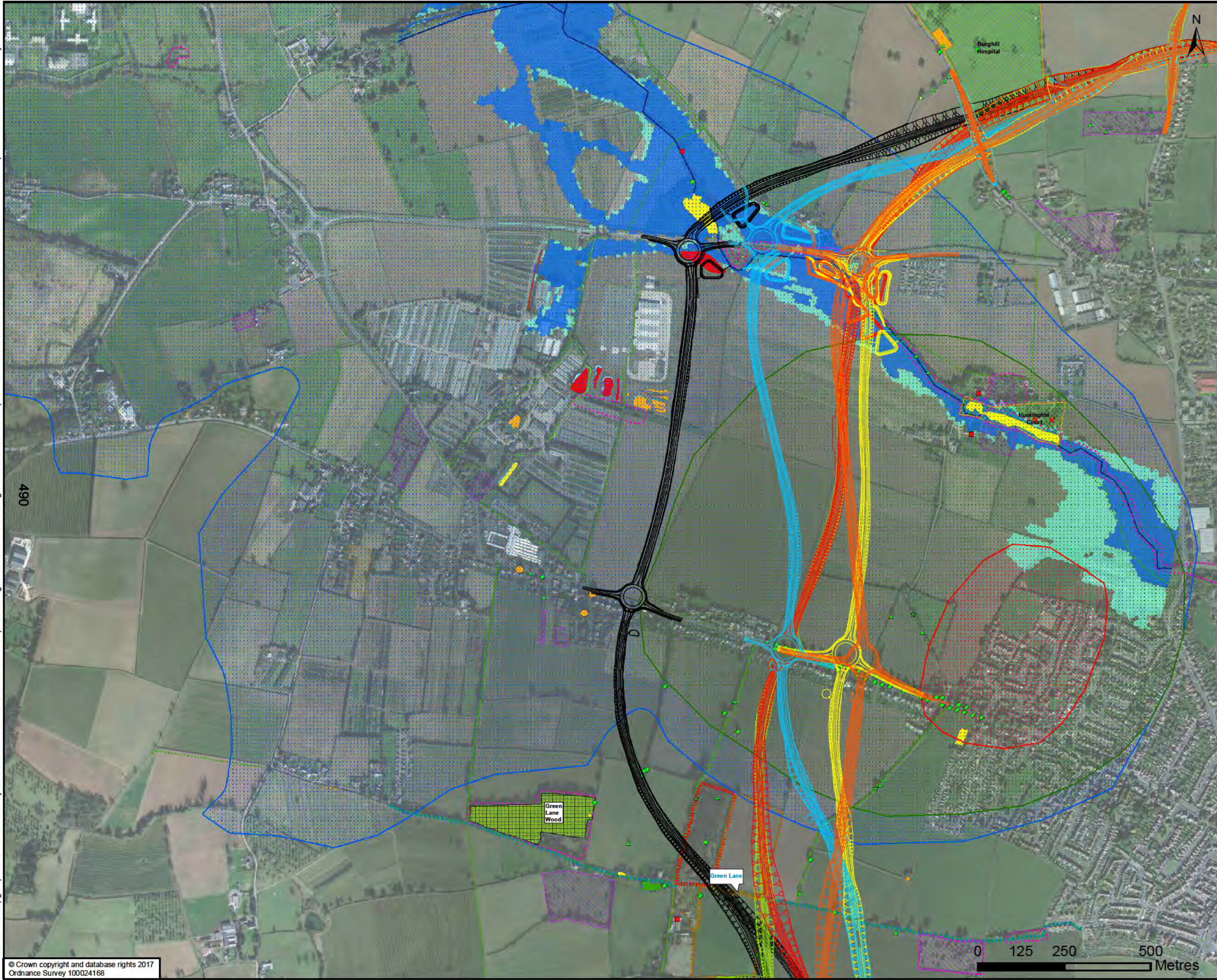
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Proposed Scheme - Orange Option

Proposed Scheme - Cyan Option

Proposed Scheme - Yellow Option

Proposed Scheme - Red Option

Proposed Scheme - Olive Option

Proposed Scheme - Black 1 Option

Proposed Scheme - Black 2 Option

Arboricultural Survey Results

Category A tree

Ancient tree

Notable tree

Veteran tree

Tree with preservation order

Ancient Woodland

Group of Trees with TPO

Traditional Orchard

Pippin Trust Orchard

Drovers Wood (Woodland Trust)

Hereford Listed Traditional Orchard

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Ponds

GCN Presence/absence

PA - absent

PSCA - medium population

PSCA - small population

Scoped in - presence assumed

Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

Grade II

Local Green Space

Bridleway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Source Protection Zone

Zone I - Inner Protection Zone

Zone II - Outer Protection Zone

Zone III - Total Catchment

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FIGURE 7-2 ENVIRONMENTAL
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Proposed Scheme - Orange Option
Proposed Scheme - Cyan Option
Proposed Scheme - Yellow Option
Proposed Scheme - Red Option
Proposed Scheme - Olive Option
Proposed Scheme - Black 1 Option
Proposed Scheme - Black 2 Option

Arboricultural Survey Results

- Category A tree
- Notable tree
- Veteran tree
- Group of Trees with TPO
- Traditional Orchard
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Bridleway
- Footpath
- Watercourse

Floodzone 3
Floodzone 2

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 7-2 ENVIRONMENTAL
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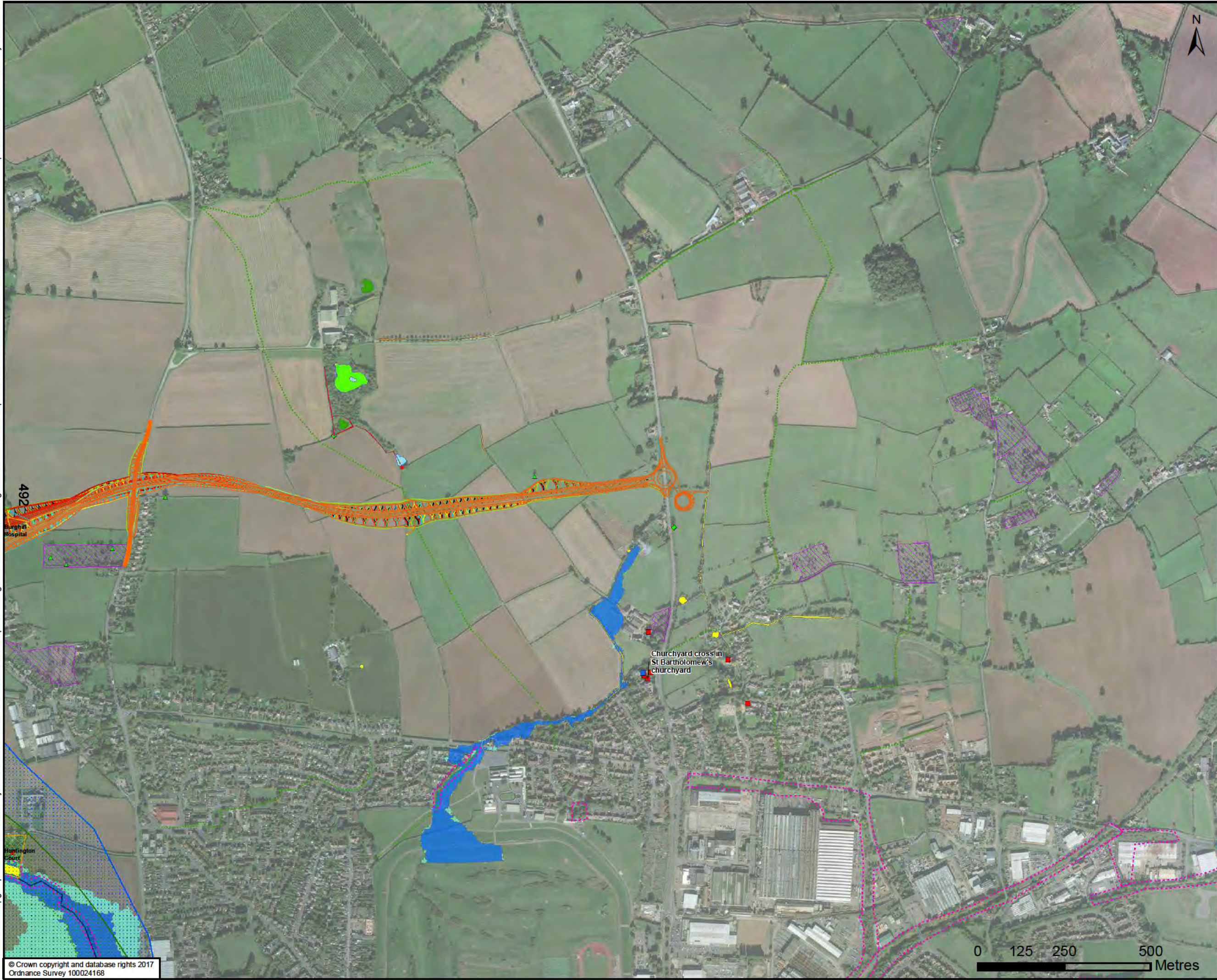
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Proposed Scheme - Orange Option

Proposed Scheme - Cyan Option

Proposed Scheme - Yellow Option

Proposed Scheme - Red Option

Proposed Scheme - Olive Option

Proposed Scheme - Black 1 Option

Proposed Scheme - Black 2 Option

Arboricultural Survey Results

Notable tree

Veteran tree

Traditional Orchard

Noise Action Planning Areas

Unregistered Parks and Gardens

Ponds

GCN Presence/absence

PA - absent

PSCA - medium population

PSCA - small population

Scoped in - presence assumed

Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

Grade I

Grade II

Scheduled Monument

Byway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Source Protection Zone

Zone I - Inner Protection Zone

Zone II - Outer Protection Zone

Zone III - Total Catchment

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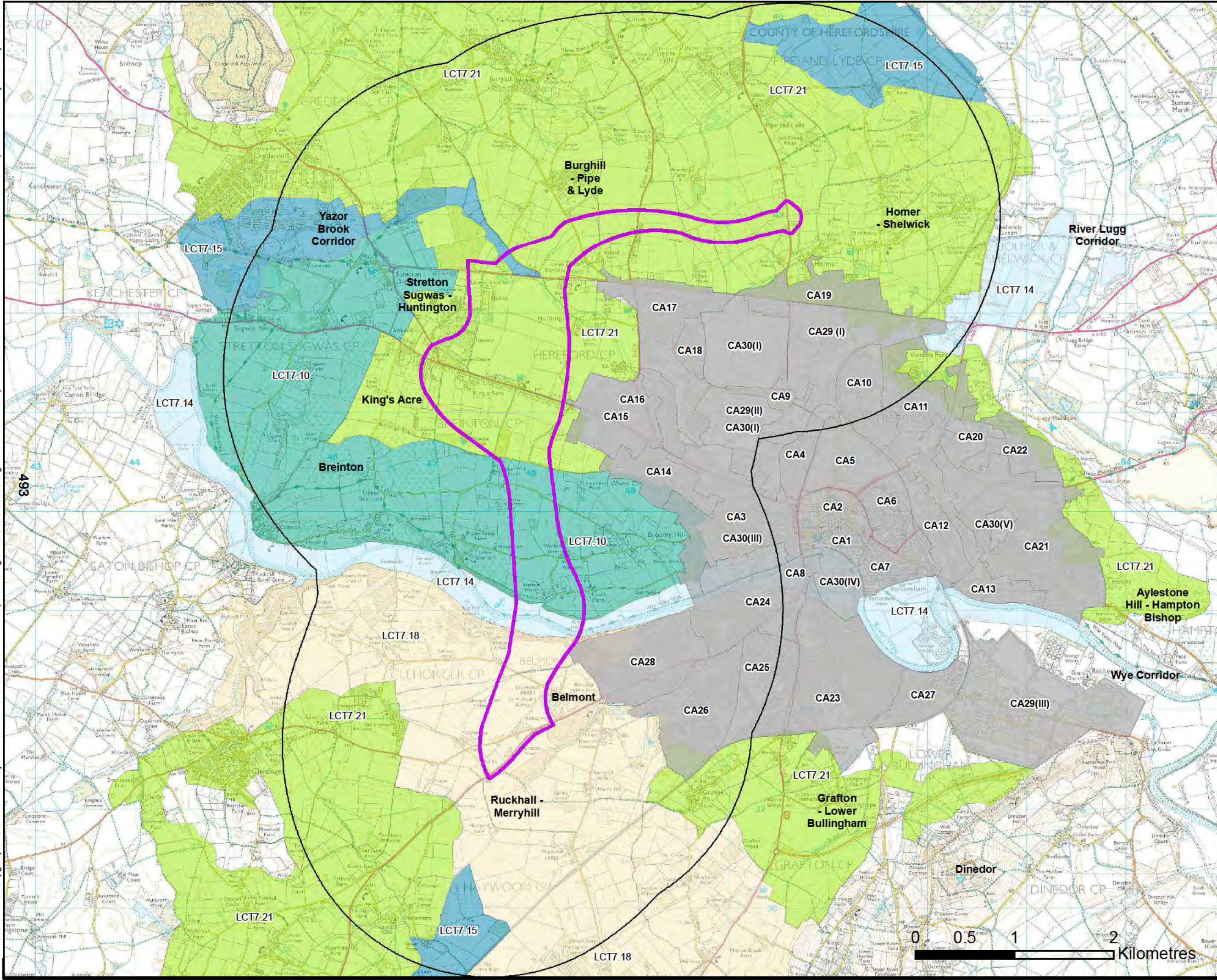
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Core strategy area

2km Study Area

Townscape character areas

Landscape Character Types

Urban

Principal timbered farmlands LCT 7.10

Riverside meadows LCT 7.14

Wet pasture meadows LCT 7.15

Wooded estate lands LCT 7.18

Principal settled farmlands LCT 7.21

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FIGURE 7-3
LANDSCAPE CHARACTER AREAS

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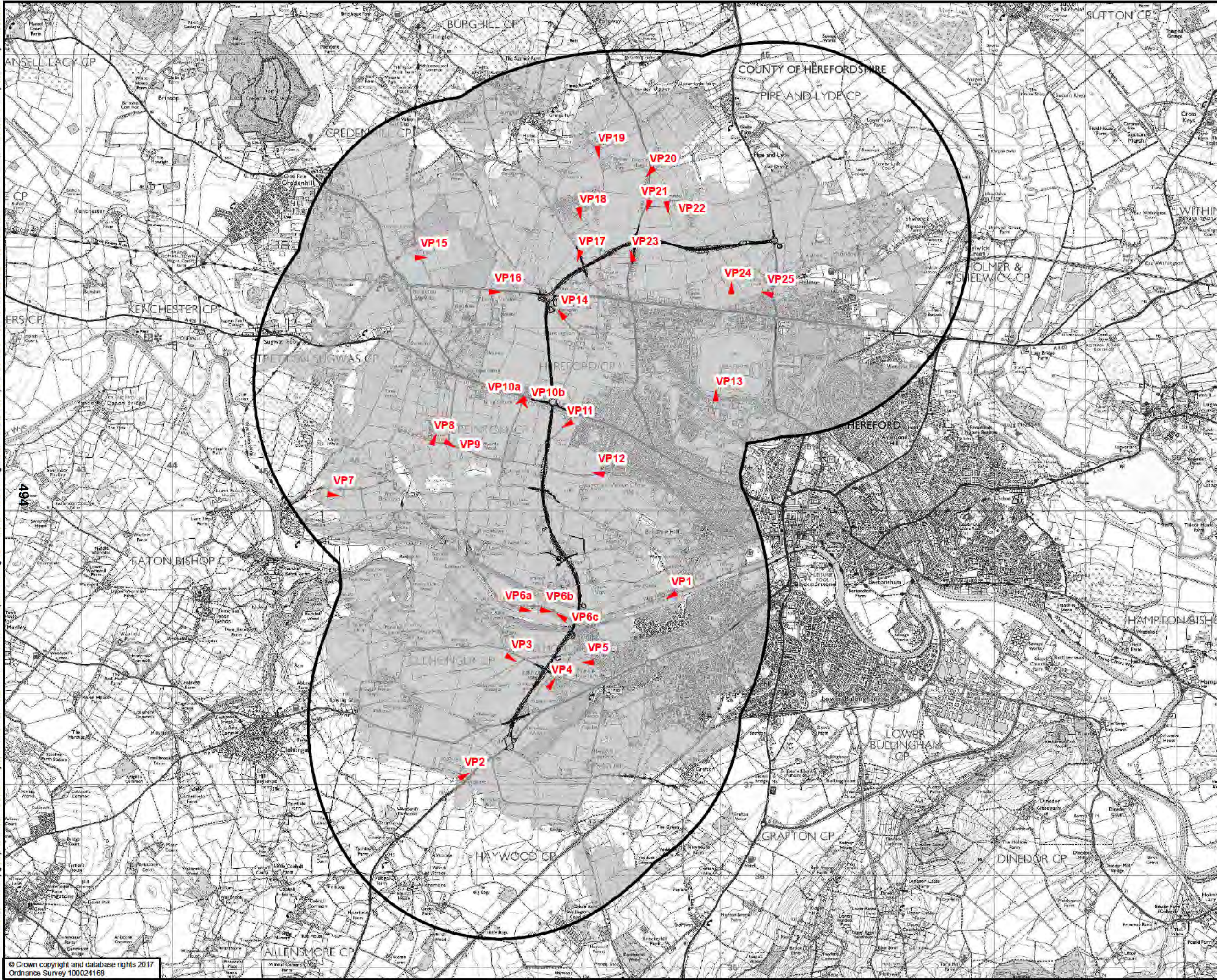
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Proposed Option - Orange Route

2km study area from Core Strategy Area

Viewpoints

Zone of Visual Influence. Area where the proposed scheme is potentially visible (does not take account of built form and vegetation). Observation height is considered to be 1.8m

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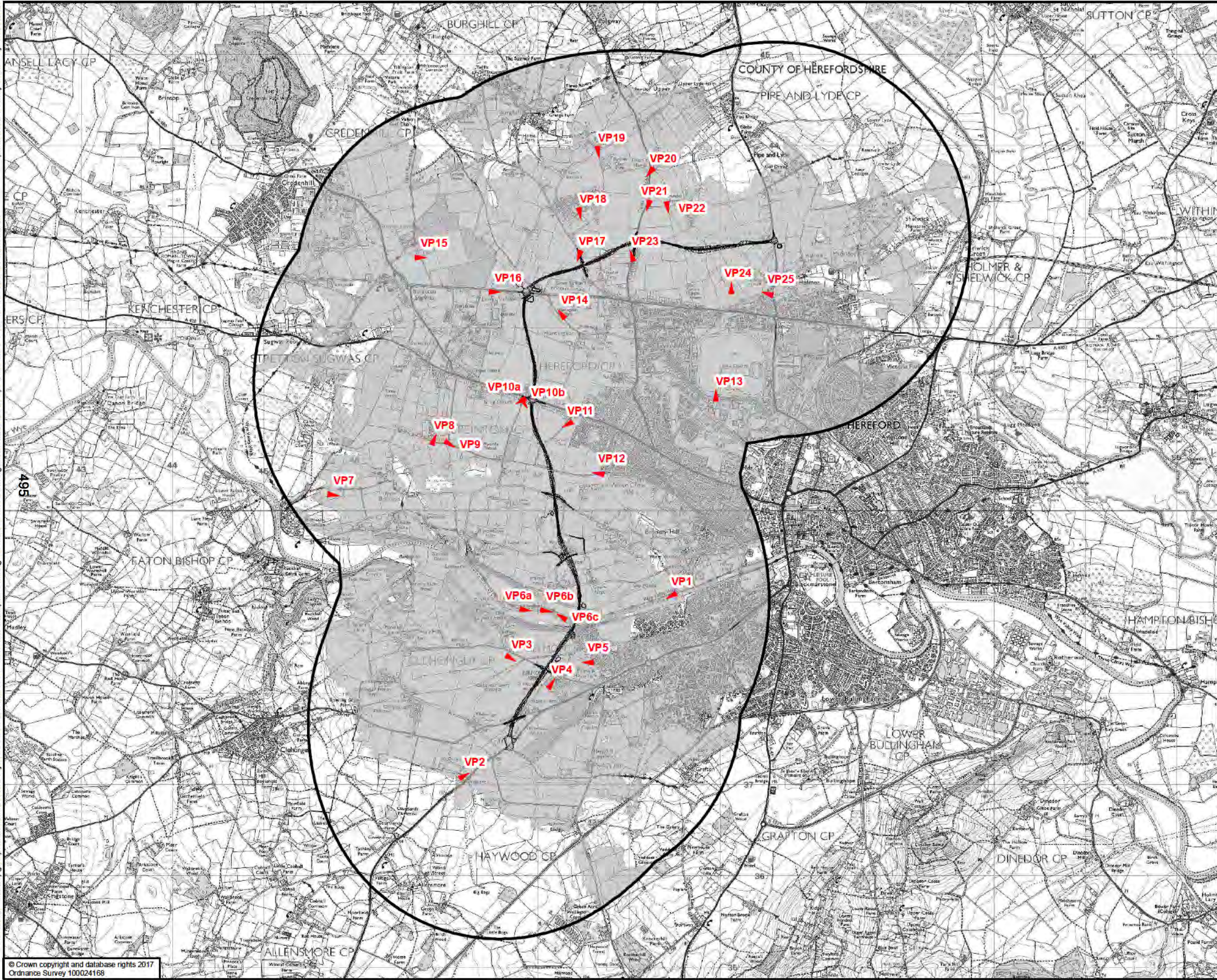
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ZONE OF VISUAL INFLUENCE, VIEWPOINT LOCATION AND PROPOSED ROUTE OPTION - ORANGE

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- Proposed Option - Cyan Route
- 2km study area from Core Strategy Area
- Viewpoints
- Zone of Visual Influence. Area where the proposed scheme is potentially visible (does not take account of built form and vegetation). Observation height is considered to be 1.8m

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FIGURE 7-5
ZONE OF VISUAL INFLUENCE,
VIEWPOINT LOCATION AND
PROPOSED ROUTE OPTION - CYAN

SCALE @ A3

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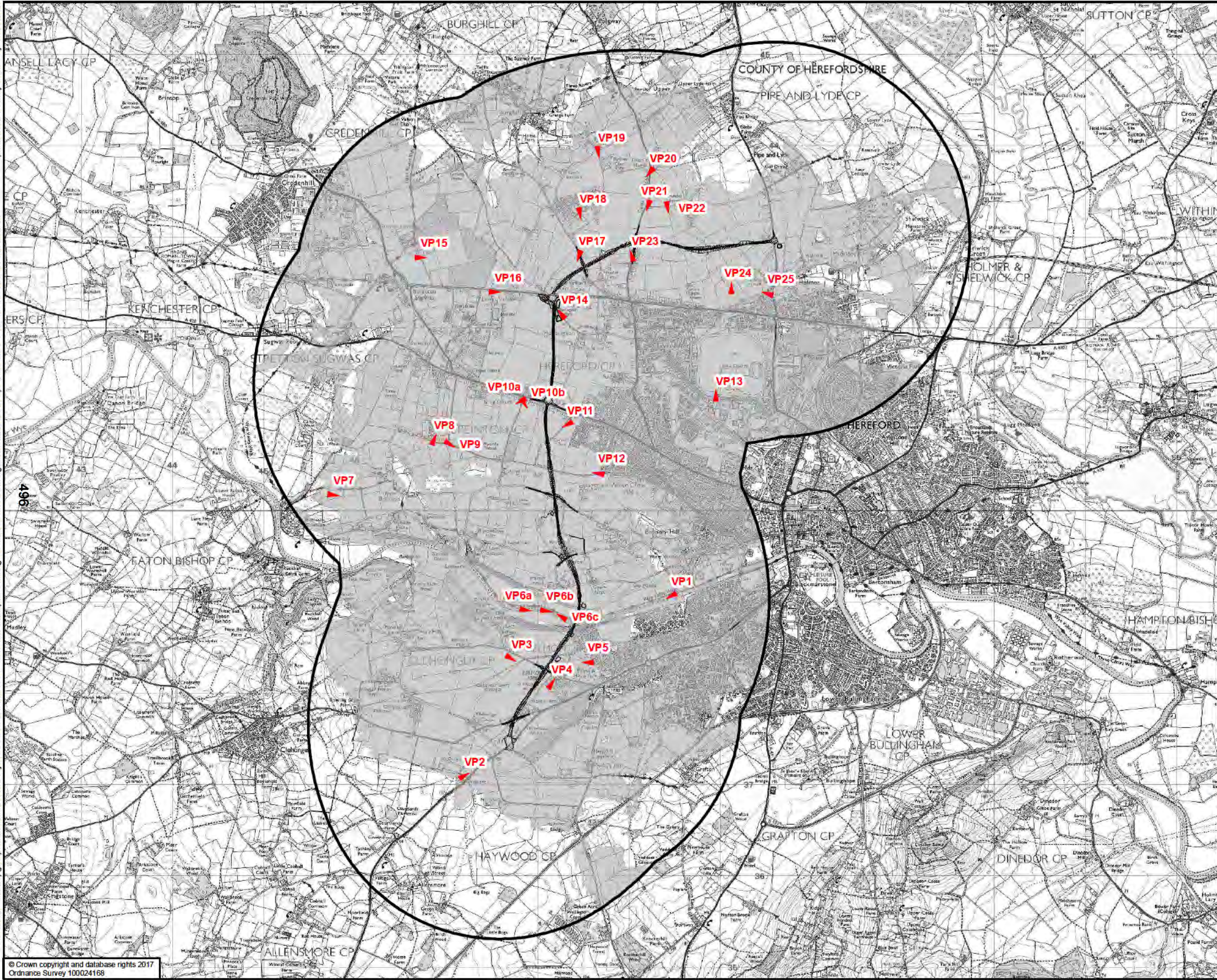
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- Proposed Option - Yellow Route
- 2km study area from Core Strategy Area
- Viewpoints
- Zone of Visual Influence. Area where the proposed scheme is potentially visible (does not take account of built form and vegetation). Observation height is considered to be 1.8m

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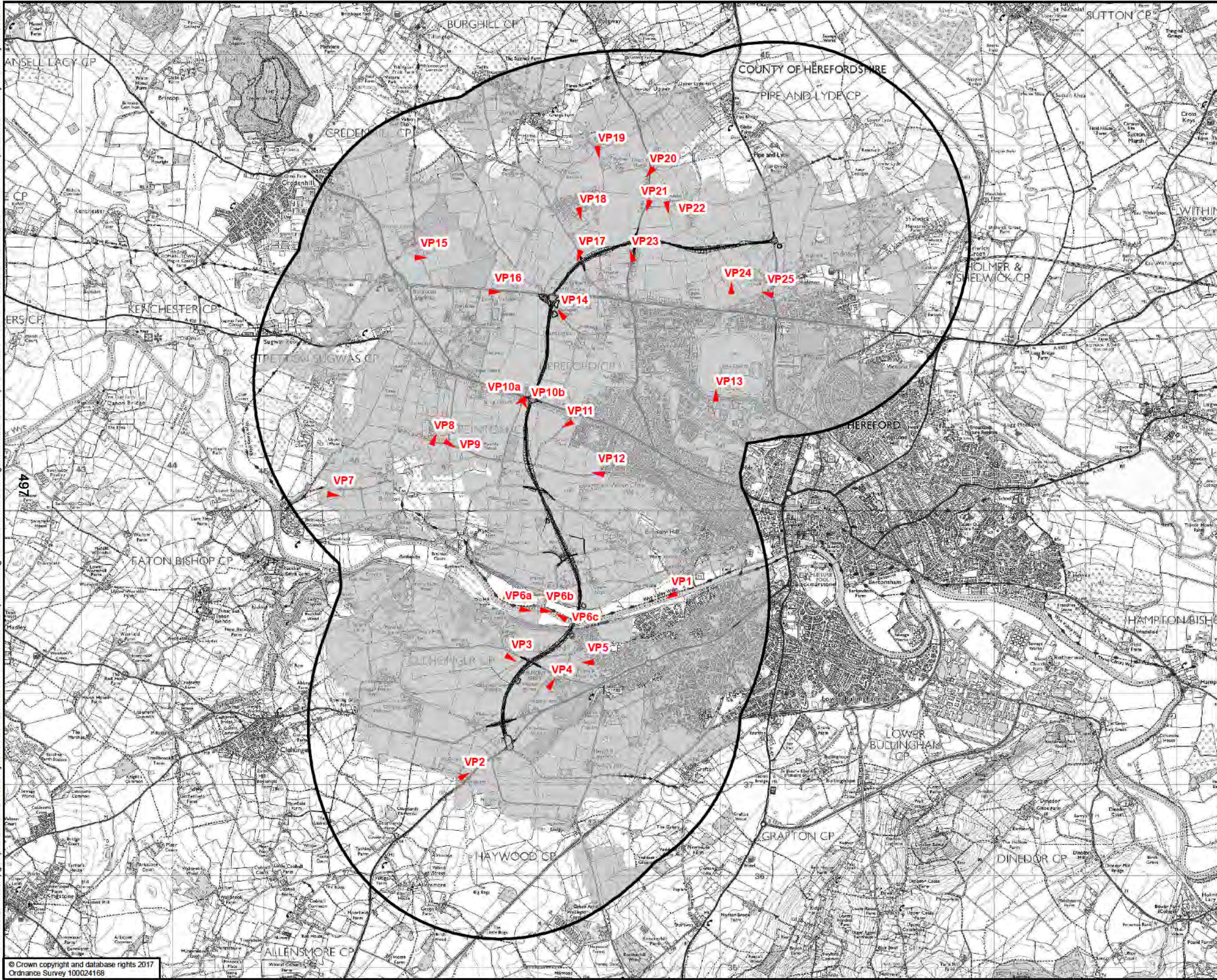
FIGURE 7-6
ZONE OF VISUAL INFLUENCE,
VIEWPOINT LOCATION AND
PROPOSED ROUTE OPTION - YELLOW

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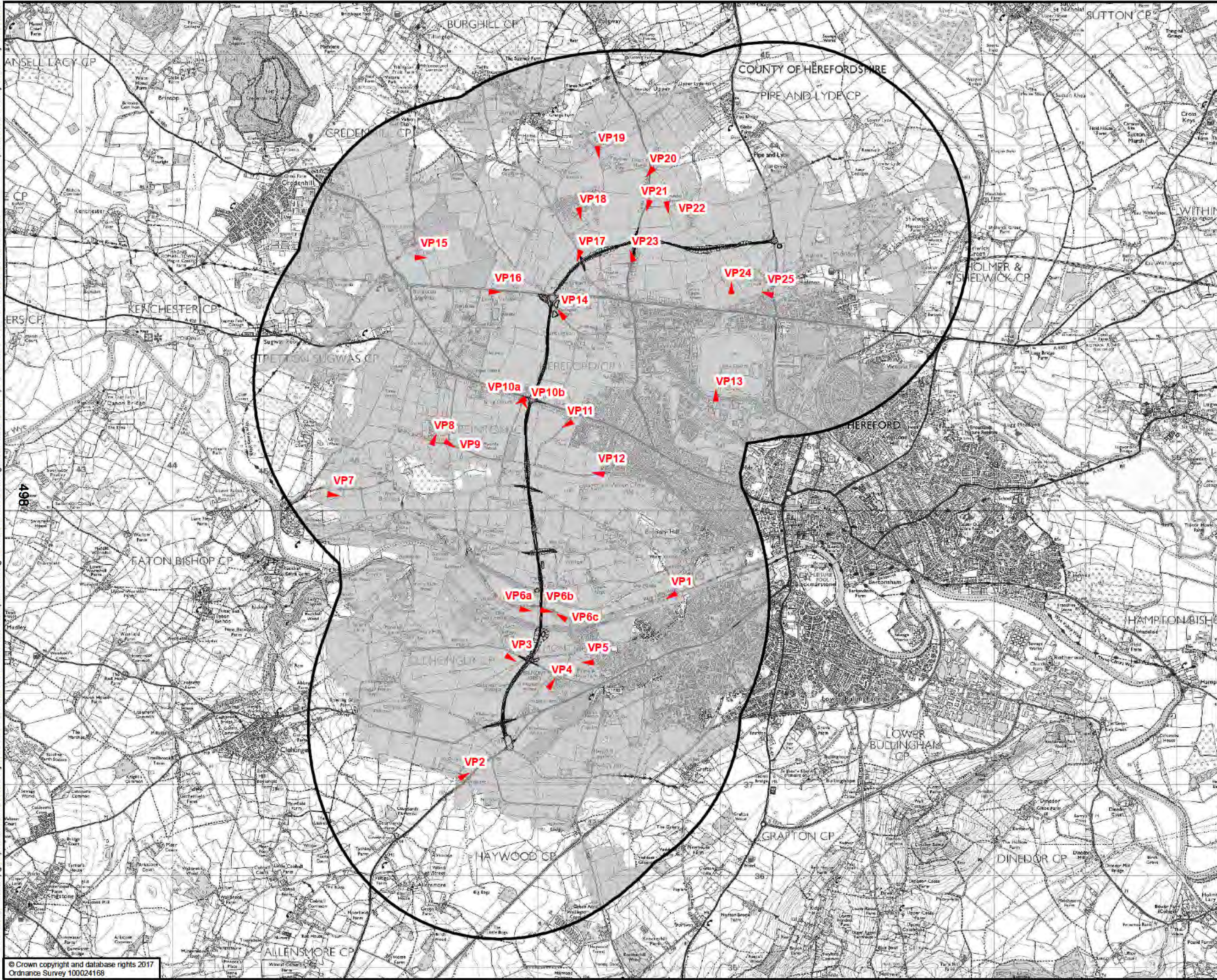
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- Proposed Option - Red Route
- 2km study area from Core Strategy Area
- Viewpoints
- Zone of Visual Influence. Area where the proposed scheme is potentially visible (does not take account of built form and vegetation). Observation height is considered to be 1.8m

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- Proposed Option - Olive Route
- 2km study area from Core Strategy Area
- Viewpoints
- Zone of Visual Influence. Area where the proposed scheme is potentially visible (does not take account of built form and vegetation). Observation height is considered to be 1.8m

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FIGURE 7-8
ZONE OF VISUAL INFLUENCE,
VIEWPOINT LOCATION AND
PROPOSED ROUTE OPTION - OLIVE

SCALE @ A3

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- Proposed Option - Black 1 Route
- 2km study area from Core Strategy Area
- Viewpoints
- Zone of Visual Influence. Area where the proposed scheme is potentially visible (does not take account of built form and vegetation). Observation height is considered to be 1.8m

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FIGURE 7-9
ZONE OF VISUAL INFLUENCE,
VIEWPOINT LOCATION AND
PROPOSED ROUTE OPTION - BLACK 1

SCALE @ A3

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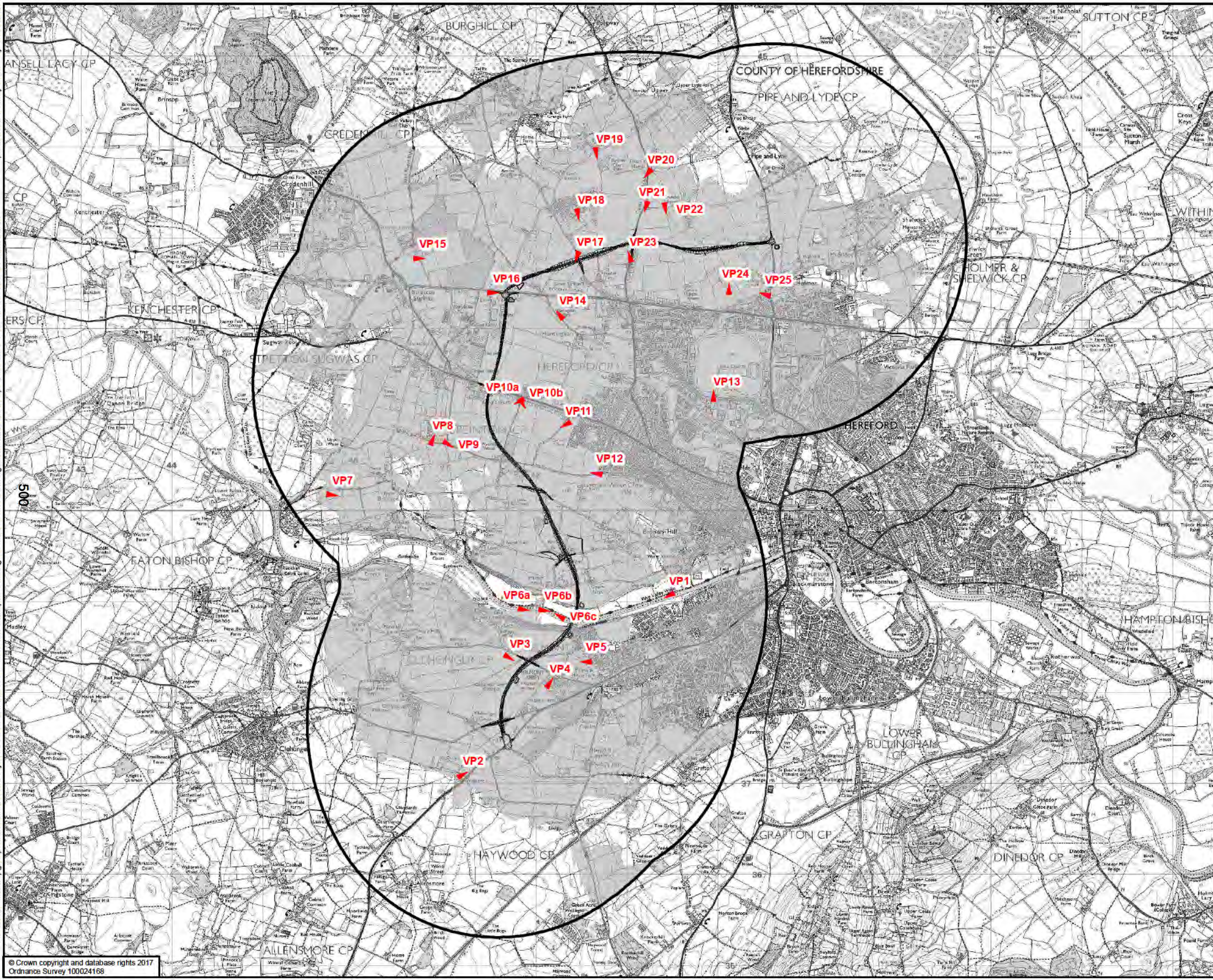
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Proposed Option - Black 2 Route

2km study area from Core Strategy Area

Viewpoints

Zone of Visual Influence. Area where the proposed scheme is potentially visible (does not take account of built form and vegetation). Observation height is considered to be 1.8m

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ZONE OF VISUAL INFLUENCE, VIEWPOINT LOCATION AND PROPOSED ROUTE OPTION - BLACK 2

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Viewpoint 1 - Wye Valley Walk view West.

Long distance views west from the Wye Valley Walk (long distance footpath). Gaps in hedgerows and field boundaries allow long views across a gently undulating landscape of agricultural fields bounded by low hedgerows, scattered trees and blocks of woodland. Glimpses of low distant hills are visible beneath a wide expanse of sky above. The view is representative of those experienced by users of the local PRow network and Wye Valley Walk. It is an open, expansive view that is largely free of built elements or other indicators of modern development.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
REFER TO APPENDIX 7-3 FOR DESCRIPTION OF VISUAL EFFECTS.

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FIGURE 7-11
VIEWPOINT 01
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Viewpoint 2 -View North East from Public Rights of Way (PRoW) bottom of garden of property near Dunan.

A wide, expansive view from a slightly elevated PRoW, looking across agricultural fields towards low rolling distant hills. The A465 can be seen snaking away to the right of the view, with blocks of woodland beyond (Newton Coppice and Hayleasow Wood). A group of white-washed cottages are clearly visible in the centre of the view (in the near to middle distance) complementing the largely rural scene with neat scattered dwellings. This view is representative of users of the local PRoW network and residential receptors at Dunan.

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REFER TO APPENDIX 7-3 FOR DESCRIPTION OF VISUAL EFFECTS.

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Viewpoint 3 - View South East from entrance to Belmont Hotel.

A peaceful, rural view of managed parkland containing mature specimen trees edged by mown grass and a country lane with hedgerow. Glimpses of gently rolling hills and woodland blocks add to the rural character and tranquillity of the view, whilst reducing the intimate feel. The tower of Belmont Abbey provides a focal point and landmark feature in the centre of the view. This view is representative of users of the local road network and visitors to Belmont Hotel as well as being located on the edge of the Unregistered Park and Garden of Belmont.

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
REFER TO APPENDIX 7-3 FOR DESCRIPTION OF VISUAL EFFECTS.

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Viewpoint 4 - View North East from St. Michaels Belmont Abbey churchyard.

An historic, peaceful and rural view across a graveyard and entrance porch towards agricultural fields and scattered views. Long distance views are largely restricted by intervening woodland blocks in the middle distance, creating a slightly more intimate view. This view is representative of visitors and users of the historic Belmont Abbey and Unregistered Park and Garden.

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
REFER TO APPENDIX 7-3 FOR DESCRIPTION OF VISUAL EFFECTS.

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FIGURE 7-11 VIEWPOINT 04 PAGE 4 OF 28			
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Viewpoint 5 - View West from edge of Belmont Housing.

Representative of residential receptors in Belmont housing estates, this wide, open but rural view looks across managed parkland with mature scattered trees. The tower of St Michaels Abbey is clearly visible as a landmark above a copse of trees in the centre of the view. A glimpse of distant rolling hills in the centre of the view adds to the open expansive feel.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
REFER TO APPENDIX 7-3 FOR DESCRIPTION OF VISUAL EFFECTS.

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FIGURE 7-11 VIEWPOINT 05 PAGE 5 OF 28			
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Viewpoint 6a - View east from Wye Valley South West of Warham House.

A wide view of meadow land, and the River Wye, the relatively flat landscape being contained by blocks of trees (Wye Coppice/ Rough Coppice) and the slight rise of the wooded valley side edging the Unregistered Park and Garden of Belmont and Belmont golf course. The wide river, edged to the banks with trees, shrubs and grassland vegetation, creates a tranquil, rural character, only partially disrupted by a post and barbed wire fence. The woodland helps create a more intimate, enclosed landscape associated with the former historic parkland around Warham House and Belmont Park. The view is representative of views experienced by users of the Wye Valley Walk (long distance footpath), river and parkland.

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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FIGURE 7-11 VIEWPOINT 06a PAGE 6 OF 28			
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Viewpoint 6c - View West towards footpath junction Wye Valley walk.

A relatively contained view with thick vegetation and woodland (Wye Coppice/ Rough Coppice) and the slight rise of the wooded valley sides edging the Unregistered Park and Garden of Belmont/ Belmont golf course and Warham House. The river is thickly edged with vegetation, partially obscuring it from the view, and creating an increased sense of enclosure at this point. This is partially offset by the wide grassland and views of more distant trees allowing linear views along the river corridor. The view is representative of views experienced by users of the Wye Valley Walk (long distance footpath), river and parkland.

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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FIGURE 7-11 VIEWPOINT 06c PAGE 8 OF 28			
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Viewpoint 7 - View East from Wye Valley walk top of hill West of Upper Breinton.

A wide, extensive, elevated view representative of users of the PRoW network. The view extends across one huge open field bounded by a low hedgerow, metal access gates and occasional hedgerow tree and looks across the valley towards opposite low rolling hills. The predominant sense of character is of a rural landscape of agricultural fields, small settlements and hamlets, scattered trees and large blocks of woodland, creating a typical pastoral English landscape in the middle/ far distance, albeit modernised in the foreground by metal field gates, amalgamated fields and improved grassland. The tower of Belmont Abbey is visible in the distance against a backdrop of fields and woodland.

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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FIGURE 7-11
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Viewpoint 8 - View North East from Green Lane Park Home Estate (caravan park).

An enclosed view representative of users of the Green Lane Park Home Estate and Green Lane. The view looks across a large agricultural field edged with hedgerows and scattered hedgerow trees. Woodland within Green Lane Wood and trees adjacent to Breinton bridleway 2A further contribute to containment of views although a gap in the hedgerow allows glimpsed longer distance views of adjacent fields. The view has a largely rural and tranquil feel but becoming suburbanised by the presence of park home caravans, fences and telephone poles and wires.

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FIGURE 7-11 VIEWPOINT 08 PAGE 10 OF 28			
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Viewpoint 9 - View South East from Public Rights of Way junction Green Lane Wood.

Another enclosed view representative of users of the PRow network and Green Lane. The view looks across a wide agricultural field containing telephone poles and wires and edged with tall hedgerows, scrub and scattered trees. Woodland within Green Lane Wood restricts wider views. Orchard trees are clearly visible in the middle distance beyond the mast adding local distinctive and historic character to the view. The view has a largely rural and fairly tranquil character.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 10a - View South West from Public Rights of Way (PRoW) opposite Bay Horse Pub.

A long view across an arable field edged with trees, hedgerows and shrubs. The view is terminated by tall trees and hedgerows across a flat landscape. The character is predominantly rural. It is representative of residential receptors along the A438, visitors to the Bay Horse Pub and users of the PRoW network.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 10b - View South East into field South of Bay Horse Inn.

A long view across an arable field edged with trees, hedgerows and shrubs. The topography allows for slightly longer views across further agricultural fields with scattered trees and hedgerows. The rear of properties along Kings Acre Road are also visible. The view is relatively wide and quite expansive, but predominantly rural in character. Suburbanising features include telephone poles/ exchanges and wires as well as garden boundary hedges/fences and sheds. The view is representative of residential properties along Kings Acre Road and users of the PRow network.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
REFER TO APPENDIX 7-3 FOR DESCRIPTION OF VISUAL EFFECTS.

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Viewpoint 11 - View South West from Public Rights of Way (PRoW) behind Kings Court Housing.

514 A wide, fairly expansive view across one very large arable field edged with trees, hedgerows and shrubs as well as houses overlooking from Kings Court and Kings Acre Road. Hedgerows and scattered trees contribute to the rural character of the view. Urban edge features including rear garden boundaries and houses introduce a suburbanising effect into the view. The view is representative of residential properties along Kings Acre Road and users of the PRoW network (Breinton Bridleway 3).

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 12 - View West from edge of housing Public Rights of Way (PRoW) White Cross.

The view is representative of views from residential properties in White Cross and users of the PRoW network (Green Lane bridleway). A wide, expansive long distance view looking across a large arable field towards distant rolling hills. Orchards are visible in the middle distance, along with housing estates, hedgerows and scattered trees. The view is largely a rural one with limited detracting features.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
REFER TO APPENDIX 7-3 FOR DESCRIPTION OF VISUAL EFFECTS.

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Viewpoint 13 - View South from Northern edge of Racecourse sports field.

A wide, open view across the race track towards distant low-rising hills. The foreground is occupied with the turf track and railings, with buildings and urbanising features including lighting, in the middle distance. The back drop of the view is of agricultural hills on gentle low-rise hills, edged with trees and hedgerows. Buildings are also distinctive features on the skyline, along with lighting columns. This view is representative of visitors and users of the racecourse.

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 15 - View East from Public Right of Way (PRoW) near Priory Hotel.

A view taken between hedgerows across a large grass field, edged with mature trees and hedgerows. Long distance views across the landscape are visible beyond the hedgerows and trees in the middle of the view. The view is predominantly a rural, tranquil view with few detracting features. Glimpses of buildings and lighting columns are visible in the distance. The view is representative of users of the PRoW network and visitors and residents at the Priory Hotel.

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 16 - View East from Public Rights of Way (PRoW) entrance to Livestock Market.

This view is representative of users of the A4103 Roman Road, local PRoW network and users of the livestock market. The view looks down the characteristically straight A4103 Roman Road, with pavements and cycle lane, lighting columns and crossing points creating urbanising elements in the view. A managed landscape to the right of the view towards the livestock markets incorporates maturing trees and hedgerows and grassed fields, with low-rise buildings and bunds in the middle distance largely blocking views beyond. To the left of the view, scrub land, arable fields and woodland contributes to the largely rural character of the view, with occasional housing visible in the distance adjacent to the road.

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 17 - View South West from gateway Public Rights of Way (PRoW) Tillington Road.

A wide view across large arable fields edged with hedgerows and scattered trees. Glimpsed views of long-distance rolling hills visible beyond the foreground topography. Telegraph poles and wires and metal 5-bar gates slightly detract from the otherwise rural and peaceful views. The view is typical of users of the PRoW network and Tillington Road.

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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FIGURE 7-11
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Viewpoint 18 - View South from shared open space Burghill Hospital development.

A view across the Unregistered Park and Garden grounds of the former Burghill hospital and representative of residential receptors and users of the shared open space within the former Burghill hospital complex. The wide but partially contained rural view looks across a managed lawn area with mature specimen parkland trees, newly planted standard trees and grazing land beyond edged with further trees and hedgerows. The middle distance is occupied with a rolling rural landscape broken up by telegraph poles and wires, agricultural buildings and scattered housing.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
REFER TO APPENDIX 7-3 FOR DESCRIPTION OF VISUAL EFFECTS.

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Viewpoint 19 - View South from gateway in front of Burlton Court.

A wide ranging view across a largely flat arable field edged with hedgerow, hedgerow trees and scrub. Long distance views towards distant wooded hills are glimpsed across a gently rolling agricultural landscape. The view is rural, fairly open and largely un blighted by detracting features. Roof tops of dwellings within the former Burghill hospital redevelopment as well as those within Burlton Court Farm are visible below the skyline in the valley. Canon Pyon Road is not readily visible in the view. The view is representative of users of the PRoW network and Burlton Court.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
REFER TO APPENDIX 7-3 FOR DESCRIPTION OF VISUAL EFFECTS.

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Viewpoint 20 - South West from Eltons Marsh, field gate.

A wide expansive view across a large, arable field edged with hedgerow, hedgerow trees and scrub. Long distance views towards distant hills are visible across a gently rolling agricultural landscape. The view is rural, open and largely unblighted by detracting features. Roof tops of dwellings within the former Burghill hospital are visible below the skyline and largely screened by vegetation and trees. Canon Pyon Road is not readily visible in the view. The view is representative of users of the PRow network and Canon Pyon Road

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REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 21 - View South from Arundel Farm Junction.

A wide, expansive view across un-bounded arable field, tarmacked farm access and a wider agricultural landscape. The foreground and middle distance are largely flat, with views beyond towards distant row-rise hills. Hedgerows and scattered trees foreshorten parts of the view. The character of the view is one of tranquil, open countryside. Minor detracting features include telephone wires and traffic along Canon Pyon Road. The view is typical of users of Canon Pyon Road, residents and visitors to Lyde Arundel (wedding venue at Arundel Farm) and adjacent properties along Canon Pyon Road (including Stone House).

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 22 - View South East from Public Rights of Way (PRoW) Arundel Farm.

This view is representative of users of the PRoW network, and users/visitors/ residents Of Arundel Farm (Lyde Arundel Wedding Venue). The view is partially enclosed by tall hedgerows and mature blocks of trees, largely blocking wider longer distance views. In the middle portion of the view, long distance views towards gently rolling hills are visible above intervening low-level hedgerows and scattered trees. The gardens and buildings of Arundel Farm are largely screened in the view by mature trees and vegetation. The overall view is one that is tranquil and rural in nature although partially contained.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 23 - View North from Gateway North of Hospital Farm.

The view looks between trees and hedgerows across a relatively wide, rural agricultural landscape of fields bounded by low hedgerows and scattered trees. Low rolling hills of fields, hedgerows, trees and woodland foreshorten the view in the middle to longer distance. Minor detracting features include telephone wires and traffic along Canon Pyon Road. The view is typical of users of visitors to the traditional Orchard and Canon Pyon road.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 24 - View North from Public Rights of Way (PRoW) North of Ayers Brook.

A wide, open view across a rising arable field, foreshortened by telegraph poles and wires, hedgerows and scattered trees in the middle distance. Glimpses of distant hills are visible to the left of the view across a hill in the topography. The view is open, rural and tranquil and typical of the view experienced by users of the local PRoW network.

REFER TO FIGURES 7-4 TO 7-10 FOR VIEWPOINT LOCATIONS.
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Viewpoint 25 - View North West from Holmer Churchyard.

The view from the churchyard looks across an agricultural landscape and gently rolling topography. The topography allows some long-distant views toward gently rolling hills. Fields are largely bounded by hedge-rows and scattered trees although some are demarcated by post and wire fencing (edging Ayles Brook). Further detracting features include numerous telephone wire and pikes. The buildings of Holmer House and farm are visible to the right of the view. The view is typical of users of the PRow network and visitors to Holmer Parish Church (St. Bartholomew's), Churchyard and adjacent residential properties.

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Appendix 7-2

LANDSCAPE EFFECTS SCHEDULE

Landscape Effects Schedule

Receptor	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
LCT 7.10 Principal Timbered Farmlands	Key element is the strong unifying presence of tree cover in the guise of woodlands, hedgerow trees, and linear tree cover associated with streams and watercourses.	High	1	Orange	The route option at this point is on embankment, rising up on embankment to cross C1189 (Lower Breinton Road) via a bridge. This would increase visibility and awareness of the route corridor and detract from the rural nature of the character area. The size and scale of the route corridor is also uncharacteristic of this character area. The route would bisect hedgerows along lanes near Warham House and Warham Farm, some of which contain mature/veteran trees and passes in close proximity to ancient woodland (Rough coppice) and Habitat of Principal Importance (orchard) to the north east of Warham Farm. There may be loss or risk of loss of two ancient/ veteran/ notable trees on the edge of Rough Coppice and one north-west of Warham Farm and loss of one TPO tree to the north-west of Warham Farm. Mitigation through planting of embankments would help soften the harsh engineered structures, and appropriate profiling of the earthworks would enable the embankments to more naturally sit in the landscape.	Major	Large adverse	Major	Large adverse	Major	Large adverse
				Cyan + yellow	The route option at this point is on embankment, rising up on embankment to cross C1189 (Lower Breinton Road) via a bridge. This would increase visibility and awareness of the route corridor and detract from the rural nature of the character area. The size and scale of the route corridor is also uncharacteristic of this character area. The route would bisect hedgerows along lanes near Warham House and Warham Farm, some of which contain mature/veteran trees and passes in close proximity to ancient woodland (Rough coppice) and Habitat of Principal Importance (orchard) to the north east of Warham Farm. There may be loss or risk of loss of two ancient/ veteran/ notable trees on the edge of Rough Coppice and one north-west of Warham Farm and loss of one TPO tree to the north-west of Warham Farm. Mitigation through planting of embankments would help soften the harsh engineered structures, and appropriate profiling of the earthworks would enable the embankments to more naturally sit in the landscape.	Major	Large adverse	Major	Large adverse	Major	Large adverse
				Red + Black 2	The route option at this point is on embankment, rising up on embankment to cross C1189 (Lower Breinton Road) via a bridge. This would increase visibility and awareness of the route corridor and detract from the rural nature of the character area. The size and scale of the route corridor is also uncharacteristic of this character area. The route would bisect hedgerows along lanes near Warham House and Warham Farm, some of which contain Ancient/Veteran/Notable trees and passes in close proximity to ancient woodland (Rough coppice) and Habitat of Principal Importance (orchard) to the north east of Warham Farm. There may be loss or risk of loss of two ancient/veteran/notable trees on the edge of Rough Coppice and one north-west of Warham Farm and loss of one TPO tree to the north-west of Warham Farm. The alignment of Red Route Option 4 and Black 2 Route Option 7 would result in the loss of Warham Farm and outbuildings, further detracting from the typical character and pattern of the character area. Mitigation through planting of embankments would help soften the harsh engineered structures, and appropriate profiling of the earthworks would enable the embankments to more naturally sit in the landscape.	Major	Large adverse	Major	Large adverse	Major	Large adverse
				Olive + Black 1	The route option at this point remains in a small cutting, although one east-west lane requires embankments and an overbridge to cross the resultant cutting west of Warham Farm. The size and scale of the route corridor is also uncharacteristic of this character area. The route would bisect hedgerows along lanes near Warham House and Warham Farm, and passes in close proximity to Ancient Woodland (Wye Coppice, a designated ancient woodland). There may be loss or risk of loss of two Ancient/ veteran/ notable trees on the edge of Rough Coppice and one Grade A tree within Warham House grounds. The Olive/ Black 1 route option cuts through Greenbank Meadows and Warham House Unregistered Park and Gardens. It would result in a loss of the cultural association with the painter Brian Hatton through permanently altering some of the local views of Warham House and grounds (and potential loss of trees) depicted in his paintings, notably "The Lawns, Warham." Mitigation through planting of embankments would help soften the harsh engineered structures, and appropriate profiling of the earthworks would enable the embankments to more naturally sit in the landscape. However, the loss of views associated with the cultural connections of the area would be lost.	Major	Large adverse	Major	Large adverse	Major	Large adverse
			2	Orange	The route option at this point is primarily in cutting, with Green Lane crossing above it largely at grade. Whilst the earthworks would not be extensive, the size and	Moderate	Moderate adverse	Minor	Slight adverse	Minor	Slight adverse

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					scale of the route corridor is uncharacteristic of this character area, cutting a linear track north-south through the local landscape. It would pass in close proximity to a woodland block protected by a TPO (group) to the north-west of Warham Farm. The Orange route bisects several hedgerows, some of which contain mature/ veteran trees and there is likely to be loss of trees protected by TPOs (individual). Mitigation through planting of cutting slopes would help soften the route corridor over time.						
				Yellow	The route option at this point is primarily in cutting, with Green Lane crossing above it largely at grade. Whilst the earthworks would not be extensive, the size and scale of the route corridor is uncharacteristic of this character area, cutting a linear track north-south through the local landscape. It would pass in close proximity to a woodland block protected by a TPO (group) to the north-west of Warham Farm. Mitigation through planting of cutting slopes would help soften the route corridor over time.	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Cyan	The route option at this point is primarily in cutting, with Green Lane crossing above it largely at grade. Whilst the earthworks would not be extensive, the size and scale of the route corridor is uncharacteristic of this character area, cutting a linear track north-south through the local landscape. Mitigation through planting of cutting slopes would help soften the route corridor over time.	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Red	The route option at this point is in cutting, with Green Lane crossing above it via an overpass largely at grade. Whilst the earthworks would not be extensive, the size and scale of the route corridor is still uncharacteristic of this character area, cutting a linear track north-south through the local landscape. The red route would result in the loss of scattered trees, including one Ancient/Veteran/Notable trees and several individual trees protected by a TPO. It would also result in the loss of a very small area of Traditional Orchard due to the re-grading of a lane to form an overbridge as well as loss of part of the recently planted heritage orchards (created by the Pippin Trust) at Upper Hill Farm. The character of the landscape would therefore be eroded through loss of trees, orchards and disruption of the rural character. Mitigation through planting of cutting slopes would help soften the route corridor over time.	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Olive	The route option at this point is in cutting, with Green Lane crossing above it via an overpass largely at grade. Whilst the earthworks would not be extensive, the size and scale of the route corridor is still uncharacteristic of this character area, cutting a linear track north-south through the local landscape. The Olive route would result in the loss of a small area of Traditional Orchard due to the re-grading of a lane to form an overbridge as well as loss of part of the recently planted heritage orchards (created by the Pippin Trust) at Upper Hill Farm. The character of the landscape would therefore be eroded through loss of trees, orchards and disruption of the rural character. Mitigation through planting of cutting slopes would help soften the route corridor over time.	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Black 1	The route option at this point is in cutting, with Green Lane crossing above it via an overpass largely at grade. Whilst the earthworks would not be extensive, the size and scale of the route corridor is still uncharacteristic of this character area, cutting a linear track north-south through the local landscape. The Olive route would result in the loss of an area of Traditional Orchard at Little Breinton due to the re-grading of a lane to form an overbridge. The route would also result in the loss of a large part of the recently planted heritage orchards (created by the Pippin Trust) at Upper Hill Farm, impacting on the character of the local area by removing some of its characteristic orchards – a particularly historic connection with the nurseries around King's Acre. The character of the landscape would therefore be eroded through loss of trees, orchards and disruption of the rural character. Mitigation through planting of cutting slopes would help soften the route corridor over time although they would not replace the orchards.	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Black 2	The route option at this point is in cutting, with Green Lane crossing above it via an overpass largely at grade. Whilst the earthworks would not be extensive, the size and scale of the route corridor is still uncharacteristic of this character area, cutting a linear track north-south through the local landscape. The Black 2 route would result in the loss of scattered trees, including several individual trees protected by a TPO. It would also result in the loss of a very small area of Traditional Orchard due to the re-grading of a lane to form an overbridge as well as loss of part a large part of the recently planted heritage orchards (created by the Pippin Trust) at Upper Hill Farm. The character of the landscape would therefore be eroded through loss of trees,	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse

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					characteristic orchards and disruption of the rural character. Mitigation through planting of cutting slopes would help soften the route corridor over time.						
			3	All	No change	No change	Neutral	No change	Neutral	No change	Neutral
LCT 7.14 Riverside Meadows	This character area is a secluded pastoral landscape characterised by extensive views along the length of river corridors and meandering tree-lined rivers, flanked by riverside meadows defined by hedge and ditch boundaries and notable tree cover.	High	1	Orange	The crossing of the river would cause visual fragmentation within the character area, disrupt local PRoW (particularly the Wye Valley Walk and Breinton footpath 8) and result in loss of tree cover and vegetation. The route option is in cutting on the approach and exit of the bridge, so views within the character area would be more localised. This option results in less tree cover loss than some other routes and therefore the perception of the change in local character as a result of the structure on this character area would be reduced. There is limited mitigation available due to the nature of the bridge within an open river corridor but the design and structure of the bridge at operation would define the quality of the built form within the character area and should be sympathetic and complimentary to its setting.	Moderate	Moderate/ Large adverse	Moderate	Moderate/ Large adverse	Moderate	Moderate/ Large adverse
				Cyan + yellow	The crossing of the river would cause visual fragmentation within the character area, disrupt local PRoW (particularly the Wye Valley Walk and Breinton footpath 8) and result in loss of tree cover and vegetation. The route option is in cutting on the approach and exit of the bridge, so views within the character area would be more localised. This option results in less tree cover loss than some other routes and therefore the perception of the change in local character as a result of the structure on this character area will be reduced. There is limited mitigation available due to the nature of the bridge within an open river corridor but the design and structure of the bridge at operation would define the quality of the built form within the character area and should be sympathetic and complimentary to its setting.	Moderate	Moderate/ Large adverse	Moderate	Moderate/ Large adverse	Moderate	Moderate/ Large adverse
				Red + Black 2	The crossing of the river would cause visual fragmentation within the character area, disrupt local PRoW (particularly the Wye Valley Walk and Breinton footpath 8) and result in loss of tree cover and vegetation. The route option is in cutting on the approach and exit of the bridge, so views within the character area would be localised. This option would result in more tree cover loss than some other routes due to the more extensive earthworks in the adjacent character area and therefore the perception of the change in local character as a result of the structure on this character area will be increased, particularly during construction. There is limited mitigation available due to the nature of the bridge within an open river corridor but the design and structure of the bridge at operation would define the quality of the built form within the character area and should be sympathetic and complimentary to its setting.	Moderate	Moderate/ Large adverse	Moderate	Moderate/ Large adverse	Moderate	Moderate/ Large adverse
				Olive + Black 1	The crossing of the river would cause visual fragmentation within the character area, disrupt local PRoW (particularly the Wye Valley Walk) and result in loss of tree cover and vegetation. These two route options are in deep cutting on the approach and exit of the bridge, so views within the character area would be localised at operation due to screening by vegetation. At construction however, the extent of the earthworks and vegetation loss in the adjacent character area is likely to extend views within the character area. This option would result in more tree cover loss than some other routes due to the more extensive earthworks and therefore the perception of the change in local character as a result of the structure on this character area would be increased, particularly during construction. The crossing at this location would be wider, requiring a longer bridge span. Natural curves in the river would help mitigate this larger structure through naturally limiting open views along the corridor. There is limited mitigation available due to the nature of the bridge within an open river corridor but the design and structure of the bridge at operation would define the quality of the built form within the character area and should be sympathetic and complimentary to its setting.	Major	Large adverse	Major	Large adverse	Moderate	Moderate/ Large adverse
			2	Orange	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Yellow	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Cyan	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Red	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Olive	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Black 1	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Black 2	No change	No change	Neutral	No change	Neutral	No change	Neutral
			3	All	No change	No change	Neutral	No change	Neutral	No change	Neutral
		High	1	Orange	No change	No change	Neutral	No change	Neutral	No change	Neutral

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LCT 7.15 Wet Pasture Meadows	This character area is a secluded, pastoral landscape characterised by a regular pattern of hedged fields and ditches fringed by lines of willow and alder.			Cyan + yellow	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Red + Black 2	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Olive + Black 1	No change	No change	Neutral	No change	Neutral	No change	Neutral
			2	Orange	The orange route option affects a very small section of this character area only, just impinging into it at the junction with Roman Road. The route option would add more hard surfacing, artificial lighting and traffic into the very edge of the character area, affecting its immediate setting. Overall this is a small contained character area of which the route option form a very small part. It would create the presence of a new highway corridor on the edge of the character area but effects would be contained to a localised area and would not influence the perception of this wider landscape.	Minor	Slight / Moderate adverse	Negligible	Slight adverse	Negligible	Slight adverse
				Yellow	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Cyan	The cyan route option crosses through the character area towards its eastern extent, causing severance of the character area and wetland, rural character of the Yazor Brook. The current design shows the Yazor Brook being culverted underneath the Cyan route, further disrupting its character. The route option would add more hard surfacing, artificial lighting and traffic across a section of the character area, greatly affecting its character and the fragmented character of the east of the proposed route alignment. It is therefore likely to alter the perception of this character area in localised views. Limited mitigation is possible within the flood plain, although planting on cutting slopes would provide some screening of vehicle movement over time.	Minor	Slight / Moderate adverse	Minor	Slight adverse	Negligible	Slight adverse
				Red	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Olive	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Black 1	Black 1 route option crosses through the character area towards its eastern extent, causing severance of the character area and wetland and the rural character of the Yazor Brook. The current design shows the Yazor Brook being culverted underneath Black 1 route, disrupting its wetland character. The route option would add more hard surfacing, artificial lighting and traffic across a section of the character area and resulting in the fragmentation of the character area to the east of the proposed route alignment. It is therefore likely to alter the perception of this character area in localised views. Limited mitigation is possible within the flood plain, although planting on cutting slopes would provide some screening of vehicle movement over time.	Moderate	Moderate adverse	Minor	Slight/moderate adverse	Minor	Slight adverse
				Black 2	Black 2 route option crosses through the character area towards its eastern extent, causing severance of the character area and wetland and the rural character of the Yazor Brook. The current design shows the Yazor Brook being culverted underneath Black 2 route, disrupting its wetland character. The route option would add more hard surfacing, artificial lighting and traffic across a section of the character area and resulting in fragmentation of the character area to the east of the proposed route alignment. It is therefore likely to alter the perception of this character area in localised views. Limited mitigation is possible within the flood plain, although planting on cutting slopes would provide some screening of vehicle movement over time.	Moderate	Moderate adverse	Minor	Slight/moderate adverse	Minor	Slight adverse
			3	All	No change	No change	Neutral	No change	Neutral	No change	Neutral
LCT 7.18 Wooded Estatelands	Parkland trees, framed views and woodland are important features in this character area.	High	1	Orange	The route option would result in a new at-grade junction with the A465 with associated lighting columns, and passing under the B4349 and Ruckhall Lane, requiring small bridges for these existing east-west crossings. The proposed option may introduce views and/or awareness of lighting associated with the proposed junction from localised views. The route running alongside Belmont Abbey and through Belmont Park is not currently well lit and would therefore have the effect of partially urbanising a part of the northern section of this character area. Overall the proximity of the route to some existing built form is not likely to influence the perception of the landscape from wider views within this character area. Although there would be no loss of parkland trees within Belmont Park as a result of this option, there would be considerable impacts on the character of Belmont Unregistered Park and Garden due to disruption of views within the designed landscape, reduction of tranquillity within the park and considerable earthworks associated with the cutting slopes. The settings of Belmont Abbey and associated Listed Buildings (Grade II and II*) and the character of the more functional agricultural landscape would all be affected. Clehonger footpath 7 would be	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse

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					directly affected where it cross the route alignment within Belmont Park. The route option is largely in cutting through this character area, allowing some potential for mitigation planting of cutting slopes.						
				Cyan + yellow	The route option would result in a new at-grade junction with the A465 with associated lighting columns, and passing under the B4349 and Ruckhall Lane, requiring small bridges for these existing east-west crossings. The proposed option may introduce views and/or awareness of lighting associated with the proposed junction from localised views. The route running alongside Belmont Abbey and through Belmont Park is not currently well lit and would therefore have the effect of partially urbanising a part of the northern section of this character area. Overall the proximity of the route to some existing built form is not likely to influence the perception of the landscape from wider views within this character area. Although there would be no loss pf parkland trees within Belmont Park as a result of this option, there would be considerable impacts on the character of Belmont Unregistered Park and Garden due to disruption of views within the designed landscape, reduction of tranquillity within the park and considerable earthworks associated with the cutting slopes. The settings of Belmont Abbey and associated Listed Buildings (Grade II and II*) and the character of the more functional agricultural landscape would all be affected. Clehonger footpath 7 would be directly affected where it cross the route alignment within Belmont Park. The route option is largely in cutting through this character area, allowing some potential for mitigation planting of cutting slopes.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Red + Black 2	The route option would result in a new at-grade junction with the A465 with associated lighting columns, then pass under the B4349 and Ruckhall Lane in cutting, requiring small bridges for these existing east-west routes. The route then continues in cutting through Belmont Park as it approaches the River Wye. The proposed option may introduce views and/or awareness of lighting associated with the proposed junction from localised views. The route passing near Belmont Abbey and through Belmont Park is not currently well lit and would therefore have the effect of partially urbanising a part of the northern section of this character area. The cutting through Belmont Park is likely to be visible in the local landscape due to its length and loss of tree cover, causing severance of the parkland and disrupting the setting of its historic houses. The route takes a curved route through the Belmont parkland, resulting in loss of scattered trees (including Grade A trees) as well as considerable impacts on the character of Belmont Unregistered Park and Garden due to disruption of views within the designed landscape, reduction of tranquillity within the park and earthworks associated with the cutting slopes. The route option is more distant from the settings of Belmont Abbey and associated Listed Buildings (Grade II and II*) than the first three options, being located more within the functional agricultural landscape. Clehonger footpath 7 would be directly affected where it cross the route alignment within Belmont Park. The route option is largely in cutting through this character area, allowing potential for mitigation planting of cutting slopes.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Olive + Black 1	This route would cause the greatest loss of trees within Belmont parkland than any of the other route options due to the size of the cutting. It would result in a new at-grade junction with the A465 with associated lighting columns, then pass under the B4349 and Ruckhall Lane in cutting, requiring small bridges for these existing east-west routes. The route then continues in increasingly deep cutting through Belmont Park as it approaches the River Wye. The proposed option may introduce views and/or awareness of lighting associated with the proposed junction from localised views. The route passing near Belmont Abbey and through Belmont Park is not currently well lit and would therefore have the effect of partially urbanising a part of the northern section of this character area. The extent of cutting and associated earthworks through Belmont Park is likely to be visible in the local landscape due to its scale and loss of tree cover, causing severance of the parkland and disrupting the setting of its historic houses. The route takes a curved route through the Belmont parkland, resulting in loss of scattered trees (including Ancient/Veteran/Notable trees) as well as considerable impacts on the character of Belmont Unregistered Park and Garden due to disruption of views within the designed landscape, reduction of tranquillity within the park and earthworks associated with the deep cutting slopes. Loss of woodland would occur to the south of the River Wye as the viaduct abutment would be located within the woodland. The route option is more	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse

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					distant from the settings of Belmont Abbey and associated Listed Buildings (Grade II and II*) than some other options, being located more within the functional agricultural landscape. Clehonger footpath 7 would be directly affected where it cross the route alignment within Belmont Park. The route option is largely in cutting through this character area, allowing potential for mitigation planting of cutting slopes.						
			2	Orange	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Yellow	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Cyan	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Red	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Olive	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Black 1	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Black 2	No change	No change	Neutral	No change	Neutral	No change	Neutral
			3	All	No change	No change	Neutral	No change	Neutral	No change	Neutral
LCT 2.21 Principal Settled Farmland	A domestic character containing a rich patchwork of land uses including traditional orchards and mixed farming of pasture and arable fields as well as variety of settlements. Tree cover is generally limited to thinly scattered hedgerows. This route option element extends from Green Lane Bridleway to Burghill Hospital.	Moderate	1	Orange	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Cyan + yellow	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Red + Black 2	No change	No change	Neutral	No change	Neutral	No change	Neutral
				Olive + Black 1	No change	No change	Neutral	No change	Neutral	No change	Neutral
			2	Orange	The route option is on slight embankment towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade where a double roundabout is located, again with associated lighting columns. North of Roman Road the route drops into slight cutting beneath Tillington Road before rising up on embankment and then cutting beneath Canon Pyon Road. The varied topography of the landscape results in a variety of earthworks requirements. The Orange route bisects several hedgerows some of which contain mature/ veteran trees although the route passes through mainly open agricultural fields. Breinton Bridleway 3 and Green Lane directly cross the proposed route alignment, as do Burghill footpath 11 and Hereford footpath 1. The route passes directly below the boundary of Burghill Hospital Unregistered Park and Garden, and just above Hospital Farm traditional orchard. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is rather uncharacteristic of this part of the landscape resulting in some visual severance of its rural character. The character and setting of Burghill Hospital Unregistered Park and Garden and traditional orchards north of Roman Road would be slightly eroded due to proximity of the route options, and visually detract from the quality of this area. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway corridor, but effects would be contained to a localised area of the character area and would not influence the perception of this wider landscape. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the route corridor and provide some integration into the landscape.	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse
				Yellow	The route option is cutting and then on slight embankment towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade where a junction is located, again with associated lighting columns and signalisation. North of Roman Road the route drops into slight cutting beneath Tillington Road before rising up on embankment and then cutting beneath Canon Pyon Road. The varied topography of the landscape results in a variety of earthworks requirements. The Yellow route bisects several hedgerows although the route passes through mainly open agricultural fields. Breinton Bridleway 3 and Green Lane directly cross the proposed route alignment, as does Hereford footpath 1. The route passes directly below the boundary of Burghill Hospital Unregistered Park and Garden, and just above Hospital Farm traditional orchard. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is uncharacteristic of this part of the landscape resulting in some visual severance of its rural character. The character and setting of Burghill hospital	Moderate	Moderate adverse	Minor	Moderate / slight adverse	Negligible	Slight adverse

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					Unregistered Park and Garden and traditional orchards north of Roman Road would be slightly eroded due to proximity of the route options, and visually detract from the quality of this area. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway corridor, but effects would be contained to a localised area of the character area and would not influence the perception of this wider landscape. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the route corridor and provide some integration into the landscape over time.						
				Cyan	The route option is largely in cutting towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade or on slight embankment. A roundabout and associated lighting columns is located at grade just north of Roman Road before the route drops into slight cutting beneath Tillington Road. It then rises up on embankment and then cutting beneath Canon Pyon Road. The varied topography of the landscape results in a variety of earthworks requirements, including embankment and bridge crossing for Tillington Road above the route option. The Cyan route bisects several hedgerows although the route passes through mainly open agricultural fields. Breinton Bridleway 3 and Green Lane directly cross the proposed route alignment, as does Burghill footpath 11. The route passes directly below the boundary of Burghill Hospital Unregistered Park and Garden, and just above Hospital Farm traditional orchard. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is rather uncharacteristic of this part of the landscape resulting in some visual severance of its rural character. The character and setting of Burghill Hospital Unregistered Park and Garden and traditional orchards north of Roman Road would be slightly eroded due to proximity of the route options, and visually detract from the quality of this area. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway corridor, but effects would be contained to a localised views and would not influence the perception of this wider landscape. Mitigation planting along the route corridor would help soften harsh engineering structures over time, although tree planting should not be continuous so as not to reinforce the presence of the route corridor.	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse
				Red	The route option is in cutting and then on slight embankment towards Kings Acre Road, where a new junction at grade is located with associated lighting columns and signalisation. The route then travels north / north east to Roman Road, largely at grade where a junction is located, again with associated lighting columns and signalisation. North of Roman Road the route rises up on embankment with Tillington Road crossing beneath it via an underpass. The route remain on embankment until nearing Canon Pyon Road where it goes into cutting beneath it. The Red route bisects several hedgerows although the route passes through mainly open agricultural fields. Green Lane directly crosses the proposed route alignment, as does Hereford footpath 1. The route crosses the southern section of the Burghill Hospital Unregistered Park and Garden, although would not affect the nearby traditional orchards above Hospital Farm. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is rather uncharacteristic of this part of the landscape resulting in some visual severance of its rural character. The character of Burghill Hospital Unregistered Park and Garden would be eroded due to loss of parkland, permanently reducing the size of the remaining historic parkland. The route option would visually detract from the quality of this area. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway corridor, but effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape, the exception being around Burghill Hospital. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the route corridor and provide some integration into the landscape over time.	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Olive	The route option is on slight embankment towards Kings Acre Road, where a new junction at grade is located with associated lighting columns. The route then travels	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse

Receptor	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
					north / north east to Roman Road, largely at grade or on slight embankment. A junction with associated lighting columns/ signalisation enables the route to cross Kings Acre Road after which it rises up on embankment to enable Tillington Road to pass beneath it via an underpass. The route then rises up on embankment until reaching Canon Pyon Road at grade. The Olive route mainly passes through mainly open agricultural fields. Green Lane directly crosses the proposed route alignment, as does Hereford footpath 1. The route option also crosses the southern section of the Burghill Hospital Unregistered Park and Garden, although would not affect the nearby traditional orchards above Hospital Farm. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is uncharacteristic of this part of the landscape resulting in some discordance with the wider character of the landscape. The character of Burghill Hospital Unregistered Park and Garden would be eroded due to loss of parkland, permanently reducing the size of the remaining historic parkland. The route option would visually detract from the quality of this area. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway corridor, but effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape, the exception being around Burghill Hospital. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the route corridor and provide some integration into the landscape over time.						
				Black 1	The route option is in slight cutting and then on a slight embankment towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade, where a further roundabout is located with associated lighting columns/ signalisation. The route then rises up on embankment to enable Tillington Road to pass beneath it via an underpass. The route then remains on embankment before going into cutting beneath Canon Pyon Road. Canon Pyon Road rises up on small embankments to cross via an overpass. Black 1 route mainly passes through open agricultural fields. Green Lane and Breinton Bridleway 3 directly crosses the proposed route alignment, as does Burghill footpath 11. The route option also crosses the southern section of the Burghill Hospital Unregistered Park and Garden. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is uncharacteristic of this part of the landscape resulting in some discordance with the wider character of the landscape. The location of part of the route adjacent to existing commercial activities north of Kings Acre Road reduces the visual discordance of the route corridor within the adjoining landscape. Black 1 route would bisect several hedgerows, some containing mature/veteran trees. It would also cross through a large section of Drovers Wood, a Woodland Trust community woodland purchased in the 1980s. The woodland would become fragmented and considerably reduced in size, resulting in loss of tree cover, including potential loss of some Grade A trees. The character of Burghill Hospital Unregistered Park and Garden would be eroded due to loss of parkland, permanently reducing the size of the remaining historic parkland. The route option would visually detract from the quality of this area. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway corridor and loss of tree cover would be perceivable in localised views. Effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape, the exception being around Burghill Hospital and around Upper Hill Farm. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the route corridor and provide some integration into the landscape over time.	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Black 2	The route option is in slight cutting and then on a slight embankment towards Kings Acre Road, where a new roundabout at grade is located with associated lighting columns. The route then travels north / north east to Roman Road, largely at grade, where a further roundabout is located with associated lighting columns/ signalisation. The route then rises up on embankment to enable Tillington Road to pass beneath it via an underpass. The route then remains on embankment before going into cutting beneath Canon Pyon Road. Canon Pyon Road rises up on small embankments to cross	Moderate	Moderate adverse	Moderate	Moderate adverse	Moderate	Moderate adverse

Receptor	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
					via an overpass. Black 2 route mainly passes through open agricultural fields. Green Lane and Breinton Bridleway 3 directly crosses the proposed route alignment, as does Burghill footpath 11. The route option also crosses the southern section of the Burghill Hospital Unregistered Park and Garden. The lighting of junctions is likely to be visible in the wider landscape of the character area, but located typically along existing A roads. The linear north-south alignment of the road is uncharacteristic of this part of the landscape resulting in some discordance with the wider character of the landscape. The location of part of the route adjacent to existing commercial activities north of Kings Acre Road reduces the visual discordance of the route corridor within the adjoining landscape. The Black 2 route would also cross through a large section of Drovers Wood, a Woodland Trust community woodland purchased in the 1980s. The woodland would become fragmented and considerably reduced in size, resulting in loss of tree cover, including potential loss of some Grade A trees. The character of Burghill Hospital Unregistered Park and Garden would be eroded due to loss of parkland, permanently reducing the size of the remaining historic parkland. The route option would visually detract from the quality of this area. Overall this is a large and expansive character area, of which the route option would be a relatively contained area. It would create the presence of a new highway corridor and loss of tree cover would be perceivable in localised views. Effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape, the exception being around Burghill Hospital and around Upper Hill Farm. Mitigation planting on cutting slopes and appropriate roadside vegetation would help to soften the route corridor and provide some integration into the landscape over time.						
			3	All	The route options are largely on embankment before going into cutting to join at grade with the A49 via a roundabout. The route options cross agricultural fields as well as Pipe and Lyde footpath 9 and would cause fragmentation of the field patterns in the local landscape. Overall this is a large and expansive character area, of which the route options would be a relatively contained area. It would create the presence of a new highway corridor but effects would generally be contained to a localised area of the character area and would not influence the perception of this wider landscape. Mitigation planting on earthworks and appropriate roadside vegetation would help to soften the route corridor over time whilst consideration of embankment profiling would help provide some integration of the route corridor into the landscape.	Minor	Slight adverse	Minor	Slight adverse	Minor	Slight adverse

Appendix 7-3

VIEWPOINT VISUAL EFFECTS SCHEDULE

Viewpoints Visual Effects Schedule

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
VP1 Wye Valley Walk view west	Long distance views west from the Wye Valley Walk (long distance footpath). Gaps in hedgerows and field boundaries allow long views across a gently undulating landscape of agricultural fields bounded by low hedgerows, scattered trees and blocks of woodland. Glimpses of low distant hills are visible beneath a wide expanse of sky above. The view is representative of those experienced by users of the local PRoW network and Wye Valley Walk. It is an open, expansive view that is largely free of built elements or other indicators of modern development.	High	1	Orange	The proposed route option would cross the River Wye on a bridge structure and is likely to be visible in glimpsed views along the river corridor. Some screening from foreground/ middle distance trees would limit visibility in summer but traffic and any lighting would be discernible in the middle distance. Construction activities will add uncharacteristic elements into the view, altering the nature of the rural views. The bridge crossing is not readily mitigated and some loss of tree canopies may be discernible in the wider landscape.	Major	Large adverse	Major	Large adverse	Major	Large adverse
				Cyan + yellow	As above	Major	Large adverse	Major	Large adverse	Major	Large adverse
				Red + Black 2	As above	Major	Large adverse	Major	Large adverse	Major	Large adverse
				Olive + Black 1	This option would be more distant from the viewpoints and partially screened by natural bends in the river. The banks contain areas of well wooded slopes and vegetation, providing screening from longer distance views in summer. The construction activities are likely to be discernible due to earthworks and bridge construction across a stretch of open water. Mitigation is limited across the river and loss of tree canopies may be discernible in the wider landscape.	Moderate	Moderate /large adverse	Moderate	Moderate /large adverse	Moderate	Moderate adverse
			2	Orange	No view	No change	Neutral	No change	Neutral	No view	No change
				yellow	No view	No change	Neutral	No change	Neutral	No view	No change
				Cyan	No view	No change	Neutral	No change	Neutral	No view	No change
				Red	No view	No change	Neutral	No change	Neutral	No view	No change
				Olive	No view	No change	Neutral	No change	Neutral	No view	No change
				Black 1	No view	No change	Neutral	No change	Neutral	No view	No change
				Black 2	No view	No change	Neutral	No change	Neutral	No view	No change
			3	All	No view	No change	Neutral	No change	Neutral	No view	No change
VP 2 View north east from PRoW bottom of garden of property near Dunan	A wide, expansive view from a slightly elevated PRoW, looking across agricultural fields towards low rolling distant hills. The A465 can be seen snaking away to the right of the view, with blocks of woodland beyond (Newton Coppice and Hayleasow Wood). A group of white-washed cottages are clearly visible in the centre of the view (in the near to middle distance) complementing the largely rural scene with neat scattered dwellings. This view is representative of users of the local PRoW network and residential receptors at Dunan	High	1	Orange	The proposed route option would commence beyond the cottages in the middle distance and sweep away from the view. Screening from foreground/ middle distance trees would limit visibility in summer but traffic and any lighting would still be discernible. Construction activities would be noticeable and detract from the character of the view. Mitigation planting over time would provide some screening and softening of harsh engineering solutions.	Moderate	Moderate / large adverse	Moderate	Moderate / large adverse	Moderate	Moderate adverse
				Cyan + yellow	As above	Moderate	Moderate /Large adverse	Moderate	Moderate / large adverse	Moderate	Moderate adverse
				Red + Black 2	The proposed route option would commence beyond the cottages and cut across the view, with only partial screening from foreground/ middle distance trees in summer. Traffic and lighting would be clearly visible in the centre of the view and construction activities would be highly visible. Mitigation planting over time would provide some screening and softening of harsh engineering solutions.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Olive + Black 1	As above.	Major	Large adverse	Major	Large adverse	Major	Large adverse
			2	Orange	No view	No change	Neutral	No change	Neutral	No change	Neutral
				yellow	No view	No change	Neutral	No change	Neutral	No change	Neutral
				Cyan	No view	No change	Neutral	No change	Neutral	No change	Neutral

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
				Red	No view	No change	Neutral	No change	Neutral	No change	Neutral
				Olive	No view	No change	Neutral	No change	Neutral	No change	Neutral
				Black 1	No view	No change	Neutral	No change	Neutral	No change	Neutral
				Black 2	No view	No change	Neutral	No change	Neutral	No change	Neutral
			3	All	No view	No change	Neutral	No change	Neutral	No change	Neutral
VP 3 View south east from entrance to Belmont Hotel	A peaceful, rural view of managed parkland containing mature specimen trees edged by mown grass and a country lane with hedgerow. Glimpses of gently rolling hills and woodland blocks add to the rural character and tranquillity of the view, whilst reducing the intimate feel. The tower of Belmont Abbey provides a focal point and landmark feature in the centre of the view. This view is representative of users of the local road network and visitors to Belmont Hotel as well as being located on the edge of the Unregistered Park and Garden of Belmont.	High	1	Orange	The route would be clearly visible in the centre of the view in the middle distance, below the tower, detracting from its setting and adding urbanising elements into the view. The construction activities would be clearly visible. There is opportunity for mitigation planting.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Cyan + yellow	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Red + Black 2	The route would be clearly visible across the centre foreground of the view, detracting from the setting of the tower and adding urbanising elements into the foreground of the view. The proposed route option would disrupt the parkland character and add an uncharacteristic element. Construction activities would be highly visible in short range views where the works would dominate and significantly detract from the existing character of the view. There is the opportunity for mitigation screen planting, although views towards the tower may be lost.	Major	Very large adverse	Major	Very large adverse	Major	Large adverse
				Olive + Black 1	The route would be clearly visible in the centre of the view in the foreground, detracting from the setting of the tower and adding urbanising elements into the foreground of the view. The proposed route option would significantly disrupt the parkland character and add an uncharacteristic element into the view. Construction activities would be highly visible in short range views where the works would dominate and significantly detract from the existing character of the view. There is the opportunity for mitigation screen planting, although views towards the tower may be lost.	Major	Very large adverse	Major	Very large adverse	Major	Large adverse
			2	Orange	No view	No change	Neutral	No change	Neutral	No change	Neutral
				yellow	No view	No change	Neutral	No change	Neutral	No change	Neutral
				Cyan	No view	No change	Neutral	No change	Neutral	No change	Neutral
				Red	No view	No change	Neutral	No change	Neutral	No change	Neutral
				Olive	No view	No change	Neutral	No change	Neutral	No change	Neutral
				Black 1	No view	No change	Neutral	No change	Neutral	No change	Neutral
				Black 2	No view	No change	Neutral	No change	Neutral	No change	Neutral
			3	All	No view	No change	Neutral	No change	Neutral	No change	Neutral
VP 4 View north east from St Michaels Belmont Abbey churchyard	An historic, peaceful and rural view across a graveyard and entrance porch towards agricultural fields and scattered views. Long distance views are largely restricted by intervening woodland blocks in the middle distance, creating a slightly more intimate view. This view is representative of visitors and users of the historic Belmont Abbey and Unregistered Park and Garden.	High	1	Orange	The proposed route would cut through the centre of the view, beyond the graveyard. It would be clearly visible and audible, adding a highly detracting and uncharacteristic feature into the view. Construction activities would be highly visible in short distance views, altering the tranquillity and character of the view and the setting of the graveyard. Some opportunity for mitigation planting and/ or acoustic barriers on cutting slopes. Over time, tops of trees would help provide some screening	Major	Very Large adverse	Major	Very Large adverse	Major	Large adverse
				Cyan + yellow	As above	Major	Very Large adverse	Major	Very Large adverse	Major	Large adverse
				Red + Black 2	As above	Major	Very Large adverse	Major	Very Large adverse	Major	Large adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
				Olive + Black 1	The route option, whilst more distant than the other options, would still be readily discernible in the landscape, cutting across currently open fields. The tranquillity and rural character of the view, as well as the setting of the graveyard would be altered. Construction activities would be visible in short distance views, altering the tranquillity and character of the view and the setting of the graveyard. Some opportunity for mitigation planting and/ or acoustic barriers on cutting slopes.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 5 View west from edge of Belmont Housing	Representative of residential receptors in Belmont housing estates, this wide, open but rural view looks across managed parkland with mature scattered trees. The tower of St Michaels Abbey is clearly visible as a landmark above a copse of trees in the centre of the view. A glimpse of distant rolling hills in the centre of the view adds to the open expansive feel.	High	3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			1	Orange	This route would cut through the centre of the view, albeit behind foreground groups of trees. Despite being in cutting at this point, it would add a significant detracting and uncharacteristic element into the view, disrupting the tranquil parkland character. Construction impacts would be greater, with increased disturbance. Loss of trees and hedgerows would be noticeable. Some opportunity for mitigation planting in a well-treed landscape.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Cyan + yellow	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Red + Black 2	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Olive + Black 1	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 6a View east from Wye Valley South West of Warham House	A wide view of meadow land, and the River Wye, the relatively flat landscape being contained by blocks of trees (Wye Coppice/ Rough Coppice) and the slight rise of the wooded valley side edging the Unregistered Park and Garden of Belmont and Belmont golf course. The wide river, edged to the banks with trees, shrubs and grassland vegetation, creates a tranquil, rural character, only partially disrupted by a post and barbed wire fence. The woodland helps create a more intimate, enclosed landscape associated with the former historic parkland around Warham House and Belmont Park. The view is representative of views experienced by users of the Wye Valley Walk (long distance footpath), river and parkland.	High	3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			1	Orange	Whilst the wooded structure would be largely retained, along with foreground bankside vegetation, the open span of the river would result in construction activities being highly visible in the middle distance, fundamentally altering the nature of the tranquil rural views. Loss of woodland may also be perceptible with a change in tree canopies to accommodate the Proposed Scheme. The route would be in cutting either side of the river, but the bridge spanning the water would be clearly visible in localised views. Whilst there is some scope for mitigation planting, the bridge across the river would remain visible, along with traffic and any lighting along this section.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Cyan + yellow	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Red + Black 2	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
				Olive + Black 1	The positioning of this route option would bring the construction activities into much shorter distance views, and together with the awareness of the works in the wider woodlands, they would dominate and fundamentally alter the nature of the existing contained views and sense of tranquillity. The road would pass through the woodland within cutting but would span the river by a bridge. As a result, awareness of traffic would be localised to the crossing point, but beyond these views there is likely to be awareness of the loss of associated woodland. The sense of seclusion and tranquillity would be significantly reduced although woodland associated with the cutting slopes would, over time, reduce the harshness associated with the engineered solutions, replacing elements of woodland removed and increasing the sense of local-level impacts associated with the crossing of the corridor by the footpath.	Major	Very large adverse	Major	Very large adverse	Major	Large adverse
				2	Orange	No view	No Change	Neutral	No Change	Neutral	Neutral
					yellow	No view	No Change	Neutral	No Change	Neutral	Neutral
					Cyan	No view	No Change	Neutral	No Change	Neutral	Neutral
					Red	No view	No Change	Neutral	No Change	Neutral	Neutral
					Olive	No view	No Change	Neutral	No Change	Neutral	Neutral
					Black 1	No view	No Change	Neutral	No Change	Neutral	Neutral
					Black 2	No view	No Change	Neutral	No Change	Neutral	Neutral
				3	All	No view	No Change	Neutral	No Change	Neutral	Neutral
VP 6b View east from PRoW junction Wye Valley Walk	A view representative of users of the Wye Valley Walk (long distance footpath), surrounding parkland and golf course. The bend in the river opens up a linear view along the valley, with a wide flat river valley and meadows edged by slightly rising ground. The view is contained by thick belts of woodland either side creating some sense of enclosure, but the flat, wide valley floor and linear visibility creates a more open character, but one that is predominately rural, tranquil and natural.	High	1	Orange	The construction activities would completely dominate the view, the openness of which will allow clear, wide views of the bridge works and earthworks. They would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The road would pass through the woodland within cutting but would span the river via a bridge. The wide flood plain at this point and curve of the river would increase visibility, extending views some way along the river corridor. However, the surrounding woodland and awareness of traffic would be relatively localised to the crossing point. The sense of seclusion and tranquillity would be substantially reduced although woodland associated with the cutting slopes would, over time, reduce the harshness associated with the engineered solutions. However, the bridge structure would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
					Cyan + yellow	As above	Major	Large adverse	Major	Large adverse	Moderate adverse
					Red + Black 2	As above	Major	Large adverse	Major	Large adverse	Moderate adverse
					Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	Neutral
				2	Orange	No view	No Change	Neutral	No Change	Neutral	Neutral
					yellow	No view	No Change	Neutral	No Change	Neutral	Neutral
					Cyan	No view	No Change	Neutral	No Change	Neutral	Neutral
					Red	No view	No Change	Neutral	No Change	Neutral	Neutral
					Olive	No view	No Change	Neutral	No Change	Neutral	Neutral
					Black 1	No view	No Change	Neutral	No Change	Neutral	Neutral
					Black 2	No view	No Change	Neutral	No Change	Neutral	Neutral
				3	All	No view	No Change	Neutral	No Change	Neutral	Neutral

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
VP 6c View west towards footpath junction Wye Valley Walk	A relatively contained view with thick vegetation and woodland (Wye Coppice/ Rough Coppice) and the slight rise of the wooded valley sides edging the Unregistered Park and Garden of Belmont/ Belmont golf course and Warham House. The river is thickly edged with vegetation, partially obscuring it from the view, and creating an increased sense of enclosure at this point. This is partially offset by the wide grassland and views of more distant trees allowing linear views along the river corridor. The view is representative of views experienced by users of the Wye Valley Walk (long distance footpath), river and parkland.	High	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	The construction activities would be clearly visible in short-range views, and together with the awareness of the works in the wider woodlands, they would dominate and fundamentally alter the nature of the existing contained views and sense of tranquillity. The road would pass through the woodland within cutting but would span the river by a bridge. As a result, awareness of traffic would be localised to the crossing point, but beyond these views there is likely to be awareness of the loss of associated woodland. The sense of seclusion and tranquillity would be significantly reduced although woodland associated with the cutting slopes would, over time, reduce the harshness associated with the engineered solutions, replacing elements of woodland removed and increasing the sense of local-level impacts associated with the crossing of the corridor by the footpath.	Major	Very large adverse	Major	Very large adverse	Major	Large adverse
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 7 View east from Wye Valley Walk top of hill west of Upper Breinton	A wide, extensive, elevated view representative of users of the PRow network. The view extends across one huge open field bounded by a low hedgerow, metal access gates and occasional hedgerow tree and looks across the valley towards opposite low rolling hills. The predominant sense of character is of a rural landscape of agricultural fields, small settlements and hamlets, scattered trees and large blocks of woodland, creating a typical pastoral English landscape in the middle/ far distance, albeit modernised in the foreground by metal field gates, amalgamated fields and improved grassland. The tower of Belmont Abbey is visible in the distance against a backdrop of fields and woodland.	High	1	Orange	The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.	Minor	Slight/ moderate adverse	Minor	Slight/ moderate adverse	Negligible	Slight adverse
				Cyan + yellow	As above	Minor	Slight/ moderate adverse	Minor	Slight/ moderate adverse	Negligible	Slight adverse
				Red + Black 2	As above	Minor	Slight/ moderate adverse	Minor	Slight/ moderate adverse	Negligible	Slight adverse
				Olive + Black 1	As above	Minor	Slight/ moderate adverse	Minor	Slight/ moderate adverse	Negligible	Slight adverse
			2	Orange	The construction activities would be visible in a small section of the wider view, being distinctive due to its uncharacteristic colour, pattern and activity in the landscape. Some loss of woodland may be discernible due to breaks in canopy tree cover, but mitigation planting and retained trees would, over time, infill some of the visual gaps.	Moderate	Moderate adverse	Minor	Slight/ moderate adverse	Minor	Slight adverse
				Yellow	As above	Moderate	Moderate adverse	Minor	Slight/ moderate adverse	Minor	Slight adverse
				Cyan	As above	Moderate	Moderate adverse	Minor	Slight/ moderate adverse	Minor	Slight adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
				Red	As above	Minor	Slight/ moderate adverse	Minor	Slight/ moderate adverse	Negligible	Slight adverse
				Olive	As above	Minor	Slight/ moderate adverse	Minor	Slight/ moderate adverse	Negligible	Slight adverse
				Black 1	As above	Minor	Slight/ moderate adverse	Minor	Slight/ moderate adverse	Negligible	Slight adverse
				Black 2	As above	Minor	Slight/ moderate adverse	Minor	Slight/ moderate adverse	Negligible	Slight adverse
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 8 View north east from Green Lane Park Home Estate	An enclosed view representative of users of the Green Lane Park Home Estate and Green Lane. The view looks across a large agricultural field edged with hedgerows and scattered hedgerow trees. Woodland within Green Lane Wood and trees adjacent to Breinton bridleway 2A further contribute to containment of views although a gap in the hedgerow allows glimpsed longer distance views of adjacent fields. The view has a largely rural and tranquil feel but becoming suburbanised by the presence of park home caravans, fences and telephone poles and wires.	High	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	Glimpses of construction activities would be discernible beyond intervening hedgerows. The road would be in cutting between Kings Acre Rod (A438) and Breinton Road (northern junction) so traffic would be largely obscured from view. With mitigation planting on cutting slopes, the route option would not be readily discernible in the view.	Minor	Slight/ moderate adverse	Negligible	Slight adverse	Negligible	Slight adverse
				Olive	As above	Minor	Slight/ moderate adverse	Negligible	Slight adverse	Negligible	Slight adverse
				Black 1	Construction activities would be visible across mid to background views and would alter the nature of the rural view. The proposed option would be predominantly in cutting at this point, largely screening traffic movements, along with screening by Green Lane Wood. Hedgerows associated with the highway boundary would replace or restore existing remnant hedges and help to reduce awareness of the cutting. In association with mitigation planting and pockets of woodland this would largely integrate the corridor into the view.	Moderate	Moderate adverse	Minor	Slight/ moderate adverse	Negligible	Slight adverse
				Black 2	As above	Moderate	Moderate adverse	Minor	Slight /Moderate adverse	Negligible	Slight adverse
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 9 View south east from PRow junction Green Lane Wood	Another enclosed view representative of users of the PRow network and Green Lane. The view looks across a wide agricultural field containing telephone poles and wires and edged with tall hedgerows, scrub and scattered trees. Woodland within Green Lane Wood restricts wider views. Orchard trees are clearly visible in the middle distance beyond the mast adding local distinctive and historic character to the view.	Moderate	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
	The view has a largely rural and fairly tranquil character.			Red	The route proposal would be largely screened by intervening hedgerow, orchards and trees, but construction activities may be just discernible in winter through loss of woodland and uncharacteristic noise and visual intrusion. Glimpses of the route may become discernible further south along the footpath where woodland is removed although the route here is in cutting. The proposed alignment would bridge over C1189 (Lower Breinton Road) on embankment and therefore more visible in the wider landscape, before going into cutting. Whilst the route option would be largely screened from view, some awareness of the top of traffic may be visible. There may be a slight loss of trees in the middle distance (Upper Hill Farm). Over time the mitigation planting and existing trees will partially restore the canopy.	Minor	Slight adverse	Negligible	Slight adverse	Negligible	Neutral
				Olive	As above	Minor	Slight adverse	Negligible	Slight adverse	Negligible	Neutral
				Black 1	The route proposal would be largely screened by intervening hedgerow, orchards and trees, but construction activities may be just discernible in winter through loss of woodland and uncharacteristic noise and visual intrusion. The proposed alignment would bridge over C1189 (Lower Breinton Road) on embankment before going into cutting. Whilst the route option would be largely screened from view, some awareness of the top of traffic may be visible. There would be a slight loss of trees in the middle distance (Upper Hill Farm orchards) which are important elements within the view. Over time the mitigation planting and existing trees will partially restore the canopy.	Minor	Slight adverse	Negligible	Slight adverse	Negligible	Neutral
				Black 2	As above	Minor	Slight adverse	Negligible	Slight adverse	Negligible	Neutral
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 10a View south west from PRoW opp. Bay Horse Pub	A long view across an arable field edged with trees, hedgerows and shrubs. The view is terminated by tall trees and hedgerows across a flat landscape. The character is predominantly rural. It is representative of residential receptors along the A438, visitors to the Bay Horse Pub and users of the PRoW network.	High	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	The foreground view would remain largely unchanged but construction activities would be clearly visible in mid-distance views, significantly altering the rural character of the view. Some slight loss of tree canopies may be discernible around Green Lane orchards but the route is largely in cutting throughout the view. Mitigation planting on slope cuttings will help, over time, to reduce visibility of traffic.	Moderate	Moderate adverse	Minor	Slight / Moderate adverse	Minor	Slight adverse
				Black 2	As above	Moderate	Moderate adverse	Minor	Slight / Moderate adverse	Minor	Slight adverse
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 10b		High	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
View south east into field south of Bay Horse Pub	A long view across an arable field edged with trees, hedgerows and shrubs. The topography allows for slightly longer views across further agricultural fields with scattered trees and hedgerows. The rear of properties along Kings Acre Road are also visible. The view is relatively wide and quite expansive, but predominantly rural in character. Suburbanising features include telephone poles/ exchanges and wires as well as garden boundary hedges/fences and sheds. The view is representative of residential properties along Kings Acre Road and users of the PRoW network.			Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	Construction activities would be visible across mid-range views and would significantly alter the nature of the rural view. The proposed alignment would be in cutting for much of the view, emerging at grade/ slight embankment to join Kings Acre Road. Green Lane and adjoining Breinton bridleway 3 would bridge over the top in the mid-distance adding further elements into the view. Minor loss of trees and hedgerows would be discernible and further diminish the quality of the view. Mitigation planting on slope cuttings and along the route corridor would partially, over time, reduce the dominance of the traffic in the view.	Moderate	Large adverse	Moderate	Large adverse	Moderate	Moderate adverse
				Yellow	As above	Moderate	Large adverse	Moderate	Large adverse	Moderate	Moderate adverse
				Cyan	Construction activities would be highly visible across the foreground of the field of view and would fundamentally alter the nature of the rural view. The proposed alignment would be in cutting for much of the view, with Green Lane bridging over the top in the mid-distance. However, the proximity of the viewpoint to the route option would provide clear views across and into the cutting, and particularly where it emerges at grade to join Kings Acre Road. Loss of housing and scattered trees would further diminish the quality of the view. Mitigation planting on slope cuttings and along the route corridor would partially, over time, reduce the dominance of the traffic in the view.	Major	Very Large adverse	Major	Very Large adverse	Major	Large adverse
				Red	As above	Major	Very Large adverse	Major	Very Large adverse	Major	Large adverse
				Olive	As above	Major	Very Large adverse	Major	Very Large adverse	Major	Large adverse
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 11 View south west from PRoW behind Kings Court Housing	A wide, fairly expansive view across one very large arable field edged with trees, hedgerows and shrubs as well as houses overlooking from Kings Court and Kings Acre Road. Hedgerows and scattered trees contribute to the rural character of the view. Urban edge features including rear garden boundaries and houses introduce a suburbanising effect into the view. The view is representative of residential properties along Kings Acre Road and users of the PRoW network (Breinton Bridleway 3).	High	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	The proposed route option would be on a slight embankment after emerging from cutting below Green Lane. Construction activities would dominate the foreground of the view and fundamentally alter the character and tranquillity of the view. The flat, open landscape would further emphasise the un-characteristic noise, colour, and visual intrusion of the construction activities and traffic would be clearly visible on the raised sections	Major	Very large adverse	Major	Very large adverse	Major	Large adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
					of road. Planting alongside the route corridor would over time soften the harshness of the route corridor and provide some screening of traffic, but in turn this screening would contribute to a loss of the extended view across countryside and a rural landscape.						
				Yellow	As above	Major	Very large adverse	Major	Very large adverse	Major	Large adverse
				Cyan	As above	Major	Very large adverse	Major	Very large adverse	Major	Large adverse
				Red	The proposed route option would be on a slight embankment after emerging from cutting below Green Lane. Construction activities would dominate the mid-level field of view, significantly altering the character and tranquillity of the view. The flat, open landscape would further emphasise the uncharacteristic noise, colour, and visual intrusion of the construction activities and traffic would be clearly visible on the raised sections of road. Planting alongside the route corridor would over time soften the harshness of the route corridor and provide some screening of traffic, but would foreshorten the long distance views across the rural landscape.	Major	Large adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Olive	As above	Major	Large adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 12 View west from PRow at edge of housing in White Cross	The view is representative of views from residential properties in White Cross and users of the PRow network (Green Lane). A wide, expansive long distance view looking across a large arable field towards distant rolling hills. Orchards are visible in the middle distance, along with housing estates, hedgerows and scattered trees. The view is largely a rural one with limited detracting features.	High	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	The construction activities would be clearly visible in the mid-range view, with the earthworks and machinery noticeable beyond the intervening hedgerows and fields. Despite the suburbanising effect of houses edging the farmland, the view is predominantly a rural one. The construction activities would considerably alter the character of the view, and the proposed route would add uncharacteristic movement and materials into the view. Although the route would largely be in cutting within the view, the crossing of the two bridleways (Green Lane and Breinton bridleway 3) would be visible in the distance along with the tops of vehicles. Mitigation planting could, over time, reduce the visual prominence of the route corridor.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Yellow	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Cyan	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Red	The construction activities would be visible in glimpsed mid-range views, although the earthworks and machinery will be more visible to the north as the cuttings are created and fewer hedgerows intervene for screening. Despite the suburbanising effect of houses edging the farmland, the view is	Moderate	Large adverse	Moderate	Moderate adverse	Moderate	Moderate adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
					predominantly a rural one. The construction activities would alter the character of the wider view, and the proposed route would add uncharacteristic movement and materials into the view. Although the route would largely be in cutting, the crossing of the bridleway may be discernible in the distance along with the tops of vehicles. Mitigation planting could reduce the visual prominence of the route corridor, over time.						
				Olive	As above	Moderate	Large adverse	Moderate	Moderate adverse	Moderate	Moderate adverse
				Black 1	The construction activities would not be readily discernible in the view, being screened by intervening orchards, hedgerows and hedgerow trees. Glimpses of construction activities in distant views may be obtained, adding uncharacteristic movement, materials and colour into the wider view. Although the route would largely be in cutting, the crossing of the bridleway may be discernible in the distance (with some loss of trees) along with the tops of vehicles. Mitigation planting could reduce the visual prominence of the route corridor, over time.	Moderate	Moderate adverse	Minor	Moderate adverse	Minor	Slight adverse
				Black 2	As above	Moderate	Moderate adverse	Minor	Moderate adverse	Minor	Slight adverse
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 13 View south from northern edge of Racecourse sports field	A wide, open view across the race track towards distant low-rising hills. The foreground is occupied with the turf track and railings, with buildings and urbanising features including lighting, in the middle distance. The back drop of the view is of agricultural hills on gentle low-rise hills, edged with trees and hedgerows. Buildings are also distinctive features on the skyline, along with lighting columns. This view is representative of visitors and users of the racecourse.	Moderate	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	The varied topography would allow long-distance views of the construction activities to be visible in the view, across opposite hills. It would form part of the wider view, and whilst the mid-range views incorporate large buildings and urban features, the backdrop is of agricultural fields, hedgerows and trees. This backdrop would become disrupted with uncharacteristic movement and activity during construction, with moving vehicles and headlights/ lighting potentially visible. The potential for mitigation planting on cutting and embankment slopes would help to integrate the route corridor into the wider landscape over time.	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
VP 14 View north west from junction of PRoW Yazor Brook south of Bovingdon housing	This view is representative of users of the PRoW network. It shows a large, open arable field, gently sloping, edged with tall hedgerows and scattered trees. Single-storey housing within the Bovingdon mobile home park are clearly visible on the skyline in the centre of the view, restricting longer-	Moderate	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
	distance views beyond and adding a suburbanising element into an otherwise rural and tranquil view. Glimpses of distant hills are visible between the mobile home park and Yazor brook hedgeline. The A4103 (Roman Road) is not readily visible in the view.		2	Orange	Construction activities would be just visible across part of the middle distance of the field of view, slightly altering the nature of the rural view. The proposed alignment would be largely at grade or on slight embankment although much of the hedge line would remain. Some slight loss of hedgerow, scattered trees and vegetation might slightly diminish the quality of the view. Mitigation planting along the route corridor would reduce visual effects of the route corridor in the view.	Moderate	Moderate adverse	Minor	Slight adverse	Negligible	Neutral
				Yellow	Construction activities would be highly visible across part of the foreground and middle distance of the field of view and would substantially alter the nature of the rural view. The proposed alignment would be largely at grade or on slight embankment within the view, cutting through the hedgeline and across behind the mobile homes. The proximity of the viewpoint to the route option would provide clear views of the construction works and at operation. Loss of hedgeline, scattered trees and vegetation would further diminish the quality of the view. Mitigation planting along the route corridor would partially, over time, reduce the dominance of the traffic in the view.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	Construction activities would be highly visible across part of the foreground and middle distance of the field of view and would substantially alter the nature of the rural view. The proposed alignment would be largely at grade or on slight embankment within the view, cutting through the hedgeline and across behind the mobile homes. The proximity of the viewpoint to the route option would provide clear views of the construction works and at operation. Loss of hedgeline, scattered trees and vegetation would further diminish the quality of the view. Mitigation planting along the route corridor would partially, over time, reduce the dominance of the traffic in the view.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Olive	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 15 View east from PRow near Priory Hotel	A view taken between hedgerows across a large grass field, edged with mature trees and hedgerows. Long distance views across the landscape are visible beyond the hedgerows and trees in the middle of the view. The view is predominantly a rural, tranquil view with few detracting features. Glimpses of buildings and lighting columns are visible in the distance. The view is representative of users of the PRow network and visitors and residents at the Priory Hotel.	Moderate	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	The route option would be largely screened by intervening hedgerows, scattered trees and occasional built form, but construction activities in winter may be discernible in the far distance. The construction works would add uncharacteristic elements into the more distant view, including noise, colour and activity incongruent with the rural view.	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
				Yellow	As above	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
				Cyan	The route option would be largely screened in the view by intervening hedgerows, scattered trees and	Moderate	Moderate adverse	Minor	Slight adverse	Minor	Slight adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
					occasional built form, but construction activities in winter would be discernible in the middle distance. The construction works would add uncharacteristic elements into the view, including noise, colours and activity incongruent with the rural view.						
				Red	The route option would be largely screened by intervening hedgerows, scattered trees and occasional built form, but construction activities in winter may be discernible in the far distance. The construction works will add uncharacteristic elements into the more distant view, including noise, colour and activity incongruent with the rural view.	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
				Olive	As above	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
				Black 1	The foreground of the view would remain unaltered, but the route option would be visible in the middle distance beyond intervening hedgerows and scattered trees. The construction works would add highly uncharacteristic elements into the view, including noise, colours and activity incongruent with the rural view. Some loss of hedgerows and tree cover, particularly around Pinstone House and Trunkquility treehouse may be discernible, further disrupting the view.	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse
				Black 2	As above	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 16 View east from PRow entrance to Livestock Market	This view is representative of users of the A4103 Roman Road, local PRow network and users of the livestock market. The view looks down the characteristically straight A4103 Roman Road, with pavements and cycle lane, lighting columns and crossing points creating urbanising elements in the view. A managed landscape to the right of the view towards the livestock markets incorporates maturing trees and hedgerows and grassed fields, with low-rise buildings and bunds in the middle distance largely blocking views beyond. To the left of the view, scrub land, arable fields and woodland contributes to the largely rural character of the view, with occasional housing visible in the distance adjacent to the road.	Moderate	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	The construction activities would be visible in the middle to far distance field of view, particularly to the right of the view where the existing openness will allow views towards the earthworks and road construction. Screening from intervening trees and hedgerows would, even in winter, provide some softening of the construction activities and traffic at operation, although both would be clearly discernible and slightly alter the nature of the existing rural views and level of relative tranquillity. Mitigation planting over time would fill in any potential gaps in the canopy and restore some of the existing hedgelines.	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse
				Yellow	As above	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse
				Cyan	The construction activities would be highly visible in the middle range field of view, particularly to the right of the view where the existing openness will allow clear, wide views of the earthworks and road construction. Whilst some screening would be obtained from intervening trees and hedgerows, in winter, the construction activities and traffic at operation would be distinctive and alter the nature of the existing rural views and level of relative tranquillity. Mitigation planting over time would reduce the harshness associated with the engineered solutions.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
				Red	The construction activities would be visible in the middle to far distance field of view, particularly to the right of the view where the existing openness would allow views towards the earthworks and road construction. Screening from intervening trees and hedgerows would, even in winter, provide some softening of the construction activities and traffic at operation, although both would be clearly discernible and slightly alter the nature of the existing rural views and level of relative tranquillity. Mitigation planting over time would fill in any potential gaps in the canopy and restore some of the existing hedgelines.	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse
				Olive	As above	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse
				Black 1	The construction activities would completely dominate the view, the openness of which in the foreground/middle distance will allow clear, wide views of the roundabout, earthworks and road construction. They would dominate and fundamentally alter the nature of the existing rural views and level of relative tranquillity. The road would pass through woodland around Pinstone House and Trunkquility tree house and their fishing lake, being on slight embankment throughout and further opening views along the route corridor. Mitigation planting over time could reduce the harshness associated with the engineered solutions. However, the route corridor would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.	Major	Large adverse	Major	Large adverse	Major	Large adverse
				Black 2	As above	Major	Large adverse	Major	Large adverse	Major	Large adverse
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 17 View south west from gateway PRow Tillington Road	A wide view across large arable fields edged with hedgerows and scattered trees. Glimpsed views of long-distance rolling hills visible beyond the foreground topography. Telegraph poles and wires and metal 5-bar gates slightly detract from the otherwise rural and peaceful views. The view is typical of users of the PRow network and Tillington Road.	Moderate	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	The route option would be partially in cutting at this point, with Tillington Road on slight embankment over. Whilst the local topography would provide some screening in the foreground at this point, the construction activities would still be clearly visible in the view, adding uncharacteristic noise, colour and activity into the rural view, substantially altering its character. At operation, the tops of vehicles are likely to be readily discernible beyond the foreground topography and on lower ground in the middle distance although mitigation planting on earthworks and along the route corridor may provide some screening, albeit at the expense of longer-distance views.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Yellow	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Cyan	The construction activities would completely dominate the view, the openness of which will allow clear, wide views of the bridge works over Tillington Road and accompanying earthworks. All longer	Major	Large adverse	Major	Large adverse	Major	Large adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
					distance views would be lost. The construction activities would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The proposed route option would span the existing Tillington Road via embankment and bridge, blocking views beyond. The sense of openness and tranquillity would be lost. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions but could not mitigate loss of openness and long-distance views. The bridge structure and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.						
				Red	As for Orange above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Olive	As above	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
				Black 1	As for Cyan above	Major	Large adverse	Major	Large adverse	Major	Large adverse
				Black 2	As above	Major	Large adverse	Major	Large adverse	Major	Large adverse
			3	All	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
VP 18 View south from shared open space Burghill Hospital development	A view across the Unregistered Park and Garden grounds of the former Burghill hospital and representative of residential receptors and users of the shared open space within the former Burghill hospital complex. The wide but partially contained rural view looks across a managed lawn area with mature specimen parkland trees, newly planted standard trees and grazing land beyond edged with further trees and hedgerows. The middle distance is occupied with a rolling rural landscape broken up by telegraph poles and wires, agricultural buildings and scattered housing.	High	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route corridor and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.	Major	Large adverse	Major	Large adverse	Moderate	Large adverse
				Yellow	As above	Major	Large adverse	Major	Large adverse	Moderate	Large adverse
				Cyan	As above	Major	Large adverse	Major	Large adverse	Moderate	Large adverse
				Red	As above	Major	Large adverse	Major	Large adverse	Moderate	Large adverse
				Olive	As above	Major	Large adverse	Major	Large adverse	Moderate	Large adverse
				Black 1	The construction activities would dominate the view, the openness of which would allow clear, wide views of the earthworks (bridge and embankment) over Tillington Road as well as the accompanying earthworks. The route option would be on embankment throughout the view in the middle distance and would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions. The route corridor and embankments would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering the character.	Major	Large adverse	Major	Large adverse	Major	Large adverse
				Black 2	As above	Major	Large adverse	Major	Large adverse	Major	Large adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
VP 19 View south from gateway in front of Burlton Court	A wide ranging view across a largely flat arable field edged with hedgerow, hedgerow trees and scrub. Long distance views towards distant wooded hills are glimpsed across a gently rolling agricultural landscape. The view is rural, fairly open and largely unblighted by detracting features. Roof tops of dwellings within the former Burghill hospital redevelopment as well as those within Burlton Court Farm are visible below the skyline in the valley. Canon Pyon Road is not readily visible in the view. The view is representative of users of the PRow network and Burlton Court.	Moderate	3	All	As above	Major	Large adverse	Major	Large adverse	Major	Large adverse
			1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	The route options would be in cutting beneath Canon Pyon Road and then largely on embankment to meet at grade with the A49. The construction activities, particularly in relation to the Canon Pyon bridge and the earthworks to the east are likely to be discernible in the view, adding uncharacteristic noise, colour and activity. Whilst the distance of the viewpoint from the proposed route options and the elevation of the viewpoint is likely to result in some screening of the construction activities and operational road, it is likely that the tops of traffic and any lighting would be visible, creating a detracting feature in part of the view. Mitigation planting over time would soften and potentially screen much of the route corridor from the view.	Moderate	Moderate adverse	Minor	Slight adverse	Minor	Slight adverse
VP 20 South west from inside gate to Burton Court Farm (Canon Pyon Road, Elton's Marsh)	A wide expansive view across a large, arable field edged with hedgerow, hedgerow trees and scrub. Long distance views towards distant hills are visible across a gently rolling agricultural landscape. The view is rural, open and largely unblighted by detracting features. Roof tops of dwellings within the former Burghill hospital are visible below the skyline and largely screened by vegetation and trees. Canon Pyon Road is not readily visible in the view. The view is representative of users of the PRow network and Canon Pyon Road	Moderate	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	The construction activities would be visible in longer distance views, particularly the earthworks and bridges for Tillington Road and Canon Pyon Road bridge. The rural nature of the view would be altered, along with the sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible, although the potential for mitigation planting on earthworks would, over time, add tree canopies into the view and provide some screening, as well as softening the harshness associated with the engineered solutions.	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
				Yellow	As above	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
				Cyan	As above	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
				Red	As above	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
				Olive	As above	Minor	Slight adverse	Minor	Slight adverse	Negligible	Neutral
				Black 1	The construction activities would be visible in longer distance views, particularly the earthworks and bridge works associated with crossing above Tillington Road and the Canon Pyon road bridge. The rural nature of the view would be altered, along with the sense of tranquillity due to construction activities. At operation, the tops of traffic may be discernible,	Moderate	Moderate adverse	Minor	Slight adverse	Minor	Slight adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
					particularly where the route option crosses over Tillington Road and the bridge for Canon Pylon Road. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions and provide some screening. The route corridor and embankments would remain a visible, uncharacteristic element in the view.						
				Black 2	As above	Moderate	Moderate adverse	Minor	Slight adverse	Minor	Slight adverse
			3	All	As above	Moderate	Moderate adverse	Minor	Slight adverse	Minor	Slight adverse
VP 21 View south from Arundel Farm (Lyde Arundel) Junction	A wide, expansive view across un-bounded arable field, tarmacked farm access and a wider agricultural landscape. The foreground and middle distance are largely flat, with views beyond towards distant row-rise hills. Hedgerows and scattered trees foreshorten parts of the view. The character of the view is one of tranquil, open countryside. Minor detracting features include telephone wires and traffic along Canon Pyon Road. The view is typical of users of Canon Pyon Road, residents and visitors to Lyde Arundel (wedding venue at Arundel Farm) and adjacent properties along Canon Pyon Road (including Stone House).	High	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	Whilst the foreground of the view would remain unaltered, the construction activities would be clearly visible beyond the hedgerow in the middle distance. They would add highly uncharacteristic noise, colour, materials and activity into the existing rural view and the Canon Pyon bridge would add a further uncharacteristic and visible element into the view. The route options at this point are largely on embankment so vehicles would be clearly visible at operation across the view, and using the Canon Pyon bridge. Mitigation planting would, in time, provide some screening although some blocking of longer views beyond may result.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
VP 22 View south east from PRoW Arundel Farm	This view is representative of users of the PRoW network, and users/visitors/ residents Of Arundel Farm (Lyde Arundel Wedding Venue). The view is partially enclosed by tall hedgerows and mature blocks of trees, largely blocking wider longer distance views. In the middle portion of the view, long distance views towards gently rolling hills are visible above intervening low-level hedgerows and scattered trees. The gardens and buildings of Arundel Farm are largely screened in the view by mature trees and vegetation. The overall view is one that is tranquil and rural in nature although partially contained.	High	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	Whilst the foreground of the view would remain unaltered but the middle distance view would fundamentally change from a rural one to uncharacteristic construction activities. The construction activities would be clearly visible beyond	Major	Large adverse	Moderate	Large adverse	Moderate	Moderate adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
					the hedgerow in the middle distance. They would add highly uncharacteristic noise, colour, materials and activity into the existing rural view and the Canon Pyon bridge would add a further uncharacteristic and visible element into the view. The route options at this point are largely on embankment so vehicles will be clearly visible at operation across the view, and using the Canon Pyon bridge. Mitigation planting would, in time, provide some screening although some blocking of longer views beyond may result.						
VP 23 View north from Gateway north of Hospital Farm	The view looks between trees and hedgerows across a relatively wide, rural agricultural landscape of fields bounded by low hedgerows and scattered trees. Low rolling hills of fields, hedgerows, trees and woodland foreshorten the view in the middle to longer distance. Minor detracting features include telephone wires and traffic along Canon Pyon Road. The view is typical of users of visitors to the traditional Orchard and Canon Pyon road.	Moderate	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	The construction activities would dominate the view, the relative openness and proximity of which would allow clear, wide views of the earthworks, including the bridge to take Canon Pyon Road. Whilst the route options would be in cutting beneath the Canon Pyon Road and for a portion of the view, it is then on embankment to the left of the view. The construction works would dominate and fundamentally alter the nature of the existing rural views and sense of tranquillity. The potential for mitigation planting on earthworks would, over time, reduce the harshness associated with the engineered solutions but the route corridor, embankments and bridge would remain a highly visible, engineered and uncharacteristic element in the view, fundamentally altering its character.	Major	Large adverse	Major	Large adverse	Moderate	Moderate adverse
VP 24 View north from PRoW north of Ayers Brook	A wide, open view across a rising arable field, foreshortened by telegraph poles and wires, hedgerows and scattered trees in the middle distance. Glimpses of distant hills are visible to the left of the view across a fall in the topography. The view is open, rural and tranquil and typical of the view experienced by users of the local PRoW network.	Moderate	1	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan + yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red + Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive + Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			2	Orange	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				yellow	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Cyan	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Red	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Olive	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 1	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
				Black 2	No view	No Change	Neutral	No Change	Neutral	No Change	Neutral
			3	All	The construction activities would be clearly visible in the middle distance beyond intervening low hedges. The route options are on embankment through much of the view, increasing visibility. Whilst at a little	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse

VP Ref	Description	Sensitivity	Element	Option	Description of impacts	Magnitude of Impact (Construction)	Significance of Effect (Construction)	Magnitude of Impact (Year 0)	Significance of Effect (Year 0)	Magnitude of Impact (Year 15)	Significance of Effect (Year 15)
					distance, the construction activities would disrupt the rural and tranquil nature of the view, with the footpath leading towards a construction site. Uncharacteristic noise, colour and patterns would create a detracting focal point in the view. Mitigation planting may help to soften harsh engineering solutions over time, but traffic is likely to remain visible.						
VP 25 View north west from Holmer Churchyard	The view from the churchyard looks across an agricultural landscape and gently rolling topography. The topography allows some long-distant views toward gently rolling hills. Fields are largely bounded by hedgerows and scattered trees although some are demarcated by post and wire fencing (edging Ayles Brook). Further detracting features include numerous telephone wire and pikes. The buildings of Holmer House and farm are visible to the right of the view. The view is typical of users of the PRoW network and visitors to Holmer Parish Church (St. Bartholomew's), Churchyard and adjacent residential properties.	High	1	Orange	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
				Cyan + yellow	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
				Red + Black 2	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
				Olive + Black 1	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
			2	Orange	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
				yellow	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
				Cyan	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
				Red	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
				Olive	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
				Black 1	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
				Black 2	No Change	Neutral	No Change	Neutral	No Change	Neutral	No Change
			3	All	Construction activities would considerably disrupt the view in the middle distance, particularly the section in cutting against the adjacent hillside. The route options for much of the view are on embankment, raising it slightly above the foreground topography. Whilst local topography, hedgerows and trees provide some screening, the construction activities would provide a very disruptive and uncharacteristic element in the view. At operation, traffic would be clearly visible until mitigation planting starts to provide some screening and softening of the harsh engineering solutions. The route options would still be a discordant element in the view.	Moderate	Moderate adverse	Moderate	Moderate adverse	Minor	Slight adverse

Appendix 7-4

ARBORICULTURAL REPORT



Balfour Beatty
Living Places

Herefordshire Council

HEREFORD TRANSPORT PACKAGE: HEREFORD BYPASS

Arboricultural Report



Herefordshire **Council**

HEREFORD TRANSPORT PACKAGE: HEREFORD BYPASS

Arboricultural Report

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DATE: MAY 2018

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HEREFORD TRANSPORT PACKAGE: HEREFORD BYPASS

Arboricultural Report

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1 INTRODUCTION

1.1 INTRODUCTION

- 1.1.1. WSP has been commissioned by Balfour Beatty Living Places on behalf of Herefordshire Council to undertake an arboricultural survey within the Hereford Bypass Core Strategy area and to subsequently provide an Arboricultural Report for the bypass scheme (the Proposed Scheme). The survey and report will be used to inform the highway corridor design, assessment and selection process and subsequently the environmental impact assessment of the preferred route of the Hereford Bypass.
- 1.1.2. This report describes and evaluates high value elements of the arboricultural resource within the study area. It identifies the likelihood of potential significant effects on high value arboricultural features associated with the seven shortlisted route corridors as identified in the Stage 1 WebTAG Corridor Appraisal Framework (CAF) report. At this stage the assessment is based on a 2D design. The findings of the assessment are intended to inform the decision making process for determining a Preferred Route and whether appropriate design and mitigation can reduce these.

2 LEGISLATION AND POLICY FRAMEWORK

2.1 LEGISLATIVE FRAMEWORK

2.1.1. Legislation of specific relevance to this report are outlined below:

TREE PRESERVATION ORDERS

2.1.2. The Town and Country Planning Act 1990 places a duty upon local planning authorities to make provision for the preservation and planting of trees when granting permission for new development (Ref. 11.2). It also affords local planning authorities with the power to make Tree Preservation Orders (TPO) where it is expedient in the interests of amenity to make provision for the preservation of trees and woodlands (Ref. 11.3).

Purpose of a Tree Preservation Order

2.1.3. The purpose of a TPO is to protect specific trees, groups of trees and woodlands for the purpose of amenity. In the Secretary of State's view 'Orders should be used to protect trees and woodlands if their removal would have a significant negative impact on the local environment and its enjoyment by the public' (Ref. 11.4).

2.1.4. A TPO does not prevent the removal of trees in order to implement development. It does however prevent their unauthorised removal and ensures that they can be fully considered when determining whether development is appropriate and acceptable.

2.1.5. A TPO makes it a statutory offence to carry out any of the following works to trees without the formal consent of the Local Planning Authority (LPA):

- cutting down;
- topping;
- lopping;
- uprooting;
- wilful damage, and;
- wilful destruction

2.2 PLANNING POLICY

2.2.1. National and local planning policies of specific relevance to this report are outlined below:

NATIONAL POLICY

National Policy Statement for National Networks

2.2.2. The National Policy Statement for National Networks (NPSNN) includes guidance relevant to trees in chapter 5: Generic impacts. Paragraph 5.32 of this chapter states that:

"The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss."

2.2.3. Paragraph 5.32 of the NPSNN further states that in instances where such trees would be affected by the proposed development then the applicant should either provide proposals for their conservation or give reasons for their loss.

LOCAL PLANNING POLICY

Hereford Local Plan – Core Strategy

- 2.2.4. The Core Study Area lies within the planning authority of Herefordshire Council, a Unitary Authority. The Hereford Local Plan – Core Strategy adopted 16 October 2015¹ provides the strategic planning framework for the county's future development needs up to 2031. Policies LD1 and LD3 within the Local Plan relate to arboriculture (and replace policies within the former Unitary Development Plan). These policies are outlined below:

Policy LD1 – Landscape and townscape:

- *Requires new development to maintain and extend tree cover where important to amenity through the retention of important trees, appropriate replacement of trees lost through new development and new planting to support green infrastructure.*

Policy LD3 – Green infrastructure:

- *Policy aims to ensure that new development identifies and retains existing valued trees, hedgerows and woodlands.*

OTHER GUIDANCE

- 2.2.5. Other guidance of specific relevance to this report is outlined below:

British Standard BS 5837:2012

- 2.2.6. British Standard BS 5837:2012 *Trees in relation to design, demolition and construction – Recommendations* (BS 5837:2012) provides recommendations and guidance on the relationship between trees and design, demolition and construction processes. It sets out principles and procedures to be applied to achieve a harmonious and sustainable relationship between trees and structures and is applicable whether or not planning consent is required.

Ancient woodland and veteran trees: protecting them from development

- 2.2.7. The Forestry Commission and Natural England published guidance on 13 October 2013 to provide information for the protection of ancient woodland and veteran trees from development². This guidance was subsequently updated on 4th January 2018 and advises the following:
- A buffer zone of semi-natural habitat should be left of at least 15 metres between any development and ancient woodland.
 - A buffer zone should be left between any veteran, ancient or aged tree and proposed development of at least 15 times the diameter of its stem or 5m from the edge of its canopy, if that is greater.

¹ Herefordshire Council, Herefordshire Local Plan Core Strategy 2011-2031, adopted October 2015

² <https://www.gov.uk/guidance/ancient-woodland-and-veteran-trees-protection-surveys-licences>, updated 4th January 2018, accessed 18 January 2018

3 BASELINE DATA COLLECTION

3.1 STUDY AREA

- 3.1.1. The study area has been defined as the combined footprint of all seven short listed route corridors plus a 200 metre buffer. This attempts to account for all trees which may be affected by each route and includes an allowance for future amendments to route alignment and variations in the extent of potential land-take.
- 3.1.2. The overall extent of the study area is shown in Figure 1 included within Appendix C of this report.

3.2 METHOD OF BASELINE DATA COLLECTION

DESK STUDY

- 3.2.1. A desk-study has been undertaken as a means of identifying any statutory and non-statutory constraints which may apply to arboricultural features within the Study Area. The desk-based review has considered the following sources:

Tree Preservation Orders and Conservation Areas

- 3.2.2. Herefordshire Council is responsible for implementing any legal controls imposed through TPOs and conservation areas within the study area. The statutory status of trees within the study area was checked using Herefordshire Council's administrative mapping service³ on 15 February 2018.

Notable, Ancient and Veteran Trees

- 3.2.3. The presence of locally notable, ancient and veteran trees within the study area was checked using the Woodland Trusts online ancient tree hunt interactive map⁴ on 15 February 2018.

Ancient Woodland

- 3.2.4. The presence of ancient woodlands within the study area was checked using Natural England's Multi Agency Geographical Information for the Countryside (MAGIC) map⁵ on 15 February 2018.

SITE VISIT / SURVEYS

- 3.2.5. A walkover survey of all arboricultural features within the study area was undertaken between 19 February and 1 March 2018.
- 3.2.6. The survey was undertaken in accordance with British Standard BS 5837:2012 with Ordnance Survey MasterMap, topographical survey data and aerial photography forming the base mapping. The survey was undertaken in accordance with the following criteria:
 - Only high and medium value arboricultural features have been recorded. High and medium value arboricultural features are defined as category A trees⁶; ancient, veteran and notable trees; ancient woodland and those covered by a Tree Preservation Orders.
 - Trees have been recorded as groups where this has been deemed appropriate. Groups have been recorded on the basis that they form distinct arboricultural features either aerodynamically, visually or because they contain trees of similar cultural and biodiversity value.
 - Trees have been inspected using the Visual Tree Assessment methodology as purported by Mattheck and Breloer (Mattheck & Breloer, 2006).
 - Arboricultural features have been categorised in accordance with Table 17 in Appendix A of this report.
 - The survey was carried out from ground level only.
 - No tissue samples were taken nor was any internal investigation of the subject trees undertaken.
 - Heights and canopy spreads have been estimated to the nearest 1m.

³ https://www.herefordshire.gov.uk/info/200152/elections/258/administrative_map

⁴ www.ancient-ancient-tree-hunt.org.uk

⁵ www.magic.gov.uk

⁶ British Standard BS 5837:2012 Table 1

- 3.2.7. Stem diameters have been measured in accordance with Annex C of BS 5837:2012. Diameters of single stem trees on level ground have been measured at 1.5m above ground level. The diameters of other commonly encountered stems have been measured where most appropriate and this is recorded within the schedule.
- 3.2.8. The combined stem diameters for multi-stemmed trees have been calculated in accordance with BS 5837:2012 paragraph 4.6.1. Root Protection Areas are calculated as an area equivalent to a circle with a radius 12 times the stem diameter.

NOTES AND LIMITATIONS

- 3.2.9. The survey has been conducted from publically accessible land or from land where access has been formally agreed. In instances where arboricultural features are wholly or partly on inaccessible land then all data has been estimated based upon what can be seen from the nearest safe point of access.
- 3.2.10. The position of arboricultural features not recorded on a topographical survey has been estimated using aerial photography. The position and extent of these features should be regarded as approximate only.

4 BASELINE CONDITIONS

4.1 DESK STUDY

- 4.1.1. The desk study confirmed the presence of 141 notable trees, 115 veteran trees, 21 ancient trees and five areas of ancient semi-natural woodland within the Study Area. Three tree preservation orders were also identified protecting a total of 12 individual trees and two wooded areas.

TREE PRESERVATION ORDERS

- 4.1.2. The arboricultural features listed in Table 1 have been identified as being afforded statutory protection by virtue of a TPO.

Table 1 - Arboricultural features covered by a TPO

Reference number	TPO Name
T1922, T1923, T1931, T1932, T1933, T1936, T1938, T1939, T1941, W102	TPO 091, Breinton
T1902, T1946	TPO 150, Conifer Walk, Kings Acre Road
T1621	TPO 214, 353 Kings Acre Road
W119	TPO 371, St Mary's Hospital, Burghill

Amenity Value

- 4.1.3. Government advice indicates that trees which are to be included within a TPO should exhibit a minimum level of current or future amenity value. This should be assessed by the LPA in a structured and consistent manner with Government advice making reference to the following requirements.

Visibility

- 4.1.4. Trees should be visible, in whole or in part, from a public place such as a road, footpath or publically accessible land.

Value

- 4.1.5. Public visibility is in itself not sufficient to warrant inclusion within a TPO. Arboricultural features should also exhibit merit in terms of one or more of the following criteria:

- Size and form.
- Future potential.
- Rarity, cultural or historical value.
- Contribution to, and relationship with, the landscape.
- Contribution to the character or appearance of a conservation area.

Other Factors

- 4.1.6. Other factors such as nature conservation may be considered when making a TPO but on their own would not warrant making an Order.

Significance of a Tree Preservation Order

- 4.1.7. The presence of a TPO does not automatically prevent removal of a tree to facilitate development. It does however indicate that Herefordshire Council considers the tree to be valuable in terms of amenity and that its loss would have a significant effect on the local environment. Trees protected by a TPO should normally be categorised as A category trees in terms of BS 5837:2012 Table 1 and would qualify as medium or high value features for the purposes of this report.
- 4.1.8. The loss of trees with TPOs may be considered contrary to local planning policy LD1 and should be fully justifiable in terms of the overall benefits provided by the Proposed Scheme.

ANCIENT, VETERAN AND NOTABLE TREES

- 4.1.9. The arboricultural features listed in Table 2 have been identified as potential ancient, veteran or notable trees.

Table 2 – Potential ancient, veteran and notable trees

Reference number	Data Source
T1697,T1698,T1699,T1683,T1680,T1681,T1589,T1590,T1588,T1686,T168,T1692,T1691,T1502,T1717,T1693,T1595,T1700,T1572,T1596,T1597,T167,T1675,T1673,T1586,T1585,T1570,T1668,T1667,T1669,T1601,T1534,T153,T1538,T1539,T1540,T1541,T1531,T1613,T1614,T1545,T1546,T1619,T162,T1628,T1639,T1635,T1637,T1640,T1651,T1646,T1647,T1659,T1713,T171,T1591,T1587,T1592,T1603,T1641	Preliminary survey data (December 2017)
162487,162448,155750,153410,15446,15447,153736,153413,153396,153397,153393,153392,153402,153404,153405,153407,153391,162310,153774,157742,162422,162427,162428,162429,162430,162431,162432,162433,162434,162435,162436,162437,162438,162439,162440,162442,162443,162444,162445,162441,162446,162447,162448,162449,162450,162464,162465,162446,162468,162470,162469,162471,162444,162473,162474,162476,162477,162478,162438,162480,162481,162482,162483,162484,162485,162486,162423,162424,162425,162486,162421,110495,154445,142103,153395,153412,153411,153408,153367,153368,158751,158753,162340,153775,153773,153772,157659,162309,162307,162308,157743,157741,157749,157748,157747,157740,157739,162467,110494,110496	Woodland Trust – Ancient Tree Hunt

- 4.1.10. An ancient tree may be defined as one ‘that has passed beyond maturity and is old, or aged, in comparison with other trees of the same species’⁷. Similarly, it may also be defined as one that has all or several of the following characteristics⁸:
- Biological, aesthetic or cultural interest because of its great age
 - A growth stage that is described as ancient or post-mature; and
 - A chronological age that is old relative to others of the same species
- 4.1.11. A veteran tree is one that possesses the physical characteristics of an ancient tree but which is not aged in comparison with other trees of the same species. Thus a veteran tree may not necessarily be particularly old but, due to the rigours of life, may exhibit signs of ancientness.
- 4.1.12. Ancient and veteran trees are of considerable interest due to their cultural, historical, landscape and conservation values. They can be found in many locations including woodlands, wood pastures, parklands, hedgerow, orchards and other areas.
- 4.1.13. The cultural, historical, landscape and conservation values associated with ancient and veteran trees mean that they should automatically be assigned category A3 when undertaking a quality assessment in accordance with BS 5837:2012 Table 1⁹. The ability of such trees to provide many important benefits even if not alive means that this assessment criterion should apply whether physiologically declining or dead¹⁰.

⁷ The Woodland Trust. *Ancient Tree Guide No.4: What are ancient, veteran and other trees of special interest?*. [pdf] Ancient Tree Forum. Available at: <http://www.ancienttreeforum.co.uk/wp-content/uploads/2015/02/ancient-tree-guide-4-definitions.pdf> [Accessed 13 December 2017].

⁸ Owen, K. and Alderman, D., 2008. *The minimum girth of Ancient Trees*. [pdf]. Available at: <http://www.ancient-tree-hunt.org.uk/NR/rdonlyres/9584AE3E-951C-4C91-AE6F-4A62574459D0/0/VerifierGirthGuidelines.pdf> [Accessed 13 December 2017].

⁹ British Standards Institute, 2012. *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*. London: BSI.

¹⁰ The woodland Trust. *Ancient Tree Guides No.3: Trees and development*. [pdf] Ancient Tree Forum. Available at: <http://www.ancienttreeforum.co.uk/wp-content/uploads/2015/02/ancient-tree-guide-3-development.pdf> [Accessed 13 December 2017].

- 4.1.14. For the purposes of this report ancient and veteran trees are regarded as high value features and form part of a finite resource which is of national importance.
- 4.1.15. Notable trees are generally recorded as such based upon their maturity, size (height and/or girth) and importance within the local environment. Notable trees do not necessarily have to be particularly old and nor do they have to exhibit any veteran characteristics.
- 4.1.16. The arboricultural and landscape values associated with notable trees mean that they should automatically be assigned category A1 or A2 when undertaking a quality assessment in accordance with BS 5837:2012 Table 1¹¹.
- 4.1.17. For the purposes of this report notable trees are regarded as medium value features and form part of a finite resource which is of local importance.

Ancient Woodland

- 4.1.18. The arboricultural features listed in Table 3 have been identified as ancient woodland.

Table 3 – Ancient woodland sites

Reference number	Name	Status
W902	Newton Coppice	Plantation on ancient woodland site (PAWS)
W1517	Wye Coppice	Plantation on ancient woodland site (PAWS)
W1530	Green Lane Wood	Ancient semi-natural woodland
W1678	Rough Coppice	Ancient semi-natural woodland
W1724	Hundertton Wood	Ancient semi-natural woodland

- 4.1.19. Ancient woodland is defined as any area that has been continuously wooded¹² since 1600 AD and accounts for approximately 2% of the United Kingdom's land area¹³. It is valued for its wildlife which may include rare or threatened species, its soils, its amenity value and its importance as a cultural, historical and landscape resource. Ancient woodland takes hundreds of years to establish and is an irreplaceable resource.
- 4.1.20. Ancient woodland includes both ancient semi-natural woodland (ASNW) and PAWS. Ancient semi-natural woodland consists predominately of naturally regenerating trees which are native to the site. Trees within ancient semi-natural woodland will be well suited to local environmental conditions, will be closely integrated into the ecology of the woodland and may represent a unique genetic resource.
- 4.1.21. Plantations on ancient woodland sites are those woodlands where the native trees have been removed and replaced with imported coniferous or broadleaved trees. These woodlands will still exhibit ancient woodland features including soils, flora and fauna and other historic features.
- 4.1.22. There is no distinction between ASNW and PAWS insofar as they are both identified as ancient woodland for the purposes of the National Planning Policy Framework¹⁴. The cultural and conservation values associated with ASNW and PAWS mean that they should automatically be assigned category A3 when undertaking a quality assessment in accordance with BS 5837:2012 Table 1¹⁵. The existing condition of ancient woodland

¹¹ British Standards Institute, 2012. *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*. London: BSI.

¹² This excludes the presence of open areas within the woodland and the periodic felling of trees either over its full extent or in part. Neither of these features/actions will necessarily negatively impact upon the value of the woodland and, in the instance of open areas, often has a positive effect on diversity of habitat.

¹³ The Woodland Trust. *Ancient Woodland*. [online] Available at: <https://www.woodlandtrust.org.uk/visiting-woods/trees-woods-and-wildlife/woodland-habitats/ancient-woodland/> [Accessed 7 December 2017].

¹⁴ Department for Communities and Local Government, *Guidance – Natural Environment* [online] Available at: <https://www.gov.uk/guidance/natural-environment> [Accessed 12 December 2017].

¹⁵ British Standards Institute, 2012. *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*. London: BSI.

should not influence its quality assessment as, if poor this can usually be improved with appropriate management¹⁶.

- 4.1.23. Due to the irreplaceable nature of ancient woodland any loss or deterioration can only be partially compensated. Compensation measures must be determined on a site specific basis and may include planting new native woodland and the implementation of positive management activities.
- 4.1.24. For the purposes of this report ancient woodland is regarded as part of a finite resource which is of national importance.

4.2 SITE VISIT / SURVEY

- 4.2.1. A total of 287 arboricultural features were surveyed details of which are provided within the Survey Schedule included in Appendix B of this report. A summary of the surveyed features including their category¹⁷ and designation is provided in Table 4.

Table 4 - Summary of surveyed arboricultural features

BS 5837 CATEGORY/SUB- CATEGORY	DESIGNATION STATUS	TREES	WOODLANDS	TOTAL
A1 / A3	No designation	3	2	5
A1	Notable tree	141	0	141
A3	Veteran tree	115	0	115
A3	Ancient tree	21	0	21
A3	Ancient Woodland	0	5	5
TOTAL		280	7	287

Sub-category

- 4.2.2. The value associated with each arboricultural feature is defined by its sub-category. Sub-categories carry equal weight, do not influence retention priority and are simply included to indicate the primary value(s) associated with each feature. Sub-categories are defined as follows:

Sub-category	Area of value	Description
1	Arboricultural	Trees that are of particularly good examples of their species (e.g. notable specimens), especially if rare or unusual; or those that are essential components of groups, or of formal or semi-formal arboricultural features (e.g. the dominant and/or principle trees within an avenue).
3	Cultural	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. ancient trees, veteran trees and ancient woodland).

¹⁶ Department for Communities and Local Government, Guidance – *Ancient woodland and veteran trees; protecting them from development* [Online] Available at: <https://www.gov.uk/guidance/ancient-woodland-and-veteran-trees-protection-surveys-licences> [Accessed 13 December 2017].

¹⁷ Categories are assigned based upon the criteria described within British Standard BS 5837:2012 Table 1.

- 4.2.3. The tree survey identified a total of 144 individual trees that have been assessed primarily on their arboricultural merits (sub-category 1); these include 141 notable trees and three category A trees without any identified designation. A further 136 trees were assessed primarily for their cultural value (sub-category 3) and include 21 ancient trees and 115 veteran trees. All seven woodlands identified during the site visit were assessed primarily on their cultural value (sub-category 3) and include five ancient woodlands and two category A woodlands protected by a Tree Preservation Order.

Individual Trees

- 4.2.4. A total of 24 different species of individual native and non-native trees were identified during the site survey. The most common of which were oak (*Quercus spp.*) and lime (*Tilia spp.*). These account for over half of the surveyed arboricultural resource with oaks accounting for 32% and limes for 18%. Pear (*Pyrus spp.*), yew (*Taxus spp.*) and apple (*Malus spp.*) account for a further 20 % of the resource. The remaining species are predominately native with the occasional exotic specimen which is most likely the result of a Victorian planting scheme.

Woodlands

- 4.2.5. Woodlands identified in the survey contain mainly oak, ash (*Fraxinus spp.*), cherry (*Prunus spp.*) and yew with an understorey of hazel (*Corylus spp.*), hawthorn (*Crataegus spp.*) and holly (*Ilex spp.*). Category A Woodland W102 also contains beech (*Fagus spp.*), Scots pine (*Pinus sylvestris*) and willow (*Salix spp.*).

FUTURE BASELINE

- 4.2.6. Trees and woodlands within the United Kingdom are currently under threat from a range of different environmental factors including pests, diseases and the effects of climate change. Resilience to threats at a population level can be achieved by ensuring that there is a diverse range of species present, that trees are adequately represented in all age groups from young to old and that those present are well suited to local environmental conditions.
- 4.2.7. The identified arboricultural resource within the study area is reasonably diverse and unlikely to undergo any significant change in the future. However the high prevalence of oak and lime trees signifies that an outbreak of a pest and/or disease specific to either genus would have the potential to adversely affect up to a third of the individual arboricultural resource. The likelihood of such an event occurring is considered to be low but cannot be fully discounted.

5 POTENTIAL IMPACTS, MITIGATION AND COMPENSATION

5.1 POTENTIAL IMPACTS

5.1.1. Potentially adverse arboricultural impacts associated with the construction of each of the route corridors have been identified as including the following:

- Damage to, or the removal of, trees including those growing within ancient woodland;
- Severance of tree roots caused by excavation;
- Damage to soil and roots caused by compaction;
- Damage to soil and roots caused by pollutants and contaminated surface run-off;
- The smothering of trees due to significant accumulations of dust, and;
- The inappropriate pruning of trees in order to facilitate access.

5.2 MITIGATION AND COMPENSATION

5.2.1. Potentially adverse arboricultural impacts associated with the construction of each of the route corridors may be mitigated through the application of the following measures:

ANCIENT AND VETERAN TREES

Design:

- Design work must seek to avoid the loss or deterioration of ancient and veteran trees unless adverse effects are clearly outweighed by the need for, and benefits of, the development in that location.
- Ensure sufficient space is left around ancient and veteran trees such that they remain unaffected by operational requirements.
- The identification and protection of other trees (notable specimens) which have the future capacity to become ancient or veteran; and
- The establishment of new trees of the same species in proximity to ancient and veteran trees; each with sufficient space to develop a full crown.

Construction:

- Establish a construction exclusion zone (CEZ) around ancient and veteran trees. This should be a minimum of 15 metres to avoid root damage and may need to be larger where other impacts are concerned (e.g. airborne pollutants).
- Protect trees from dust through the use of suitable screens or dust suppression measures.

ANCIENT WOODLAND

Design:

- Design work must seek to avoid the loss or deterioration of ancient woodland unless adverse effects are clearly outweighed by the need for, and benefits of, the development in that location.
- Ensure sufficient space is left around the edge of ancient woodland such that it remains unaffected by operational requirements; and
- The establishment of new native woodland which links or directly abuts the ancient woodland site.

Construction:

- Establish a construction exclusion zone (CEZ) around the edge of ancient woodland. This should be a minimum of 15 metres to avoid root damage and may need to be larger where other impacts are concerned (e.g. airborne pollutants)¹⁸; and
- Protect trees from dust through the use of suitable screens or dust suppression measures.

¹⁸ Department for Communities and Local Government, Guidance – *Ancient woodland and veteran trees; protecting them from development* [Online] Available at: <https://www.gov.uk/guidance/ancient-woodland-and-veteran-trees-protection-surveys-licences> [Accessed 13 December 2017]

OTHER TREES, GROUPS AND WOODLANDS

Design:

- Design work must seek to avoid the loss of trees, groups and woodlands wherever possible; and
- Ensure sufficient space is left around trees such that they remain unaffected by operational requirements.

Construction:

- Establish a construction exclusion zone (CEZ) around retained trees, groups and woodlands; and
- Protect trees from dust through the use of suitable screens or dust suppression measures.

REPLACEMENT PLANTING

- 5.2.2. It is unlikely that the loss of any of the identified arboricultural resource could be adequately mitigated through replacement planting. Any planting associated with the Proposed Scheme would over time begin to compensate for removals but their loss must be viewed as a permanent degradation of the existing arboricultural resource.

6 ASSESSMENT OF EFFECTS METHODOLOGY

6.1 ASSESSMENT METHODOLOGY

- 6.1.1. The objective of this arboricultural assessment is to gain an appreciation of the significant arboricultural effects that are likely to arise from the construction of each of the seven route corridors on the existing baseline arboricultural resource.
- 6.1.2. This is achieved by comparing the arboricultural effects associated with the construction of each of the seven route corridors against those that are likely to occur in the absence of each of the proposed route corridors over a period of time.
- 6.1.3. Significant arboricultural effects are identified in a qualitative manner and may be either positive (beneficial) or negative (adverse). Significant arboricultural effects are formulated as a function of the baseline arboricultural value and the magnitude of impact with significance criteria used as a means of reporting beneficial or adverse change.
- 6.1.4. Further details of the descriptions and criteria used to define arboricultural effects are provided in Appendix A of this report.

ASSUMPTIONS AND LIMITATIONS

Assumptions

- 6.1.5. The assessment of effects is based upon the following assumptions:
- That a 2m working area will be required around the footprint of each route corridor;
 - That no work which may have an adverse impact on arboricultural features will occur outside of the two metre working area, and;
 - That all trees identified for retention can be fully protected during the construction process.

Limitations

- 6.1.6. The assessment of effects is based upon the following limitations:
- The assessment is based solely upon the footprint of each route corridor as shown in Figures 2 to 8 in Appendix C. It does not account for any highway design features which may be required but which are not yet known (e.g. balancing ponds, boundary fencing, underground services, sightlines, drains/ditches and lighting columns);
 - The assessment does not take account of the operational requirements associated with each of the proposed route corridors (e.g. access for maintenance and hazard assessments associated with changes in land-use);
 - Land take for construction purposes is limited to a 2m buffer around the footprint of each route corridor; and
 - The assessment excludes any adverse arboricultural effects which may arise due to changes in groundwater levels and airborne particulates

SPATIAL AND TEMPORAL SCOPE

- 6.1.7. This assessment considers effects associated with the construction of each route corridor (year 1). It does not include an assessment of operational effects as these are unknown at this stage.

VALUE (SENSITIVITY) OF BASELINE ARBORICULTURAL RESOURCE

- 6.1.8. Each element of the arboricultural resource has been assigned a value in accordance with the criteria outlined in Table 17 of Appendix A. The value assigned to each arboricultural feature has been allocated on the basis of its condition at the time of the survey. No account has been made of the future potential of any group where this is contingent on appropriate management being undertaken to promote the development of better specimens.

- 6.1.9. Value has been assigned solely on the arboricultural merits of each feature. Values do not account for their ecological or landscape merits each of which is discussed elsewhere within the main Environmental Assessment Report.
- 6.1.10. The following table shows the value (sensitivity) of the arboricultural resource by designation.

Table 5: Value (Sensitivity) of the Arboricultural Resource by designation

VALUE (SENSITIVITY)	DESIGNATION STATUS	TREES	GROUPS	WOODLANDS	TOTAL
Medium	No designation	3	0	2	5
Medium	Notable tree	141	0	0	141
High	Veteran tree	115	0	0	115
High	Ancient tree	21	0	0	21
High	Ancient Woodland	0	0	5	5

High Value Arboricultural Features

- 6.1.11. These features include trees or woodlands which, because of their great age, size or habitat continuity are of exceptional value as arboricultural or cultural features (e.g. ancient or veteran trees and ancient woodland).

Medium Value Arboricultural Features

- 6.1.12. Trees and woodlands assigned a medium value include those with identifiable arboricultural values and including specimens which are particularly good examples of their species, especially if rare or unusual (e.g. notable specimens and other category A trees). This value is also assigned to woodlands with identified visual, arboricultural or cultural importance (e.g. category A woodlands without ancient woodland designation).

7 ASSESSMENT OF EFFECTS

- 7.1.1. The likely arboricultural effects associated with the construction of each of the seven route corridors on the baseline resource have been assessed.
- 7.1.2. The effects associated with the operation of each of the seven route options has not been assessed as we do not have sufficient information regarding operational requirements and proposed mitigation at this stage. However, due to the size, age and value of the trees which will potentially be affected any adverse impacts are unlikely to be mitigated by replacement tree planting especially over time frames measured in less than several decades. As such operational effects are likely to remain similar to those at the time of construction.

7.2 MAGNITUDE OF IMPACT

- 7.2.1. The criteria identified in Table 6 have been used to determine the magnitude of adverse impacts associated with medium and high value arboricultural features.

Table 6 – Magnitude of impact – arboricultural descriptors

Magnitude Of Impact	Typical Arboricultural Descriptors
Major	Major damage to many trees Loss of a number of trees
Moderate	Major damage to a number of trees Loss of a single tree
Minor	Major damage to a single tree Minor damage to a number of trees
Negligible	Minor damage to a single tree
No change	No impact

- 7.2.2. Magnitude of impact has been assessed based upon the number of arboricultural features identified as being removed.

7.3 INCURSIONS INTO RECOMMENDED ‘BUFFER ZONES’ ANCIENT WOODLAND

- 7.3.1. Standing advice “Ancient woodland and veteran trees: protecting them from development” (Standing Advice) recommends that a minimum of 15m buffer of semi-natural habitat should be left between any development and the edge of ancient woodland.
- 7.3.2. Each of the route corridors has been evaluated and where there is as an incursion into the 15m buffer zone there may be a requirement to remove trees from the woodland edge. Given that the individual stem diameters of trees on the woodland edge are currently unknown a worst case scenario to include multiple tree removals has been assumed and the impact and effects assessed accordingly.

ANCIENT AND VETERAN TREES

- 7.3.3. Standing advice further states that a buffer zone should be left between any ancient or veteran tree and proposed development of at least 15 times the diameter of its stem or 5m from the edge of its canopy, if that's greater.
- 7.3.4. Where there are minor incursions into the buffer zone of ancient and veteran trees the significance of the potential impacts have been assessed on a tree by tree basis. Where potential impacts to the health of the tree have been assessed as non-significant to their long term retention these trees have been identified as being retained. This assessment will however rely on robust and continuous tree protection being deployed during the entire construction phase.

7.4 ASSESSMENT OF EFFECTS

ORANGE ROUTE CORRIDOR

Table 7 - Potential magnitude of impacts and significance of effects for Orange Route Corridor

Status	BS 5837 Category	Sensitivity Value	TOTAL	Retained	Removed	Incursion into ancient woodland buffer zone	Construction	
							Magnitude of impact	Significance of effect
Ancient Tree	A	High	21	19	2	N/A	Major (Adverse)	Very Large (Adverse)
Veteran Tree	A	High	115	107	8	N/A	Major (Adverse)	Very Large (Adverse)
Ancient Woodland	A	High	5	5	0	1	Moderate (Adverse)	Large (Adverse)
Notable Tree	A	Medium	141	112	29	N/A	Major (Adverse)	Large (Adverse)
None	A	Medium	5	3	0	N/A	No change	Neutral

- 7.4.1. Tree removals associated with the Orange corridor are shown in Figure 2 in Appendix C.
- 7.4.2. Effects associated with the construction of the Orange route corridor on various elements of the arboricultural resource range from neutral to very large adverse. Effects occur as a result of the loss of two ancient trees, eight veteran trees, 29 notable trees and the incursion into the recommended 15m buffer zone surrounding one area of ancient woodland.
- 7.4.3. Additional impacts associated with the loss of these high and medium value trees include the removal of two trees covered by Tree Preservation Order TPO 091.
- 7.4.4. NPSNN identifies ancient and veteran trees as potential constraints to development. It states that the loss of these trees should be justifiable by the national need for and benefits of the Proposed Scheme clearly outweighing the loss. Failure to adequately justify the loss of ancient or veteran trees may be considered as contrary to the NPSNN.
- 7.4.5. Notable and trees with TPOs are those which are important within their immediate surroundings. Unless adequately justified the loss of these trees may be viewed as contrary to local planning policy LD1.
- 7.4.6. The significant incursion into the recommended buffer zone of ancient woodland W1678 and the minor incursion into the buffer zone of one ancient tree and two veteran trees may be seen as contrary to the Standing Advice recommendations for minimum distances between development and ancient/veteran trees and ancient woodland.

CYAN ROUTE CORRIDOR

Table 8 - Potential magnitude of impacts and significance of effects for Cyan Route Corridor

Status	BS 5837 Category	Sensitivity Value	TOTAL	Retained	Removed	Incursion into ancient woodland buffer zone	Construction	
							Magnitude of impact	Significance of effect
Ancient Tree	A	High	21	20	1	N/A	Moderate (Adverse)	Large (Adverse)
Veteran Tree	A	High	115	110	5	N/A	Major (Adverse)	Very Large (Adverse)
Ancient Woodland	A	High	5	5	0	1	Moderate (Adverse)	Large (Adverse)
Notable Tree	A	Medium	141	123	18	N/A	Major (Adverse)	Large (Adverse)
None	A	Medium	3	3	0	N/A	No change	Neutral

- 7.4.7. Tree removals associated with the Cyan corridor are shown in Figure 3 in Appendix C.
- 7.4.8. Effects associated with the construction of the Cyan route corridor on various elements of the arboricultural resource range from neutral to very large adverse. Effects occur as a result of the loss of one ancient tree, five veteran trees, 18 notable trees and the incursion into the recommended 15m buffer zone surrounding one area of ancient woodland.
- 7.4.9. Additional impacts associated with the loss of these high and medium value trees include the removal of one tree covered by Tree Preservation Order TPO 091.
- 7.4.10. NPSNN identifies ancient and veteran trees as potential constraints to development. It states that the loss of these trees should be justifiable by the national need for and benefits of the Proposed Scheme clearly outweighing the loss. Failure to adequately justify the loss of ancient or veteran trees may be considered as contrary to the NPSNN.
- 7.4.11. Notable and tree with TPOs are those which are important within their immediate surroundings. Unless adequately justified the loss of these trees may be viewed as contrary to local planning policy LD1.
- 7.4.12. The significant incursion into the recommended buffer zone of ancient woodland W1678 and the minor incursion into the buffer zone of one ancient tree and four veteran trees may be seen as contrary to the Standing Advice recommendations for minimum distances between development and ancient/veteran trees and ancient woodland.

YELLOW ROUTE CORRIDOR

Table 9 - Potential magnitude of impacts and significance of effects for Yellow Route Corridor

Status	BS 5837 Category	Sensitivity Value	TOTAL	Retained	Removed	Incursion into ancient woodland buffer zone	Construction	
							Magnitude of impact	Significance of effect
Ancient Tree	A	High	21	20	1	N/A	Moderate (Adverse)	Large (Adverse)
Veteran Tree	A	High	115	110	5	N/A	Major (Adverse)	Very Large (Adverse)
Ancient Woodland	A	High	5	5	0	1	Moderate (Adverse)	Large (Adverse)
Notable Tree	A	Medium	141	114	27	N/A	Major (Adverse)	Large (Adverse)
None	A	Medium	5	3	0	N/A	No change	Neutral

- 7.4.13. Tree removals associated with the Yellow corridor are shown in Figure 4 in Appendix C.
- 7.4.14. Effects associated with the construction of the Yellow route corridor on various elements of the arboricultural resource range from neutral to very large adverse. Effects occur as a result of the loss of one ancient tree, five veteran trees, 27 notable trees and the incursion into the recommended 15m buffer zone surrounding one area of ancient woodland.
- 7.4.15. Additional impacts associated with the loss of these high and medium value trees include the removal of one tree covered by Tree Preservation Order TPO 091.
- 7.4.16. NPSNN identifies ancient and veteran trees as potential constraints to development. It states that the loss of these trees should be justifiable by the national need for and benefits of the Proposed Scheme clearly outweighing the loss. Failure to adequately justify the loss of ancient or veteran trees may be considered as contrary to the NPSNN.
- 7.4.17. Notable trees, Category A trees and trees with TPOs are those which are important within their immediate surroundings. Unless adequately justified the loss of these trees may be viewed as contrary to local planning policy LD1.
- 7.4.18. The significant incursion into the recommended buffer zone of ancient woodland W1678 and the minor incursion into the buffer zone of three ancient trees and one veteran tree may be seen as contrary to the Standing Advice recommendations for minimum distances between development and ancient/veteran trees and ancient woodland.

RED ROUTE CORRIDOR

Table 10 - Potential magnitude of impacts and significance of effects for Red Route Corridor

Status	BS 5837 Category	Sensitivity Value	TOTAL	Retained	Removed	Incursion into ancient woodland buffer zone	Construction	
							Magnitude of impact	Significance of effect
Ancient Tree	A	High	21	19	2	N/A	Major (Adverse)	Very Large (Adverse)
Veteran Tree	A	High	115	110	5	N/A	Major (Adverse)	Very Large (Adverse)
Ancient Woodland	A	High	5	5	0	1	Moderate (Adverse)	Large (Adverse)
Notable Tree	A	Medium	141	122	19	N/A	Major (Adverse)	Large (Adverse)
None	A	Medium	5	3	0	N/A	No change	Neutral

- 7.4.19. Tree removals associated with the Red corridor are shown in Figure 5 in Appendix C.
- 7.4.20. Effects associated with the construction of the Red route corridor on various elements of the arboricultural resource range from neutral to very large adverse. Effects occur as a result of the loss of two ancient trees, five veteran trees, 19 notable trees and the incursion into the recommended 15m buffer zone surrounding one area of ancient woodland.
- 7.4.21. Additional impacts associated with the loss of these high and medium value trees include the removal of three trees covered by Tree Preservation Order TPO 091.
- 7.4.22. NPSNN identifies ancient and veteran trees as potential constraints to development. It states that the loss of these trees should be justifiable by the national need for and benefits of the Proposed Scheme clearly outweighing the loss. Failure to adequately justify the loss of ancient or veteran trees may be considered as contrary to the NPSNN.
- 7.4.23. Notable and trees with TPOs are those which are important within their immediate surroundings. Unless adequately justified the loss of these trees may be viewed as contrary to local planning policy LD1.
- 7.4.24. The significant incursion into the recommended buffer zone of ancient woodland W1678 and the minor incursion into the buffer zone of two ancient trees and five veteran trees may be seen as contrary to the Standing Advice recommendations for minimum distances between development and ancient/veteran trees and ancient woodland.

OLIVE ROUTE CORRIDOR

Table 11 - Potential magnitude of impacts and significance of effects for Olive Route Corridor

Status	BS 5837 Category	Sensitivity Value	TOTAL	Retained	Removed	Incursion into ancient woodland buffer zone	Construction	
							Magnitude of impact	Significance of effect
Ancient Tree	A	High	21	19	2	N/A	Major (Adverse)	Very Large (Adverse)
Veteran Tree	A	High	115	101	14	N/A	Major (Adverse)	Very Large (Adverse)
Ancient Woodland	A	High	5	5	0	1	Moderate (Adverse)	Large (Adverse)
Notable Tree	A	Medium	141	119	22	N/A	Major (Adverse)	Large (Adverse)
None	A	Medium	5	3	0	N/A	No change	Neutral

- 7.4.25. Tree removals associated with the Olive route are shown in Figure 6 in Appendix C.
- 7.4.26. Effects associated with the construction of the Olive route option on various elements of the arboricultural resource range from neutral to very large adverse. Effects occur as a result of the loss of two ancient trees, 14 veteran trees, 22 notable trees and the incursion into the recommended 15m buffer zone surrounding one area of ancient woodland.
- 7.4.27. None of these trees are covered by a TPO.
- 7.4.28. NPSNN identifies ancient and veteran trees as potential constraints to development. It states that the loss of these trees should be justifiable by the national need for and benefits of the Proposed Scheme clearly outweighing the loss. Failure to adequately justify the loss of ancient or veteran trees may be considered as contrary to the NPS NN.
- 7.4.29. Notable trees are those which are important within their immediate surroundings. Unless adequately justified the loss of these trees may be viewed as contrary to local planning policy LD1.
- 7.4.30. The significant incursion into the recommended buffer zone of ancient woodland W1517 and the minor incursion into the buffer zone of six veteran trees may be seen as contrary to the Standing Advice recommendations for minimum distances between development and ancient/veteran trees and ancient woodland.

BLACK 1 ROUTE CORRIDOR

Table 12 - Potential magnitude of impacts and significance of effects for Black 1 Route Corridor

Status	BS 5837 Category	Sensitivity Value	TOTAL	Retained	Removed	Incursion into ancient woodland buffer	Construction	
							Magnitude of impact	Significance of effect
Ancient Tree	A	High	21	19	2	N/A	Major (Adverse)	Very Large (Adverse)
Veteran Tree	A	High	115	98	17	N/A	Major (Adverse)	Very Large (Adverse)
Ancient Woodland	A	High	5	5	0	1	Moderate (Adverse)	Large (Adverse)
Notable Tree	A	Medium	141	128	13	N/A	Major (Adverse)	Large (Adverse)
None	A	Medium	3	3	0	N/A	No change	Neutral

- 7.4.31. Tree removals associated with the Black 1 route are shown in Figure 7 in Appendix C.
- 7.4.32. Effects associated with the construction of the Black 1 route corridor on various elements of the arboricultural resource range from neutral to very large adverse. Effects occur as a result of the loss of two ancient trees, 17 veteran trees, 13 notable trees and the incursion into the recommended 15m buffer zone surrounding one area of ancient woodland.
- 7.4.33. Additional impacts associated with the loss of these high and medium value trees include the removal of one tree covered by Tree Preservation Order TPO 150.
- 7.4.34. NPSNN identifies ancient and veteran trees as potential constraints to development. It states that the loss of these trees should be justifiable by the national need for and benefits of the Proposed Scheme clearly outweighing the loss. Failure to adequately justify the loss of ancient or veteran trees may be considered as contrary to the NPSNN.
- 7.4.35. Notable and trees with TPOs are those which are important within their immediate surroundings. Unless adequately justified the loss of these trees may be viewed as contrary to local planning policy LD1.
- 7.4.36. The significant incursion into the recommended buffer zone of ancient woodland W1517 and the minor incursion into the buffer zone of eight veteran trees may be seen as contrary to the Standing Advice recommendations for minimum distances between development and ancient/veteran trees and ancient woodland.

BLACK 2 ROUTE CORRIDOR

Table 13 - Potential magnitude of impacts and significance of effects for Black 2 Route Corridor

Status	BS 5837 Category	Sensitivity Value	TOTAL	Retained	Removed	Incursion into ancient woodland buffer zone	Construction	
							Magnitude of impact	Significance of effect
Ancient Tree	A	High	21	19	2	N/A	Major (Adverse)	Very Large (Adverse)
Veteran Tree	A	High	115	106	9	N/A	Major (Adverse)	Very Large (Adverse)
Ancient Woodland	A	High	5	5	0	1	Moderate (Adverse)	Large (Adverse)
Notable Tree	A	Medium	141	132	9	N/A	Major (Adverse)	Moderate (Adverse)
None	A	Medium	3	3	0	N/A	No change	Neutral

- 7.4.37. Tree removals associated with the Black 2 corridor are shown in Figure 8 in Appendix C.
- 7.4.38. Effects associated with the construction of the Black 2 route corridor on various elements of the arboricultural resource range from neutral to very large adverse. Effects occur as a result of the loss of two ancient trees, nine veteran trees, nine notable trees and the incursion into the recommended 15m buffer zone surrounding one area of ancient woodland.
- 7.4.39. Additional impacts associated with the loss of these high and medium value trees include the removal of three trees covered by Tree Preservation Order TPO 091 and one tree covered by Tree Preservation Order TPO 150.
- 7.4.40. NPSNN identifies ancient and veteran trees as potential constraints to development. It states that the loss of these trees should be justifiable by the national need for and benefits of the Proposed Scheme clearly outweighing the loss. Failure to adequately justify the loss of ancient or veteran trees may be considered as contrary to the NPSNN.
- 7.4.41. Notable and trees with TPOs are those which are important within their immediate surroundings. Unless adequately justified the loss of these trees may be viewed as contrary to local planning policy LD1.
- 7.4.42. The significant incursion into the recommended buffer zone of ancient woodland W1678 and the minor incursion into the buffer zone of two ancient trees and five veteran trees may be seen as contrary to the Standing Advice recommendations for minimum distances between development and ancient/veteran trees and ancient woodland.

7.5 SUMMARY OF EFFECTS

- 7.5.1. NPSNN identifies ancient and veteran trees as potential constraints to development. It states that the loss of these trees should be justifiable by the national need for and benefits of the Proposed Scheme clearly outweighing the loss. All route corridors will result in the removal of ancient and veteran trees. Failure to adequately justify the loss of ancient or veteran trees may be considered as contrary to the NPSNN.
- 7.5.2. Notable and trees with TPOs are those which are important within their immediate surroundings. All route corridors with the exception of the Olive route option will require the removal of trees covered by a TPO and all will require the removal of several local notable trees. Unless adequately justified the loss of these trees may be viewed as contrary to local planning policy LD1.
- 7.5.3. All proposed route corridors will result in an incursion into the recommended buffer zone between ancient woodland and development. Similarly all proposed route corridors will result in minor incursions into the buffer

zone of ancient and veteran trees although these are insufficient to render trees unsuitable for retention. These incursions may however be viewed as contrary to Standing Advice insofar as a mandatory buffer between trees and development will not be maintained.

7.6 BEST PERFORMING ROUTE

- 7.6.1. All route corridors would potentially result in significant adverse impacts to the arboricultural resource. For the purposes of this assessment routes have been ranked based upon their likely arboricultural effects as it applies to high and medium quality features.
- 7.6.2. All seven of the proposed route corridors have the potential to have a large adverse effect on ancient woodland and their effects are considered equal in this respect.

Table 14 - Tree Removal by Route Corridors

Value	Orange	Cyan	Yellow	Red	Olive	Black 1	Black 2
High	10	6	6	7	16	19	11
Medium	29	18	27	19	22	13	9
TOTAL	39	24	33	26	38	32	20

- 7.6.3. An evaluation of the above effects identifies the following preference in terms of tree removals as applied to both high value features and medium value features.

Table 15 – Route Preference – As applies to both high and medium value features

Route Option	High Value	Medium Value
Orange	3	7
Cyan	1	3
Yellow	1	6
Red	2	4
Olive	5	5
Black 1	6	2
Black 2	4	1

- 7.6.4. Identification of a preferred route corridor based upon arboricultural effects should be undertaken with due regard for both high and medium quality features. This should include a decision regarding the weighting which should be applied to the different values assigned to each arboricultural feature and how this should be interpreted in relation to the overall number of trees which will be removed.

8 GLOSSARY OF TERMS

Table 16 – Glossary of Terms

Term	Definition
Construction Exclusion Zone	An area within which all site clearance and construction activities, access and storage of materials are prohibited.
Root Protection Area	Layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's vitality.
Proposed Route Corridor	The footprint of the proposed route corridor
Ancient Tree	A tree that has passed beyond maturity and is old, or aged, in comparison with trees of the same species. Characterised by biological, cultural or aesthetic features of interest.
Veteran Tree	A tree that has the biological or aesthetic characteristics of an ancient tree but is not ancient in years compared with others of the same species.
Notable Tree	A tree that is very large but might not qualify as ancient or veteran.
Ancient Woodland	Any wooded area that has been continuously wooded since 1600 AD
Ancient Semi-Natural Woodland	An area of ancient woodland where the vegetation is made up of trees and shrubs native to the site and which have predominately arise from natural regeneration.
Plantation on Ancient Woodland Site	An area of ancient woodland where the former native tree cover has been felled and replaced by planted trees, usually of species not native to the site.

Appendix A

ASSESSMENT CRITERIA



VALUE OF ARBORICULTURAL RESOURCE

Descriptions and criteria for assigning a value to the arboricultural resource are provided in Table 17.

Table 17 - Description of the value (sensitivity) of the arboricultural resource

Sensitivity (Value)	BS 5837 Category	Remaining Life Expectancy	Typical Tree Quality and Value Descriptors
Very High	N/A	N/A	Unlikely to apply to arboricultural elements. Includes features of international value and importance.
High	A	>40 years	Trees, groups or woodlands which, because of their great age, size or habitat continuity are of exceptional value as arboricultural, landscape, conservation or cultural features (e.g. ancient or veteran trees and ancient woodland).
Medium	A	>40 years	Trees, groups or woodlands of identifiable arboricultural, landscape or cultural value. Trees that are of particularly good examples of their species, especially if rare or unusual (e.g. notable specimens); Trees that are essential components of groups, or of formal or semi-formal arboricultural features; Trees, groups, or woodlands of particular visual importance as arboricultural and/or landscape features.
Low	B	20+ years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. the presence of significant though remediable defects including unsympathetic past management and storm damage); Trees lacking the special quality necessary to merit category A designation; Trees present in numbers, usually as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality; Trees with material conservation or other cultural value.
Very Low	C / U	<20 years	Trees with a stem diameter of less than 150mm; Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories; Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits; Trees with no material conservation or other cultural value. Trees in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years; Trees that have a serious, irreparable, structural defect, such that their early loss is expected due to collapse; Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline; Trees infected with pathogens of significance to the health and/or safety of other trees nearby.

MAGNITUDE OF IMPACT

Descriptions and criteria used to define the magnitude of impact are provided in Table 18.

Table 18 - Magnitude of Impact and Typical Descriptors

Magnitude Of Impact	Typical Arboricultural Descriptors
Major	Major damage to many trees Loss of a number of trees
Moderate	Major damage to a number of trees Loss of a single tree
Minor	Major damage to a single tree Minor damage to a number of trees
Negligible	Minor damage to a single tree
No change	No impact

SIGNIFICANCE

Significance of effect is defined in a qualitative manner and may be beneficial or adverse. Significance of effect is assigned after consideration of the design and identified mitigation measures with any assumptions recorded. Significance of effect should be evaluated taking account of the following points:

- Which elements of the arboricultural resource are likely to be affected and in what way?
- What is the value of the arboricultural resource likely to be affected?
- Is the effect long or short term; permanent or temporary and does it increase or decrease over time?
- Is any change reversible or irreversible?

Table 19 - Significance of Effect

MAGNITUDE OF IMPACT (DEGREE OF CHANGE)						
ARBORICULTURAL VALUE (SENSITIVITY)		No Change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Very Low	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

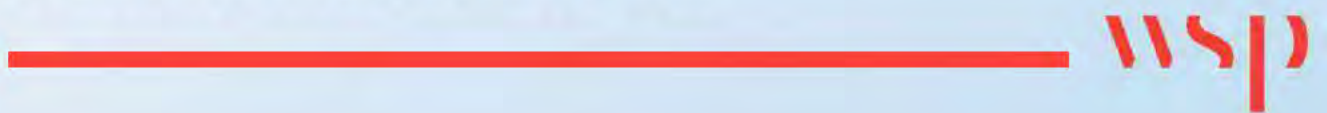
Descriptions of the significance of effect are provided in Table 20.

Table 20 - Descriptors of Significance of Effect

Significance Category	Typical Descriptors of Effect
Very Large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Appendix B

SURVEY SCHEDULE



Key:					
REFERENCE NUMBER:	Individual reference number				
TYPE:	T - Tree	G - Group	W - Woodland	H - Hedge	
SPECIES:	Species listed by common name				
HEIGHT:	Overall height (m)				
DIAMETER:	Stem diameter (mm) calculated in accordance with BS 5837 paragraph 4.6.1. An average stem diameter is provided for groups, woodlands and hedges. * Denotes an estimated stem diameter				
CROWN SPREAD:	Maximum crown spread (m)				
LCH:	Lowest crown height (m)				
FSB:	Height of lowest significant branch (m)				
AGE CLASS:	Young - < 1/3rd estimated life expectancy	Semi-mature – 1/3rd to 2/3rd estimated life expectancy	Mature - > 2/3rd estimated life expectancy	Veteran – a tree which exists significantly beyond its normal life expectancy	
PHYSIOLOGICAL CONDITION:	Good	Fair	Poor	Dead	
STRUCTURAL CONDITION:	Good	Fair	Poor		
ESTIMATED REMAINING CONTRIBUTION:	>10 years	10+ years	20+ years	40+ years	
CATEGORY:	BS 5837 Category - A, B, C, U	BS 5837 Sub-category - 1, 2, 3			
RPA RADIUS	The radius of the circular Root Protection Area associated with the tree as measured from the centre of the stem (m)				

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1697	T	Oak	16.0	1650	11.0	1.5	3.5	Mature	Good	Fair	40+	A3	24.8	Ancient
1698	T	Oak	23.0	1650	10.0	1.0	3.0	Mature	Good	Good	40+	A3	24.8	Veteran
1699	T	Oak	19.0	1600	8.0	2.0	2.5	Mature	Good	Fair	40+	A3	24.0	Ancient
1682	T	Scots Pine	17.0	870	4.5	1.0	2.5	Mature	Good	Fair	20+	A1	10.4	Notable
1683	T	Oak	17.0	1120	9.0	1.5	2.5	Mature	Good	Fair	40+	A1	13.4	Notable
1680	T	Lime	5.0	1900	5.0	1.0	1.5	Mature	Fair	Poor	<10	A3	28.5	Ancient
1681	T	Turkey Oak	27.0	1750	12.0	1.0	4.5	Mature	Good	Good	40+	A3	26.3	Veteran
1589	T	Wellingtonia	27.0	2500	4.0	1.0	2.0	Mature	Good	Good	40+	A3	37.5	Veteran
1590	T	Horse Chestnut	12.0	1000	9.0	0.0	2.0	Mature	Poor	Poor	<10	A3	15.0	Veteran
1588	T	Wellingtonia	30.0	2500	4.0	1.0	4.0	Mature	Good	Good	40+	A3	37.5	Veteran
1694	T	Scots Pine	17.0	960	6.0	1.0	3.5	Mature	Good	Poor	10+	A3	14.4	Veteran
1686	T	Turkey Oak	20.0	1460	10.0	2.5	2.0	Mature	Good	Fair	40+	A3	21.9	Veteran
1684	T	Oak	17.0	980	8.0	1.0	2.5	Mature	Good	Fair	40+	A1	11.8	Notable
1685	T	Oak	17.0	1250	8.0	1.0	3.5	Mature	Good	Fair	40+	A3	18.8	Veteran
1689	T	Oak	11.0	2375	9.0	3.0	4.0	Mature	Fair	Fair	40+	A3	35.6	Ancient
1692	T	Wellingtonia	30.0	2500	5.0	1.0	3.5	Mature	Good	Fair	40+	A1	15.0	Notable
1691	T	Wellingtonia	30.0	2300	5.5	0.5	3.0	Mature	Good	Good	40+	A1	15.0	Notable
1501	T	Hornbeam	18.0	700	5.0	2.0	2.5	Mature	Good	Fair	40+	A1	8.4	Notable

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1767	T	Lucombe Oak	16.0	1100	8.0	6.0	3.0	Mature	Good	Good	40+	A3	16.5	Veteran
1768	T	Lucombe Oak	16.0	900	8.0	6.0	3.0	Mature	Good	Good	40+	A1	10.8	Notable
1774	T	Field Maple	12.0	930	6.0	2.0	2.0	Mature	Good	Good	40+	A3	14.0	Veteran
1503	T	Lime	25.0	1450	8.0	0.5	2.0	Mature	Good	Good	40+	A3	21.8	Ancient
1717	T	Oak	15.0	1300	5.0	2.0	3.0	Over Mature	Poor	Poor	10+	A3	19.5	Veteran
1763	T	Lime	20.0	1100	9.0	3.0	2.5	Mature	Good	Good	40+	A3	16.5	Veteran
1764	T	London Plane	20.0	1080	9.0	5.0	4.0	Mature	Good	Good	40+	A1	13.0	Notable
1765	T	Norway Maple	17.0	800	7.0	4.0	3.0	Mature	Good	Good	20+	A1	9.6	Notable
1701	T	Oak	20.0	1360	10.0	7.0	5.0	Mature	Poor	Poor	<10	A3	20.4	Veteran
1716	T	Oak	25.0	1600	11.0	2.0	4.0	Mature	Good	Fair	40+	A3	24.0	Ancient
1693	T	Sweet Chestnut	15.0	1250	4.5	1.0	1.0	Mature	Fair	Poor	20+	A3	18.8	Veteran
1595	T	Oak	20.0	1540	11.0	1.0	2.0	Mature	Good	Good	40+	A3	23.1	Veteran
1700	T	Turkey Oak	17.0	850	7.0	1.0	3.0	Mature	Good	Good	20+	A1	10.2	Notable
1572	T	Oak	20.0	2050	11.0	2.0	6.0	Over Mature	Good	Good	40+	A3	30.8	Ancient
1596	T	Atlantic Cedar	27.0	2000	10.0	4.0	8.0	Mature	Good	Fair	40+	A1	15.0	Notable
1597	T	Corsican Pine	26.0	1100	6.0	10.0	10.0	Mature	Good	Fair	40+	A3	16.5	Veteran
1676	T	Oak	16.0	1300	10.0	2.0	2.0	Mature	Fair	Fair	40+	A3	19.5	Veteran
1675	T	Oak	14.0	1000	7.0	2.0	2.5	Mature	Fair	Fair	40+	A1	12.0	Notable

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1673	T	Oak	12.0	2500	8.0	1.5	2.0	Mature	Good	Good	40+	A3	37.5	Ancient
1586	T	Oak	18.0	910	7.0	0.5	3.0	Mature	Good	Fair	20+	A1	10.9	Notable
1585	T	Atlantic Cedar	30.0	1500	11.0	2.0	3.0	Mature	Good	Fair	40+	A1	15.0	Notable
1570	T	Oak	17.0	1800	4.0	4.0	6.0	Over Mature	Fair	Fair	40+	A3	27.0	Ancient
1667	T	Horse Chestnut	17.0	1250	5.0	2.0	6.0	Mature	Fair	Fair	10+	A3	18.8	Veteran
1672	T	Ash	18.0	1000	10.0	-	5.0	Mature	Good	Good	20+	A1	12.0	Notable
1670	T	London Plane	27.0	1200	10.0	2.0	6.0	Mature	Good	Good	40+	A1	14.4	Notable
1671	T	Turkey Oak	27.0	1300	12.0	3.0	2.0	Mature	Good	Fair	10+	A1	15.0	Notable
1668	T	Beech	22.0	1500	8.0	2.0	3.0	Mature	Good	Good	40+	A3	22.5	Veteran
1516	T	Sycamore	18.0	1000	5.0	2.0	2.0	Mature	Fair	Fair	10+	A1	12.0	Notable
1669	T	Oak	20.0	900	7.0	3.0	2.0	Mature	Good	Fair	20+	A1	10.8	Notable
1513	T	Oak	25.0	900	9.0	2.0	4.0	Mature	Good	Good	40+	A1	10.8	-
1600	T	Oak	19.0	1500	8.0	4.0	3.0	Mature	Good	Good	20+	A3	22.5	Ancient
1599	T	Oak	13.0	1000	8.0	4.0	3.0	Mature	Fair	Fair	20+	A3	15.0	Veteran
1601	T	Oak	18.0	1200	7.0	4.0	3.0	Mature	Good	Good	40+	A3	18.0	Veteran
1534	T	Oak	16.0	1100	9.0	6.0	4.0	Mature	Good	Good	40+	A1	13.2	Notable
1537	T	Oak	9.0	1200	6.0	2.0	4.0	Over Mature	Good	Fair	40+	A3	18.0	Veteran
1538	T	Oak	20.0	1100	11.0	2.0	4.0	Mature	Good	Good	40+	A1	13.2	Notable

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1539	T	Oak	16.0	1460	9.0	2.0	4.0	Over Mature	Fair	Fair	40+	A3	21.9	Ancient
1540	T	Oak	9.0	1400	7.0	5.0	3.0	Dead	Poor	Poor	<10	A3	21.0	Veteran
1541	T	Oak	10.0	1100	10.0	1.0	4.0	Mature	Good	Fair	20+	A3	16.5	Veteran
1532	T	Oak	15.0	1500	5.0	5.0	4.0	Over Mature	Fair	Fair	40+	A3	22.5	Ancient
1543	T	Oak	18.0	750	8.0	3.0	4.0	Mature	Good	Good	40+	A1	9.0	-
1544	T	Oak	18.0	1300	11.0	2.0	4.0	Over Mature	Good	Fair	40+	A3	19.5	Veteran
1549	T	Oak	19.0	1500	9.0	2.0	2.0	Over Mature	Good	Fair	40+	A3	22.5	Ancient
1545	T	Oak	18.0	900	7.0	2.0	4.0	Mature	Good	Good	40+	A1	10.8	Notable
1546	T	Oak	17.0	900	9.0	2.0	4.0	Mature	Good	Good	40+	A1	10.8	Notable
1619	T	Oak	16.0	1600	10.0	5.0	4.0	Mature	Good	Good	40+	A3	24.0	Veteran
1621	T	Lime	30.0	1300	12.0	6.0	5.0	Mature	Good	Fair	2+	A3	19.5	Veteran
1625	T	Oak	13.0	1200	7.0	8.0	-	Mature	Fair	Fair	20+	A3	18.0	Veteran
1628	T	Oak	16.0	1000	8.0	4.0	2.5	Mature	Good	Fair	20+	A1	12.0	Notable
1639	T	Oak	22.0	1200	9.0	6.0	4.0	Mature	Fair	Fair	20+	A3	18.0	Veteran
1640	T	Oak	0.0	850	0.0	-	-	-	-	-	-	A1	10.2	-
1651	T	Oak	16.0	1000	12.0	3.0	4.0	Mature	Good	Good	20+	A3	15.0	Veteran
1646	T	Oak	16.0	900	10.0	7.0	3.0	Mature	Good	Good	20+	A1	10.8	Notable
1647	T	Oak	0.0	1500	7.0	4.0	2.5	Mature	Fair	Fair	20+	A3	22.5	Veteran

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1659	T	Oak	18.0	1200	6.0	2.0	2.0	Mature	Fair	Fair	20+	A1	14.4	Notable
1660	T	Oak	17.0	1300	8.0	4.0	3.0	Mature	Good	Good	-	A3	19.5	Veteran
1713	T	Beech	20.0	1000	7.0	2.0	3.0	Mature	Good	Good	20+	A3	15.0	Veteran
1712	T	Beech	20.0	800	7.0	3.0	3.0	Mature	Good	Good	20+	A1	9.6	Notable
1711	T	Oak	17.0	1000	10.0	6.0	4.0	Mature	Good	Good	40+	A1	12.0	Notable
1591	T	Lime	30.0	1200	9.0	1.0	2.0	Mature	Fair	Fair	10+	A3	18.0	Veteran
1587	T	Wellingtonia	35.0	2400	5.0	1.0	4.0	Mature	Good	Good	40+	A3	36.0	Veteran
1592	T	Oak	18.0	1750	10.0	1.0	4.0	Mature	Good	Fair	40+	A3	26.3	Ancient
1641	T	Oak	22.0	1600	9.0	7.0	3.0	Mature	Good	Good	-	A3	24.0	Veteran
1922	T	Oak	16.0	1600	8.0	3.5	4.0	Mature	Good	Fair	40+	A3	24.0	Ancient
1923	T	Oak	16.0	1150	9.0	7.0	4.0	Mature	Fair	Fair	20+	A3	17.3	Veteran
1941	T	Oak	17.0	880	10.0	3.5	4.0	Mature	Good	Good	40+	A1	10.6	Notable
1933	T	Oak	18.0	1600	12.0	5.0	6.0	Mature	Good	Good	40+	A3	24.0	Veteran
1932	T	Oak	17.0	1400	11.0	5.0	3.0	Mature	Good	Good	40+	A3	21.0	Ancient
1931	T	Oak	18.0	1400	11.0	6.0	4.0	Mature	Good	Fair	40+	A3	21.0	Ancient
1936	T	Oak	17.0	1300	11.0	4.0	4.0	Mature	Good	Good	40+	A1	15.0	Notable
1938	T	Oak	18.0	1600	12.0	5.0	3.0	Mature	Good	fair	20+	A3	24.0	Veteran
1939	T	Oak	16.0	1000	8.0	5.0	4.0	Mature	Fair	Fair	20+	A1	12.0	Notable

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1902	T	Cedar	17.0	1000	10.0	4.0	6.0	Mature	Good	Good	20+	A1	12.0	Notable
1946	T	Cedar	20.0	1200	8.0	10.0	15.0	Mature	Poor	Poor	10+	A1	14.4	Notable
1857	T	Lime	18.0	890	9.0	9.0	4.0	Mature	Good	Good	20+	A1	10.7	Notable
1856	T	Lime	18.0	810	9.0	7.0	3.0	Mature	Good	Good	20+	A1	9.7	Notable
1855	T	Lime	19.0	900	9.0	9.0	4.0	Mature	Good	Good	20+	A1	10.8	Notable
1854	T	Lime	20.0	800	8.0	9.0	5.0	Mature	Good	Good	20+	A1	9.6	Notable
1853	T	Lime	21.0	970	9.0	7.0	3.0	Mature	Good	Good	20+	A1	11.6	Notable
1896	T	Lime	8.0	810	4.0	2.0	2.0	Mature	Poor	Poor	-10	A1	12.2	Notable
1895	T	Lime	17.0	890	11.0	7.0	3.0	Mature	Good	Good	20+	A1	10.7	Notable
1858	T	Lime	22.0	830	11.0	8.0	4.0	Mature	Good	Good	20+	A1	10.0	Notable
1859	T	Lime	23.0	770	11.0	7.0	4.0	Mature	Good	Good	20+	A1	9.2	Notable
1860	T	Lime	24.0	790	9.0	7.0	4.0	Mature	Good	Fair	20+	A1	9.5	Notable
1861	T	Lime	24.0	800	9.0	7.0	6.0	Mature	Good	Fair	20+	A1	9.6	Notable
1862	T	Lime	25.0	940	9.0	7.0	5.0	Mature	Good	Good	20+	A1	11.3	Notable
1889	T	Lime	23.0	840	9.0	7.0	4.0	Mature	Fair	Fair	20+	A1	10.1	Notable
1890	T	Lime	24.0	800	9.0	7.0	3.0	Mature	Good	Good	20+	A1	9.6	Notable
1891	T	Lime	22.0	900	9.0	7.0	3.0	Mature	Good	Good	20+	A1	10.8	Notable
1892	T	Lime	24.0	750	9.0	7.0	4.0	Mature	Good	Fair	20+	A1	9.0	Notable

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1893	T	Lime	24.0	850	11.0	8.0	2.0	Mature	Good	Good	20+	A1	12.8	Notable
1894	T	Beech	23.0	800	10.0	2.0	3.0	Mature	Good	Good	20+	A1	9.6	Notable
1863	T	Lime	23.0	840	9.0	7.0	4.0	Mature	Good	Good	20+	A1	10.1	Notable
1864	T	Lime	25.0	920	9.0	7.0	5.0	Mature	Good	Good	20+	A1	11.0	Notable
1865	T	Lime	23.0	940	10.0	7.0	5.0	Mature	Good	Good	20+	A1	11.3	Notable
1866	T	Lime	22.0	840	9.0	7.0	5.0	Mature	Good	Good	20+	A1	10.1	Notable
1867	T	Lime	24.0	830	10.0	8.0	5.0	Mature	Good	Good	20+	A1	10.0	Notable
1868	T	Lime	23.0	770	9.0	7.0	5.0	Mature	Good	Good	20+	A1	9.2	Notable
1869	T	Lime	24.0	910	9.0	7.0	5.0	Mature	Good	Fair	20+	A1	10.9	Notable
1870	T	Lime	12.0	990	6.0	4.0	4.0	Mature	Fair	Fair	10+	A1	11.9	Notable
1871	T	Lime	25.0	850	8.0	7.0	5.0	Mature	Good	Fair	20+	A1	12.8	Notable
1872	T	Lime	26.0	910	9.0	7.0	5.0	Mature	Fair	Fair	20+	A1	13.7	Notable
1873	T	Lime	24.0	960	9.0	7.0	5.0	Mature	Fair	Fair	20+	A1	11.5	Notable
1874	T	Lime	24.0	970	8.0	7.0	5.0	Mature	Good	fair	20+	A1	11.6	Notable
1875	T	Lime	25.0	810	10.0	7.0	4.0	Mature	Good	Good	20+	A1	9.7	Notable
1876	T	Lime	25.0	880	9.0	7.0	3.0	Mature	Good	fair	20+	A1	10.6	Notable
1877	T	Lime	10.0	990	4.0	5.0	3.0	Mature	Fair	Fair	20+	A1	11.9	Notable
1878	T	Lime	23.0	1000	10.0	7.0	4.0	Mature	Good	Good	20+	A1	12.0	Notable

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1879	T	Lime	25.0	980	9.0	7.0	5.0	Mature	Good	Good	20+	A1	11.8	Notable
1880	T	Lime	22.0	1000	9.0	7.0	4.0	Mature	Fair	Fair	20+	A1	12.0	Notable
1881	T	Lime	25.0	940	10.0	7.0	3.0	Mature	Fair	Fair	20+	A1	11.3	Notable
1882	T	Lime	25.0	1050	11.0	8.0	5.0	Mature	Good	Good	20+	A1	12.6	Notable
1883	T	Lime	25.0	1000	10.0	8.0	3.0	Mature	Good	Good	20+	A1	12.0	Notable
1884	T	Lime	25.0	950	10.0	8.0	4.0	Mature	Good	Good	20+	A1	11.4	Notable
1885	T	Lime	19.0	890	10.0	7.0	4.0	Mature	Good	Good	20+	A1	10.7	Notable
1886	T	Lime	9.0	840	3.0	2.0	4.0	Mature	Fair	Fair	20+	A1	10.1	Notable
1887	T	Lime	18.0	760	9.0	7.0	3.0	Mature	Good	Good	20+	A1	9.1	Notable
1888	T	Lime	18.0	810	10.0	9.0	3.0	Mature	Good	Good	20+	A1	9.7	Notable
1718	T	Pear	16.0	800	3.0	-	-	-	-	-	-	A3	12.0	Ancient
1719	T	Pear	11.0	530	3.0	-	-	-	-	-	-	A3	8.0	Veteran
1720	T	Pear	15.0	680	3.0	-	-	-	-	-	-	A3	10.2	Veteran
1721	T	Pear	14.0	530	3.0	-	-	-	-	-	-	A3	8.0	Veteran
1722	T	Pear	16.0	580	3.0	-	-	-	-	-	-	A3	8.7	Veteran
1723	T	Pear	16.0	520	3.0	-	-	-	-	-	-	A3	7.8	Veteran
1724	T	Pear	17.0	670	3.0	-	-	-	-	-	-	A3	10.1	Veteran
1725	T	Pear	16.0	600	3.0	-	-	-	-	-	-	A3	9.0	Veteran

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1726	T	Pear	18.0	580	3.0	-	-	-	-	-	-	A3	8.7	Veteran
1727	T	Pear	14.0	620	3.0	-	-	-	-	-	-	A3	9.3	Veteran
1728	T	Pear	13.0	710	3.0	-	-	-	-	-	-	A3	10.7	Veteran
1729	T	Pear	11.0	570	3.0	-	-	-	-	-	-	A3	8.6	Veteran
1730	T	Pear	11.0	540	3.0	-	-	-	-	-	-	A3	8.1	Veteran
1731	T	Pear	8.0	550	3.0	-	-	-	-	-	-	A3	8.3	Veteran
1732	T	Pear	7.0	520	3.0	-	-	-	-	-	-	A3	7.8	Veteran
1733	T	Pear	8.0	560	3.0	-	-	-	-	-	-	A3	8.4	Veteran
1734	T	Pear	9.0	540	3.0	-	-	-	-	-	-	A3	8.1	Veteran
1735	T	Pear	7.0	540	3.0	-	-	-	-	-	-	A3	8.1	Veteran
1736	T	Pear	9.0	550	3.0	-	-	-	-	-	-	A3	8.3	Veteran
1737	T	Pear	12.0	580	3.0	-	-	-	-	-	-	A3	8.7	Veteran
1738	T	Apple	9.0	560	3.0	-	-	-	-	-	-	A3	8.4	Veteran
1739	T	Apple	7.0	560	3.0	-	-	-	-	-	-	A3	8.4	Veteran
1740	T	Apple	8.0	500	3.0	-	-	-	-	-	-	A3	7.5	Veteran
1741	T	Apple	12.0	550	3.0	-	-	-	-	-	-	A3	8.3	Veteran
1742	T	Apple	8.0	600	3.0	-	-	-	-	-	-	A3	9.0	Veteran
1743	T	Apple	9.0	510	3.0	-	-	-	-	-	-	A3	7.7	Veteran

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1746	T	Apple	13.0	530	3.0	-	-	-	-	-	-	A3	8.0	Veteran
1747	T	Apple	9.0	480	3.0	-	-	-	-	-	-	A3	7.2	Veteran
1755	T	Apple	8.0	580	3.0	-	-	-	-	-	-	A3	8.7	Veteran
1759	T	Oak	17.0	1000	9.0	-	-	-	-	-	-	A1	12.0	Notable
1760	T	Beech	17.0	800	5.0	5.0	6.0	Mature	Good	Good	20+	A1	9.6	Notable
1761	T	Oak	12.0	1250	5.0	3.0	4.0	Mature	Good	Good	40+	A3	18.8	Veteran
1762	T	Ash	14.0	1300	6.0	3.0	2.5	Mature	Good	Good	20+	A3	19.5	Veteran
1766	T	London Plane	20.0	1350	8.0	4.0	3.0	Mature	Good	Good	40+	A1	16.2	Notable
1769	T	Lucombe Oak	16.0	900	8.0	7.0	3.0	Mature	Good	Good	40+	A1	10.8	Notable
1770	T	Lucombe Oak	16.0	900	8.0	7.0	2.5	Mature	Good	Good	40+	A1	10.8	Notable
1771	T	Lucombe Oak	16.0	900	8.0	6.0	3.0	Mature	Good	Good	40+	A1	10.8	Notable
1772	T	Lucombe Oak	16.0	900	8.0	6.0	3.0	Mature	Good	Good	40+	A1	10.8	Notable
1773	T	Lucombe Oak	16.0	900	8.0	6.0	3.0	Mature	Good	Good	40+	A1	10.8	Notable
1777	T	Oak	0.0	900	0.0	-	-	Mature	0	0	-	A1	10.8	Notable
1779	T	Atlantic Cedar	26.0	1500	6.0	5.0	4.0	Mature	Fair	Fair	20+	A3	22.5	Veteran
1780	T	Corsican Pine	27.0	1060	6.0	7.0	5.0	Mature	Good	Good	20+	A1	12.7	Notable
1781	T	Corsican Pine	27.0	1020	6.0	6.0	4.0	Mature	Good	Good	20+	A1	12.2	Notable
1782	T	Corsican Pine	27.0	910	6.0	5.0	3.0	Mature	Good	Good	20+	A1	10.9	Notable

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1783	T	Corsican Pine	27.0	1040	6.0	5.0	3.0	Mature	Good	Good	20+	A1	12.5	Notable
1784	T	Oak	26.0	1100	10.0	1.0	3.0	Mature	0	-	-	A1	13.2	Notable
1785	T	Yew	17.0	1100	10.0	1.0	2.0	Mature	Good	Good	40+	A1	13.2	Notable
1786	T	Yew	17.0	1000	8.0	1.0	4.0	Mature	Good	Good	40+	A1	12.0	Notable
1787	T	Norway Maple	23.0	1050	9.0	11.0	15.0	Mature	Good	Fair	20+	A1	12.6	Notable
1788	T	Ash	25.0	1000	9.0	5.0	6.0	Mature	Good	Fair	20+	A1	12.0	Notable
1789	T	Yew	17.0	1000	10.0	1.5	2.0	Mature	Good	Good	40+	A1	12.0	Notable
1790	T	Sycamore	30.0	1000	8.0	12.0	15.0	Mature	Good	Good	40+	A1	12.0	Notable
1791	T	Yew	17.0	1390	10.0	1.5	0.5	Mature	Good	Good	40+	A3	20.9	Veteran
1792	T	Yew	19.0	900	6.0	1.5	3.0	Mature	Good	fair	20+	A3	13.5	Veteran
1793	T	Yew	18.0	900	9.0	2.0	4.0	Mature	Good	Good	40+	A1	10.8	Notable
1794	T	Yew	19.0	900	8.0	1.0	1.5	Mature	Good	Good	20+	A1	10.8	Notable
1795	T	Yew	17.0	900	8.0	1.0	1.0	Mature	Good	Good	40+	A1	10.8	Notable
1796	T	Yew	17.0	900	9.0	3.0	6.0	Mature	Good	Good	40+	A1	10.8	Notable
1797	T	Lime	20.0	590	5.0	2.0	4.0	Mature	Good	Good	20+	A1	7.1	Notable
1798	T	Yew	25.0	1070	9.0	2.0	1.5	Mature	Good	Good	40+	A3	16.1	Veteran
1799	T	Yew	15.0	640	10.0	4.0	1.0	Mature	Good	Good	20+	A1	7.7	Notable
1800	T	Oak	17.0	1300	10.0	5.0	3.0	Mature	Good	Good	40+	A3	19.5	Veteran

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1801	T	Oak	18.0	1200	9.0	5.0	6.0	Mature	Good	Good	40+	A1	14.4	Notable
1802	T	Lime	15.0	1100	12.0	4.0	5.0	Mature	Fair	Fair	40+	A3	16.5	Veteran
1803	T	Yew	17.0	900	10.0	1.5	2.0	Mature	Good	Good	40+	A1	10.8	Notable
1804	T	Turkey Oak	20.0	1350	10.0	7.0	6.0	Mature	Good	Good	40+	A3	20.3	Veteran
1805	T	Sycamore	25.0	850	10.0	5.0	8.0	Mature	Good	Good	20+	A1	10.2	Notable
1806	T	Holly	16.0	600	5.0	1.5	5.0	Mature	Good	Good	40+	A1	7.2	Notable
1807	T	Oak	25.0	950	12.0	2.0	5.0	Mature	Good	Good	40+	A1	11.4	Notable
1808	T	Scots Pine	23.0	900	9.0	5.0	4.0	Mature	Good	Fair	20+	A3	13.5	Veteran
1809	T	Yew	16.0	900	9.0	1.0	1.5	Mature	Good	Good	40+	A1	10.8	Notable
1810	T	Oak	27.0	900	9.0	7.0	6.0	Mature	Good	Good	40+	A1	10.8	Notable
1811	T	Yew	16.0	900	8.0	1.0	0.5	Mature	Good	Good	40+	A1	10.8	Notable
1812	T	Yew	17.0	1200	6.0	1.0	2.0	Mature	Good	Good	40+	A3	18.0	Veteran
1813	T	Yew	16.0	900	7.0	2.0	0.5	Mature	Good	Good	40+	A1	10.8	Notable
1814	T	Yew	17.0	1000	12.0	1.5	2.0	Mature	Good	Good	40+	A1	12.0	Notable
1815	T	Yew	17.0	1050	9.0	0.5	1.0	Mature	Good	Good	40+	A1	12.6	Notable
1816	T	Lime	30.0	1500	10.0	5.0	5.0	Mature	Good	Good	10+	A3	22.5	Veteran
1819	T	Yew	16.0	900	9.0	1.5	2.0	Mature	Good	Good	40+	A1	10.8	Notable
1820	T	Yew	16.0	1000	8.0	2.5	2.0	Mature	Good	Good	40+	A3	15.0	Veteran

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1821	T	Yew	16.0	1000	8.0	1.0	2.0	Mature	Good	Good	-	A3	15.0	Veteran
1824	T	Scots Pine	32.0	1170	10.0	12.0	11.0	Mature	Good	Good	40+	A3	17.6	Veteran
1825	T	Sycamore	20.0	1050	9.0	7.0	5.0	Mature	Good	Fair	20+	A1	12.6	Notable
1830	T	Oak	17.0	1000	9.0	2.0	2.0	Mature	Good	Good	20+	A1	12.0	Notable
1831	T	Oak	18.0	1130	10.0	5.0	5.0	Mature	Good	Good	20+	A1	13.6	Notable
1832	T	Oak	18.0	1100	10.0	2.0	4.0	Mature	Good	Good	40+	A1	13.2	Notable
1834	T	Willow	13.0	1000	9.0	5.0	2.5	Mature	Good	Fair	20+	A3	15.0	Veteran
1835	T	Oak	17.0	1000	12.0	4.0	5.0	Mature	Good	Good	40+	A3	15.0	Veteran
1836	T	Oak	19.0	1000	13.0	3.0	2.5	Mature	Good	Good	40+	A1	12.0	Notable
1837	T	Oak	10.0	900	8.0	3.0	2.0	Mature	Good	Good	20+	A3	13.5	Veteran
1838	T	Oak	16.0	900	7.0	4.0	5.0	Mature	Good	Good	20+	A1	10.8	Notable
1839	T	Oak	10.0	1100	6.0	3.0	5.0	Mature	Good	Good	20+	A3	16.5	Veteran
1840	T	Oak	13.0	1500	10.0	3.0	5.0	Mature	Good	Good	40+	A1	18.0	Notable
1841	T	Oak	23.0	1080	11.0	6.0	5.0	Mature	Good	Good	20+	A3	16.2	Veteran
1842	T	Oak	16.0	900	7.0	2.5	2.0	Mature	Fair	Fair	2+	A1	10.8	Notable
1843	T	Oak	16.0	1700	8.0	2.0	2.5	Mature	Good	Poor	20+	A3	25.5	Veteran
1844	T	Holm Oak	16.0	1100	9.0	4.0	2.5	Mature	Good	Good	40+	A1	13.2	Notable
1845	T	Ash	20.0	950	9.0	5.0	3.0	Mature	Fair	Fair	20+	A1	11.4	Notable

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1846	T	Oak	18.0	900	9.0	5.0	4.0	Mature	Good	Good	40+	A3	13.5	Veteran
1847	T	Oak	18.0	900	9.0	5.0	3.0	Mature	Good	Good	20+	A1	10.8	Notable
1848	T	Oak	18.0	900	9.0	6.0	3.0	Mature	Good	Good	20+	A1	10.8	Notable
1849	T	Beech	26.0	900	10.0	7.0	3.0	Mature	Good	Good	40+	A1	10.8	Notable
1850	T	Ash	23.0	850	9.0	6.0	3.0	Mature	Fair	Fair	20+	A3	12.8	Veteran
1851	T	Oak	15.0	900	9.0	5.0	4.0	Mature	Fair	Fair	20+	A3	13.5	Veteran
1899	T	Ash	12.0	1200	6.0	6.0	4.0	Mature	Good	Good	40+	A3	18.0	Veteran
1900	T	Ash	15.0	1500	7.0	7.0	5.0	Mature	Good	Poor	20+	A3	22.5	Ancient
1901	T	Lime	18.0	1100	12.0	3.0	5.0	Mature	Good	Good	40+	A3	16.5	Veteran
1903	T	Holm Oak	17.0	1000	10.0	7.0	3.0	Mature	Good	Good	40+	A1	12.0	Notable
1904	T	Sycamore	17.0	1000	9.0	7.0	3.0	Mature	Fair	Fair	20+	A3	15.0	Veteran
1905	T	Oak	20.0	1000	12.0	8.0	4.0	Mature	Good	Good	20+	A1	12.0	Notable
1906	T	Oak	17.0	900	9.0	6.0	5.0	Mature	Fair	Fair	20+	A1	10.8	Notable
1907	T	Oak	22.0	1200	13.0	7.0	8.0	Mature	Good	Good	40+	A3	18.0	Veteran
1908	T	Oak	17.0	1000	13.0	7.0	2.0	Mature	Good	Good	20+	A1	12.0	Notable
1909	T	Oak	20.0	900	9.0	7.0	5.0	Mature	Fair	Fair	20+	A3	13.5	Veteran
1910	T	Oak	16.0	900	9.0	7.0	5.0	Mature	Poor	Poor	20+	A3	13.5	Veteran
1911	T	Willow	12.0	1000	9.0	2.0	3.0	Mature	Fair	Fair	20+	A3	15.0	Veteran

REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL CONDITION	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
1912	T	Willow	17.0	1200	12.0	2.0	3.0	Mature	Fair	Fair	20+	A3	18.0	Veteran
1913	T	Willow	13.0	1200	12.0	2.0	3.0	Mature	Fair	Fair	20+	A3	18.0	Veteran
1914	T	Willow	16.0	1300	11.0	1.0	3.0	Mature	Good	Good	20+	A3	19.5	Veteran
1915	T	Ash	16.0	1100	9.0	7.0	2.0	Mature	Fair	Fair	20+	A3	16.5	Veteran
1916	T	Ash	16.0	1000	6.0	3.0	2.0	Mature	Fair	Fair	20+	A3	15.0	Veteran
1917	T	Willow	15.0	1000	6.0	4.0	3.0	Mature	Good	Good	20+	A3	15.0	Veteran
1918	T	Willow	9.0	1000	12.0	0.5	1.0	Mature	Good	Poor	20+	A3	15.0	Veteran
1919	T	Willow	10.0	1000	8.0	2.0	1.0	Mature	Poor	Poor	-10	A3	15.0	Veteran
1921	T	Willow	10.0	1300	6.0	4.0	3.0	Mature	Good	Good	20	A3	19.5	Veteran
1751	T	Apple	9.0	500	3.0	-	-	-	-	-	-	A3	7.5	Veteran
1752	T	Apple	13.0	640	3.0	-	-	-	-	-	-	A1	7.7	Notable
1753	T	Apple	10.0	620	3.0	-	-	-	-	-	-	A3	9.3	Veteran
1754	T	Apple	6.0	600	3.0	-	-	-	-	-	-	A3	9.0	Veteran
1756	T	Apple	5.0	580	3.0	-	-	-	-	-	-	A3	8.7	Veteran
1757	T	Apple	8.0	630	3.0	-	-	-	-	-	-	A3	9.5	Veteran
1758	T	Apple	9.0	640	3.0	-	-	-	-	-	-	A3	9.6	Veteran
1924	T	Turkey Oak	27.0	920	8.0	10.0	11.0	Mature	Good	Good	20+	A1	11.0	Notable
1925	T	Beech	30.0	1100	12.0	3.0	5.0	Mature	Good	Good	40+	A1	13.2	Notable

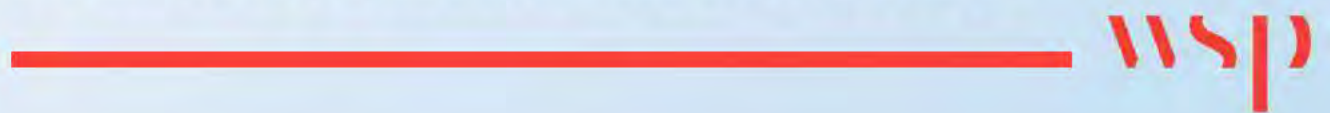
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1926	T	Turkey Oak	27.0	1100	10.0	12.0	14.0	Mature	Good	Good	20+	A1	13.2	Notable
1927	T	Turkey Oak	32.0	1200	10.0	2.0	5.0	Mature	Fair	Fair	20+	A1	14.4	Notable
1928	T	Willow	17.0	1600	5.0	6.0	4.0	Mature	Fair	Fair	20+	A3	24.0	Ancient
1929	T	Willow	19.0	1600	10.0	2.0	3.0	Mature	Fair	Fair	20+	A3	24.0	Ancient
1930	T	Oak	17.0	1100	8.0	4.0	3.0	Mature	Good	Good	40+	A1	13.2	Notable
1934	T	Oak	12.0	1100	6.0	6.0	3.0	Mature	Fair	Fair	20+	A3	16.5	Veteran
1935	T	Oak	11.0	900	5.0	6.0	2.0	Mature	Good	Good	20+	A3	13.5	Veteran
1775	T	Oak	28.0	1080	7.0	2.0	3.0	Mature	Good	Good	20+	A1	13.0	Notable
1817	T	Yew	16.0	900	7.0	3.0	2.0	Mature	Good	Good	20+	A1	10.8	Notable
1818	T	Sycamore	26.0	1130	7.0	2.0	2.0	Mature	Good	Good	20+	A1	13.6	Notable

NAME (IF AVAILABLE)	REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
Rough Coppice	1678	W	Ash; Hawthorn; Hazel; Cherry; Oak	15.0	150-500	5.0	0.5	0.5	Mature	Fair	-	40+	A3	15.0	Ancient Woodland

NAME (IF AVAILABLE)	REFERENCE NUMBER	TYPE	SPECIES	HEIGHT	DIAMETER	CROWN SPREAD	LCH	FSB	AGE CLASS	PHYSIOLOGICAL CONDITION	STRUCTURAL	ESTIMATED REMAINING CONTRIBUTION	CATEGORY	RPA RADIUS	ENVIRONMENTAL STATUS
Green Lane Wood	1530	W	Oak; Hazel	25.0	600 - 1000	8.0	3.0	3.0	Mature	Good	Good	40+	A3	15.0	Ancient Woodland
Newton Coppice	902	W	-	-	-	-	-	-	Mature	-	-	-	A3	15.0	Ancient Woodland
Hunderton Wood	1724	W	Ash; Atlantic Cedar; Cherry; Elder; Evergreen Oak; Hazel; Holly; Oak; Turkey Oak; Yew; Poplar	20.0	200 - 700	6.0	0.5	0.5	Mature	Good	Fair	40+	A3	15.0	Ancient Woodland
Wye Coppice	1517	W	Ash; Cherry; Holly; Oak	20.0	200 - 800	6.0	3.5	3.0	Mature	Fair	Fair	20+	A3	15.0	Ancient Woodland
-	102	W	Oak; Beech; Elm; Red Oak; Scots pine; Willow	15.0	100-700	7.0	3.0	2.0	Mature	Good	Good	40+	A3	8.4	Tree Preservation Order
-	119	W	Cedar; Oak; Cherry; Holly	17.0	200-600	3.0	2.0	2.5	Mature	Fair	Fair	20+	A3	7.2	Tree Preservation Order

Appendix C

ARBORICULTURAL FIGURES



Arboricultural Figures

Figure 1 - Baseline Arboricultural Resources and Study Area

Figure 2 - Arboricultural Impact Plan – Orange Route Corridor

Figure 3 - Arboricultural Impact Plan – Cyan Route Corridor

Figure 4 - Arboricultural Impact Plan – Yellow Route Corridor

Figure 5 - Arboricultural Impact Plan – Red Route Corridor

Figure 6 - Arboricultural Impact Plan – Olive Route Corridor

Figure 7 - Arboricultural Impact Plan – Black 1 Route Corridor

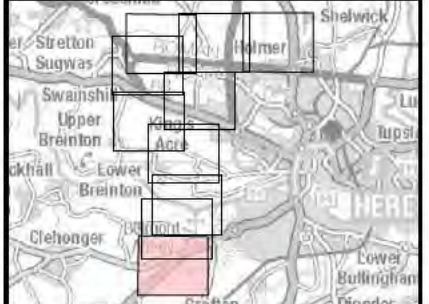
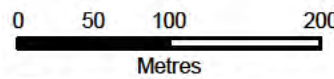
Figure 8 - Arboricultural Impact Plan – Black 2 Route Corridor

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614



- Study Area
- Notable tree
- Veteran tree
- Ancient Woodland



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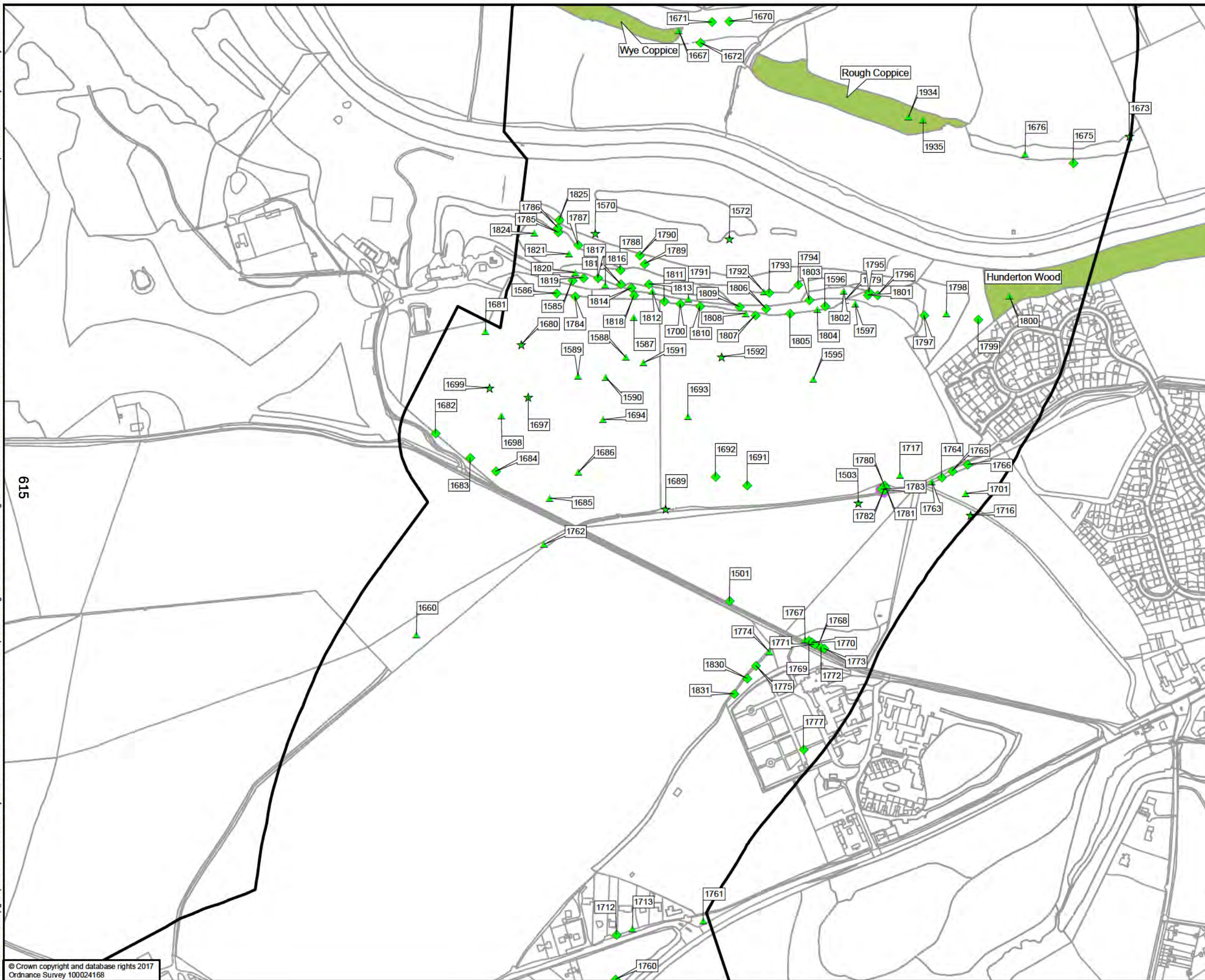
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RESOURCES AND STUDY AREA
PAGE 1 OF 10

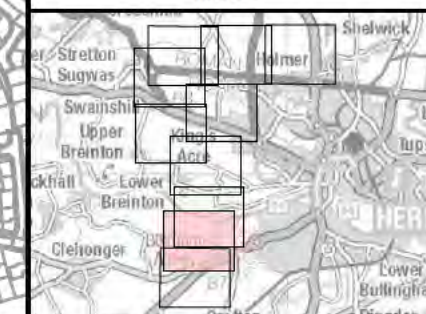
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-  Study Area
-  Notable tree
-  Veteran tree
-  Ancient tree
-  Ancient Woodland
-  Category A Tree Groups



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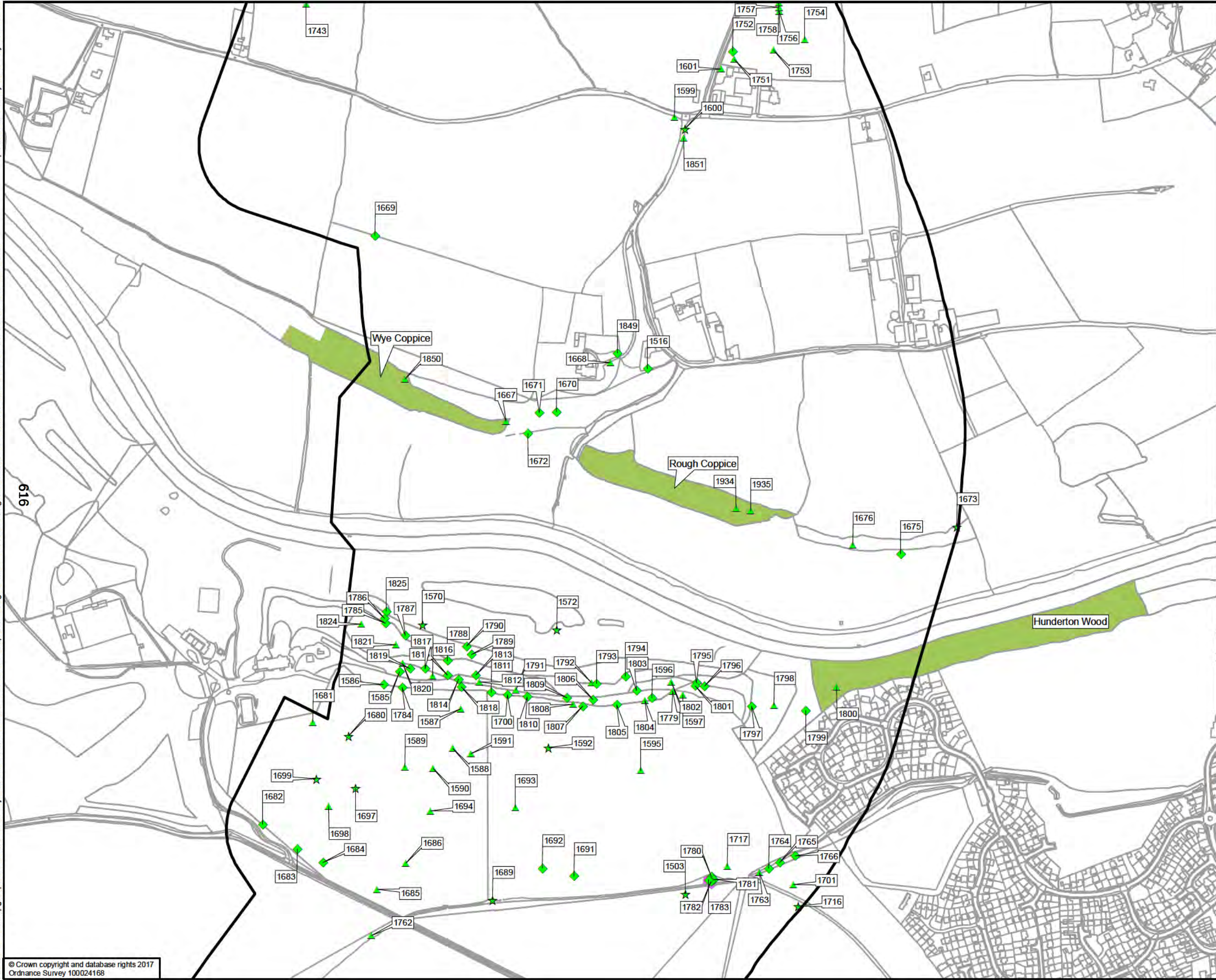
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Study Area

Notable tree

Veteran tree

Ancient tree

Ancient Woodland

Category A Tree Groups

050100200

Metres

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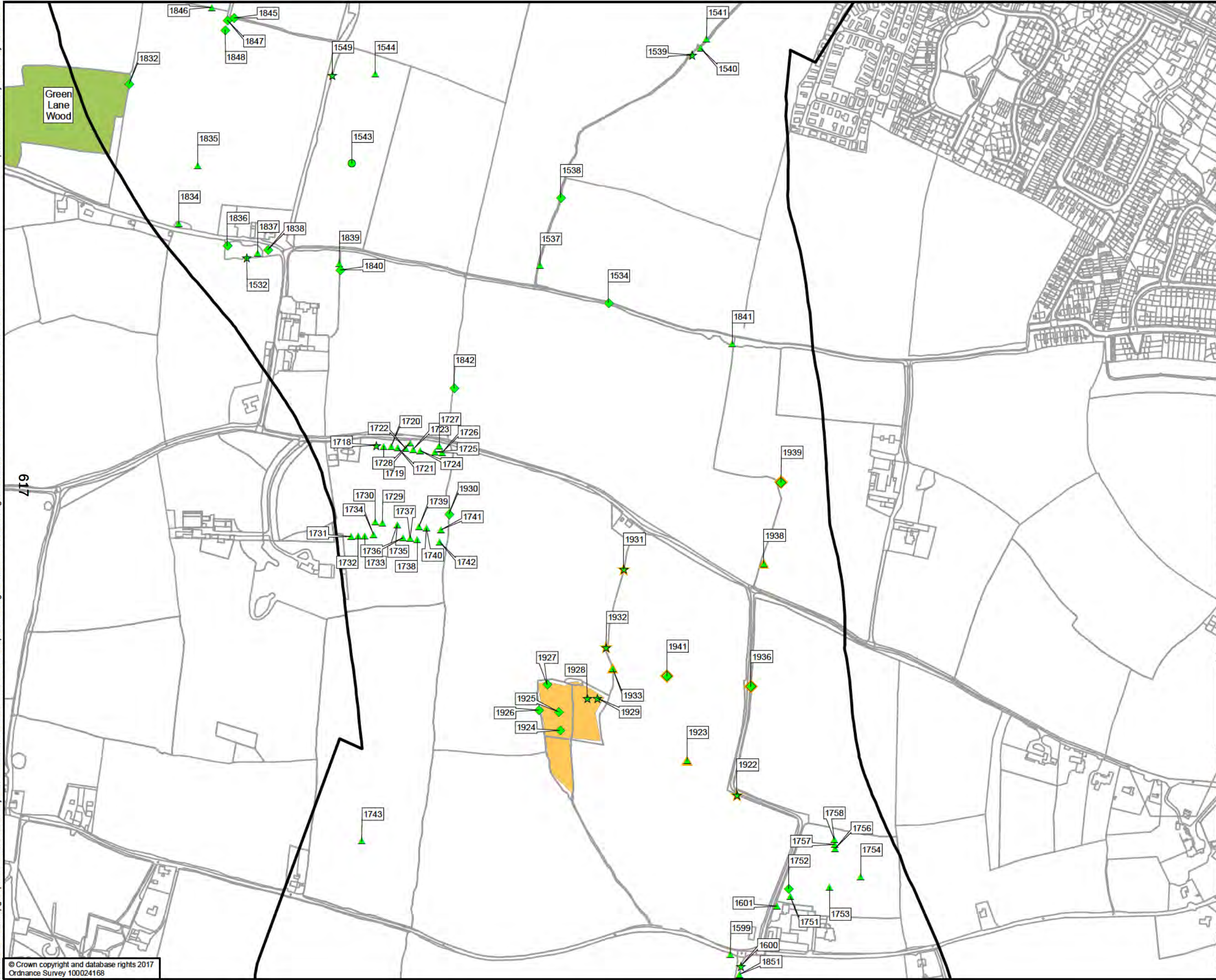
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Study Area

Category A tree

Notable tree

Veteran tree

Ancient tree

Notable tree with TPO

Veteran tree with TPO

Ancient tree with TPO

Ancient Woodland

Group of Trees with TPO

050100200

Metres

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STATUS

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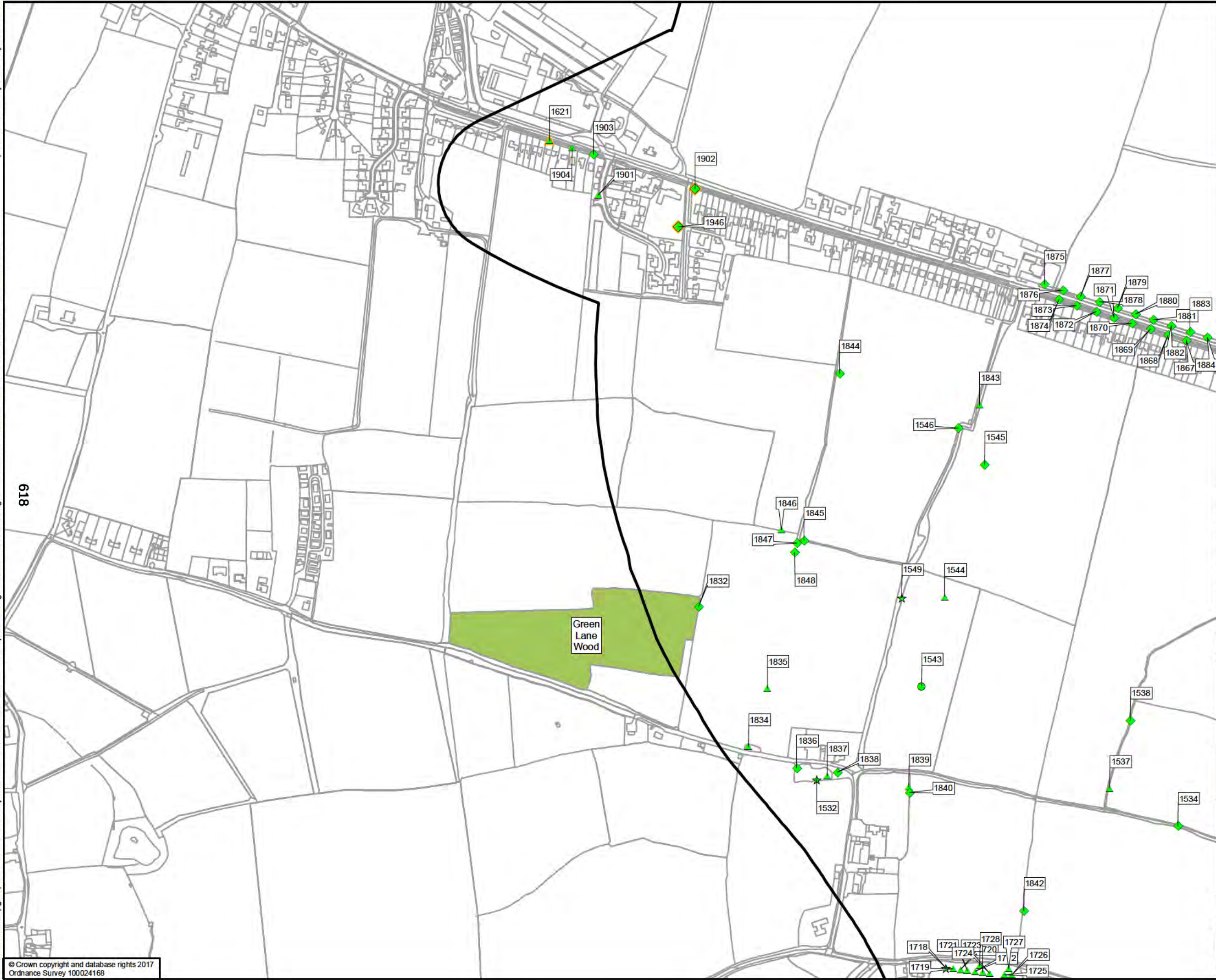
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618



Study Area

Category A tree

Notable tree

Veteran tree

Ancient tree

Notable tree wi h TPO

Veteran tree wi h TPO

Ancient Woodland

050100200

Metres

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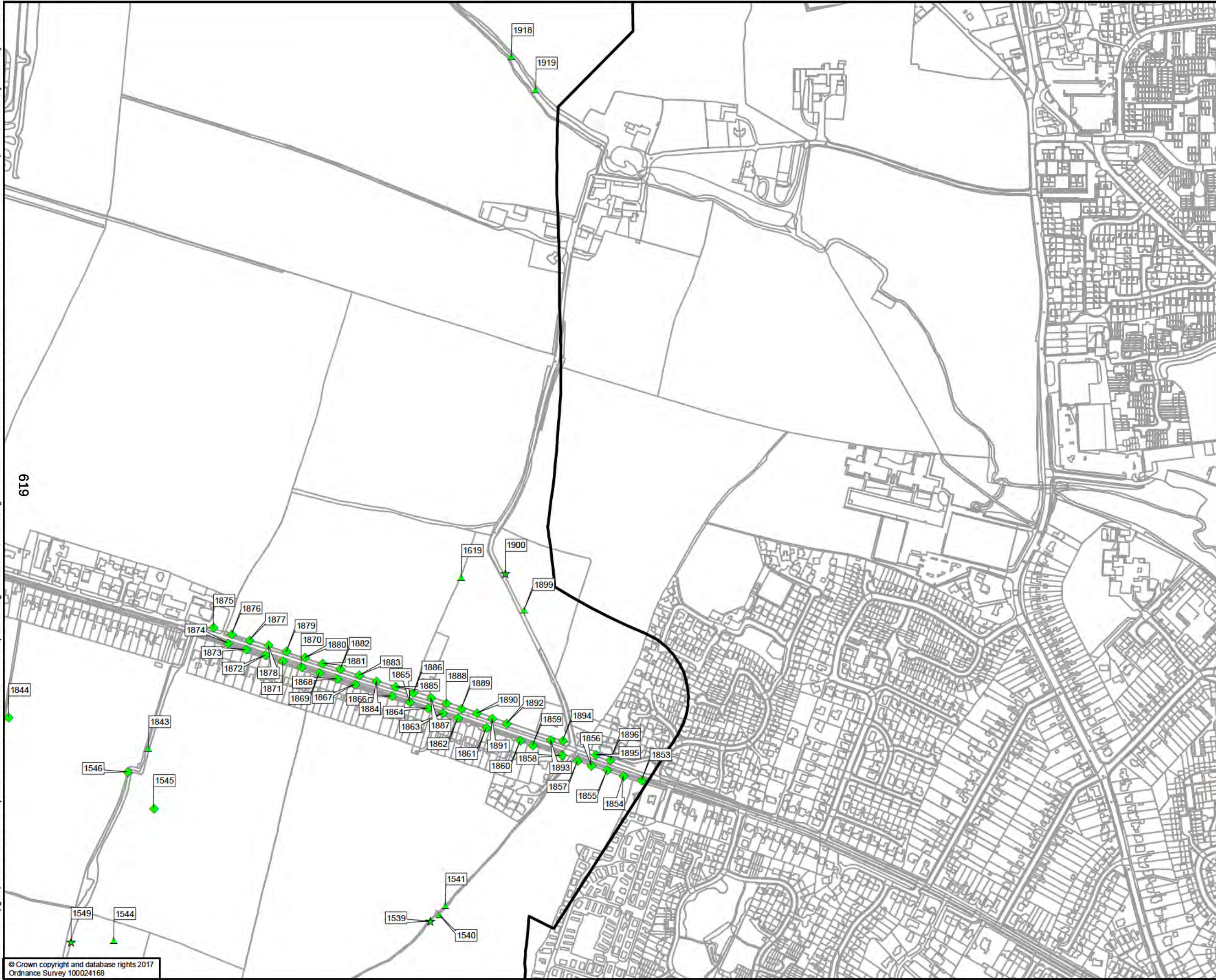
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Study Area

Notable tree

Veteran tree

Ancient tree

050100200

Metres

DRAWING STATUS

STATUS

Kings Orchard, 1 Queen St, Bristol, BS2 0HQ
T +44 (0)1179 306200

CLIENT

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FIGURE 1
BASELINE ARBORICULTURAL
RESOURCES AND STUDY AREA
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SCALE @ A3
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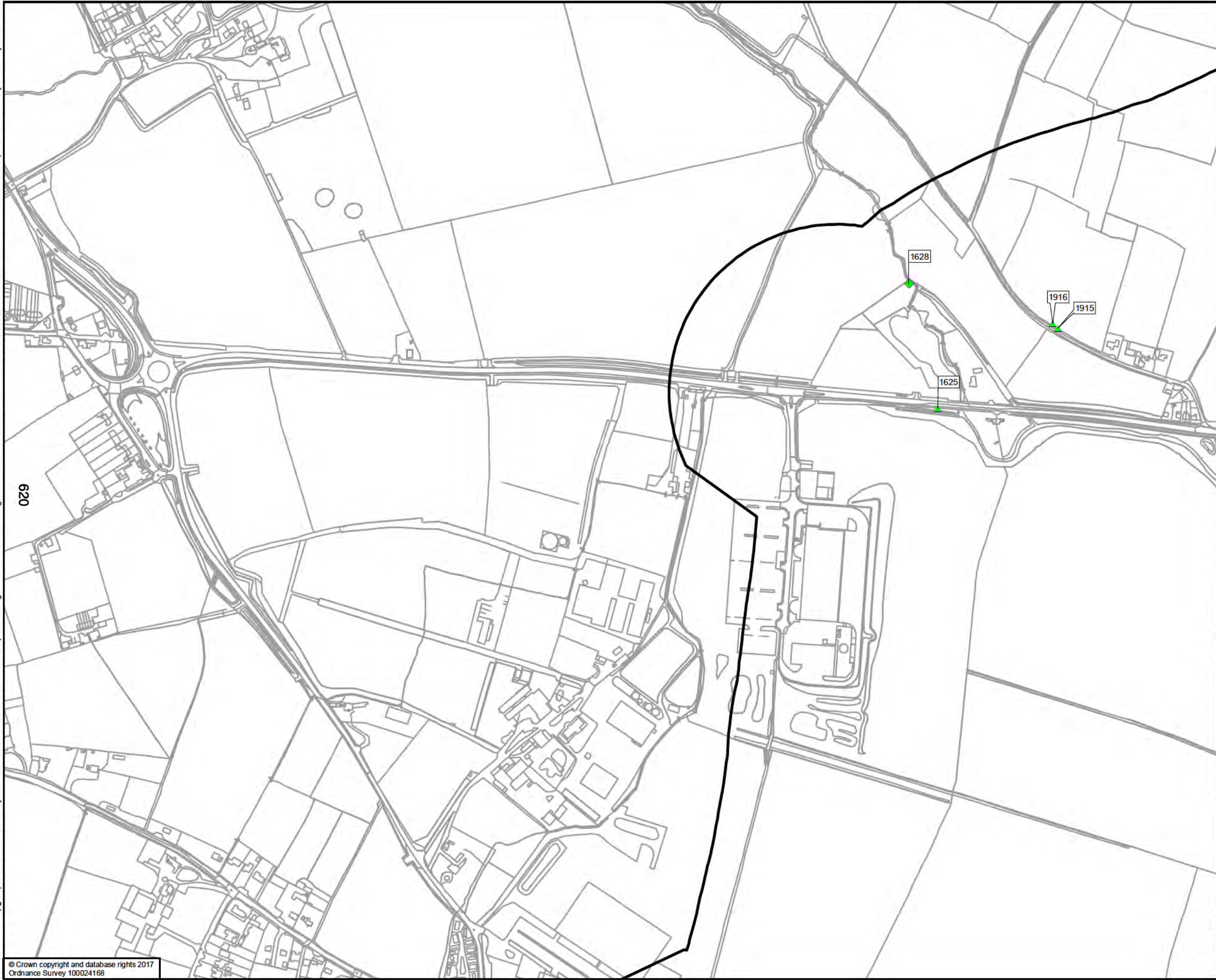
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620

Study Area

Notable tree

Veteran tree

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 1
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Study Area

Notable tree

Veteran tree

Group of Trees with TPO

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 1
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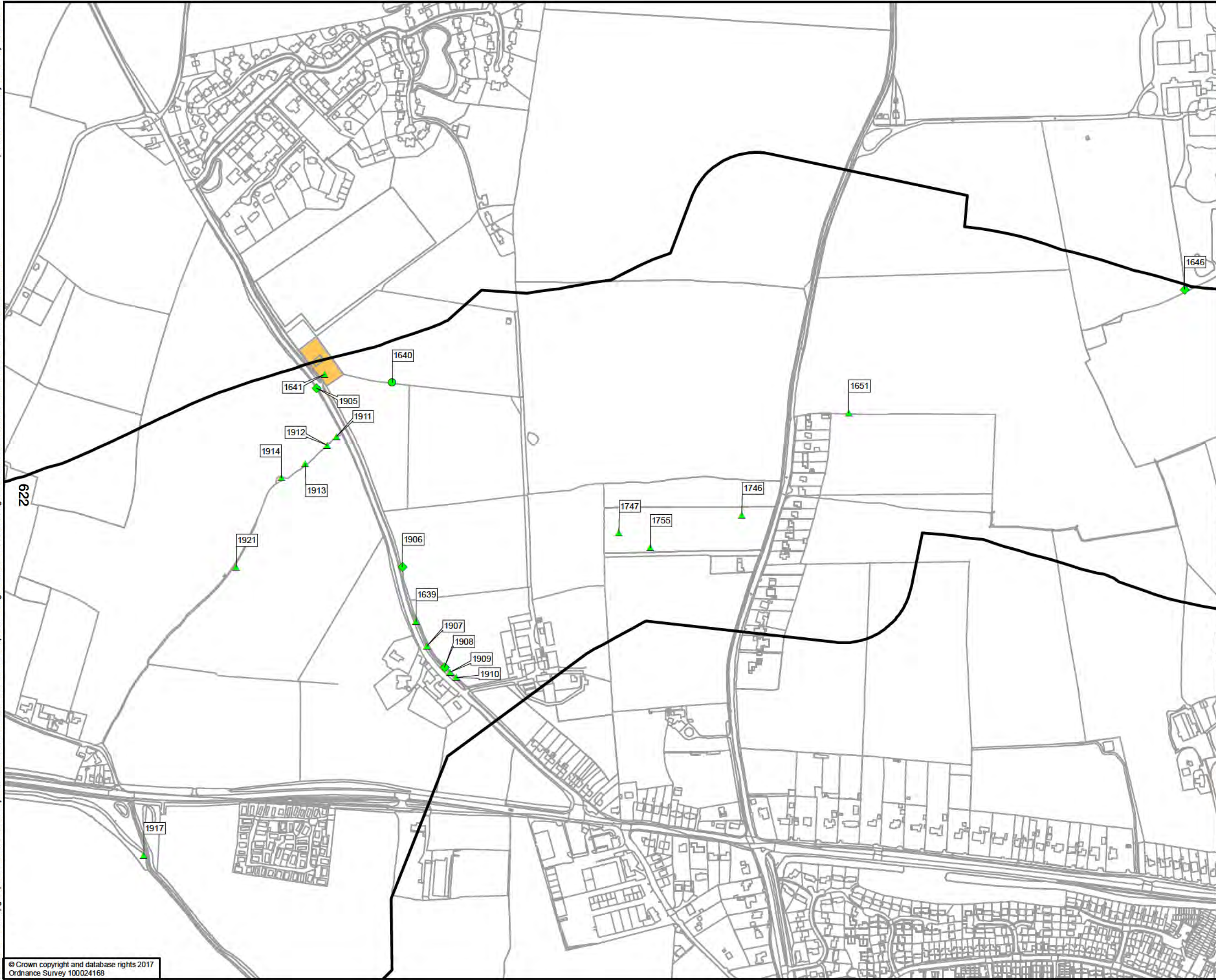
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Study Area

Category A tree

Notable tree

Veteran tree

Group of Trees with TPO

050100200

Metres

DRAWING STATUS

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FIGURE 1
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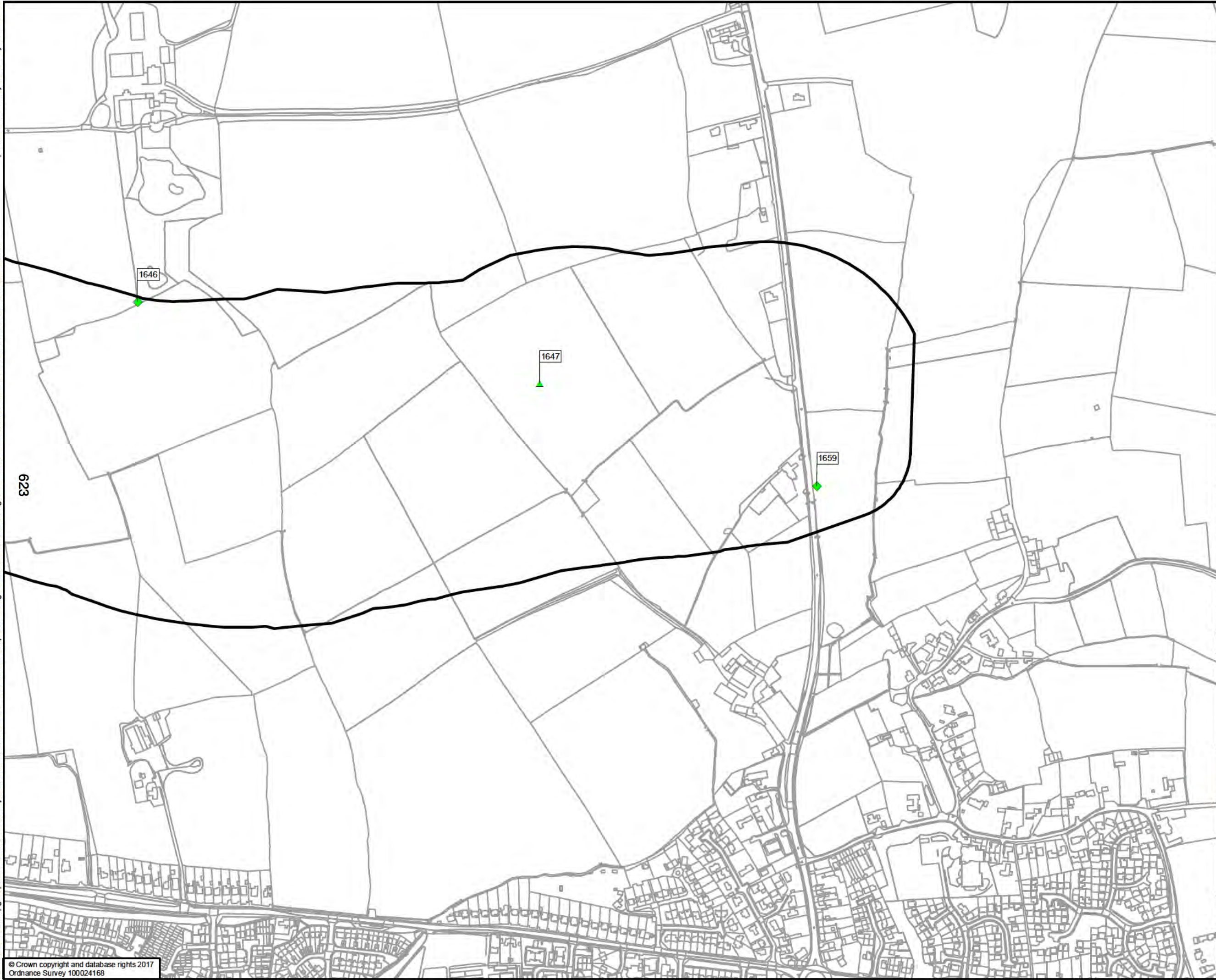
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Study Area

Notable tree

Veteran tree

0 50 100 200

Metres

DRAWING STATUS

STATUS

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FIGURE 1
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Proposed Scheme - Orange Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

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Proposed Scheme - Orange Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

Stretton Sugwas

Swainshill

Upper Breinton

Lower Breinton

Cleington

Shelwick

Helmer

Lower Bullington

Dinedor

DRAWING STATUS

STATUS

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FIGURE 2
ARBORICULTURAL IMPACT PLAN
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PAGE 2 OF 10

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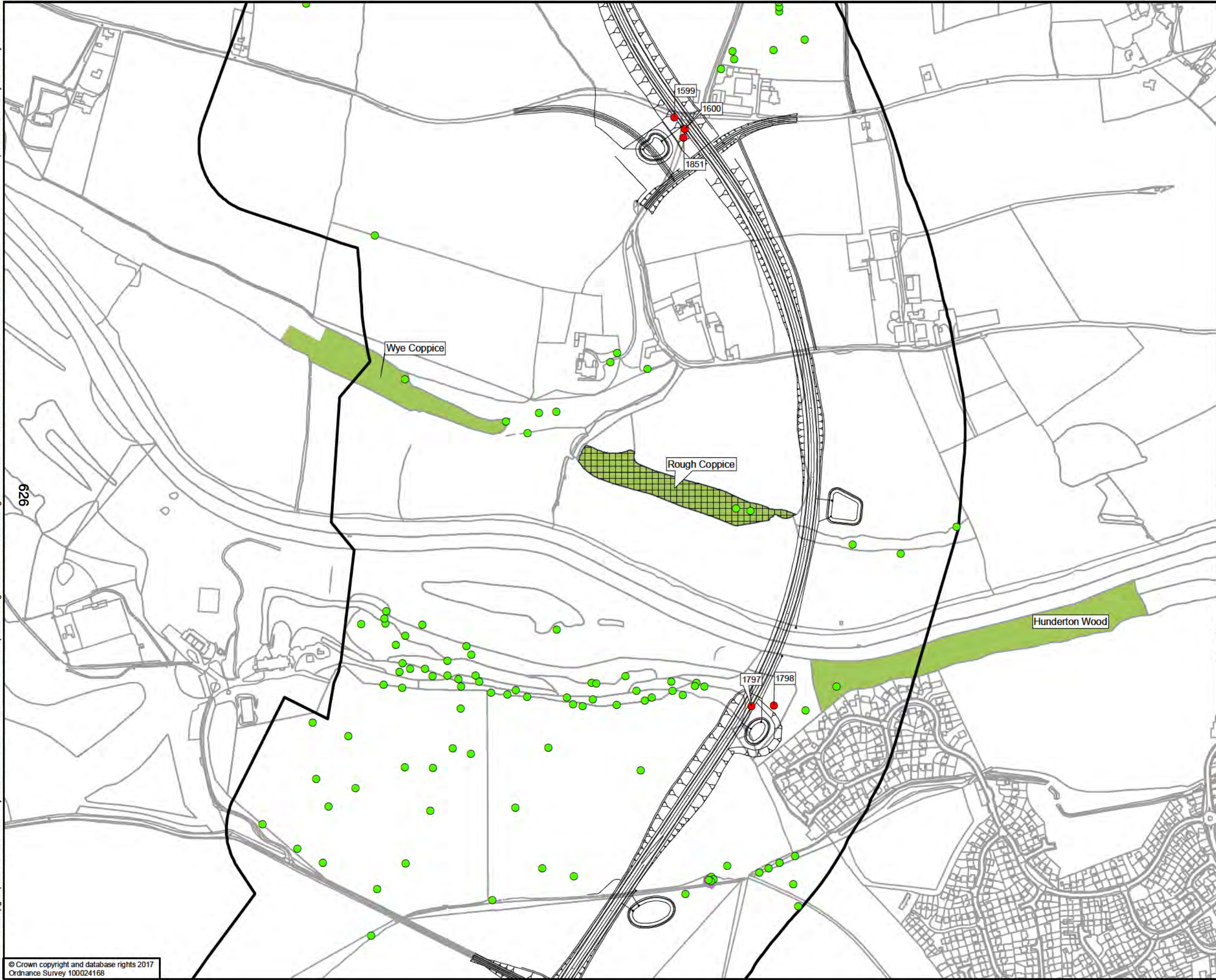
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Proposed Scheme - Orange Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

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STATUS

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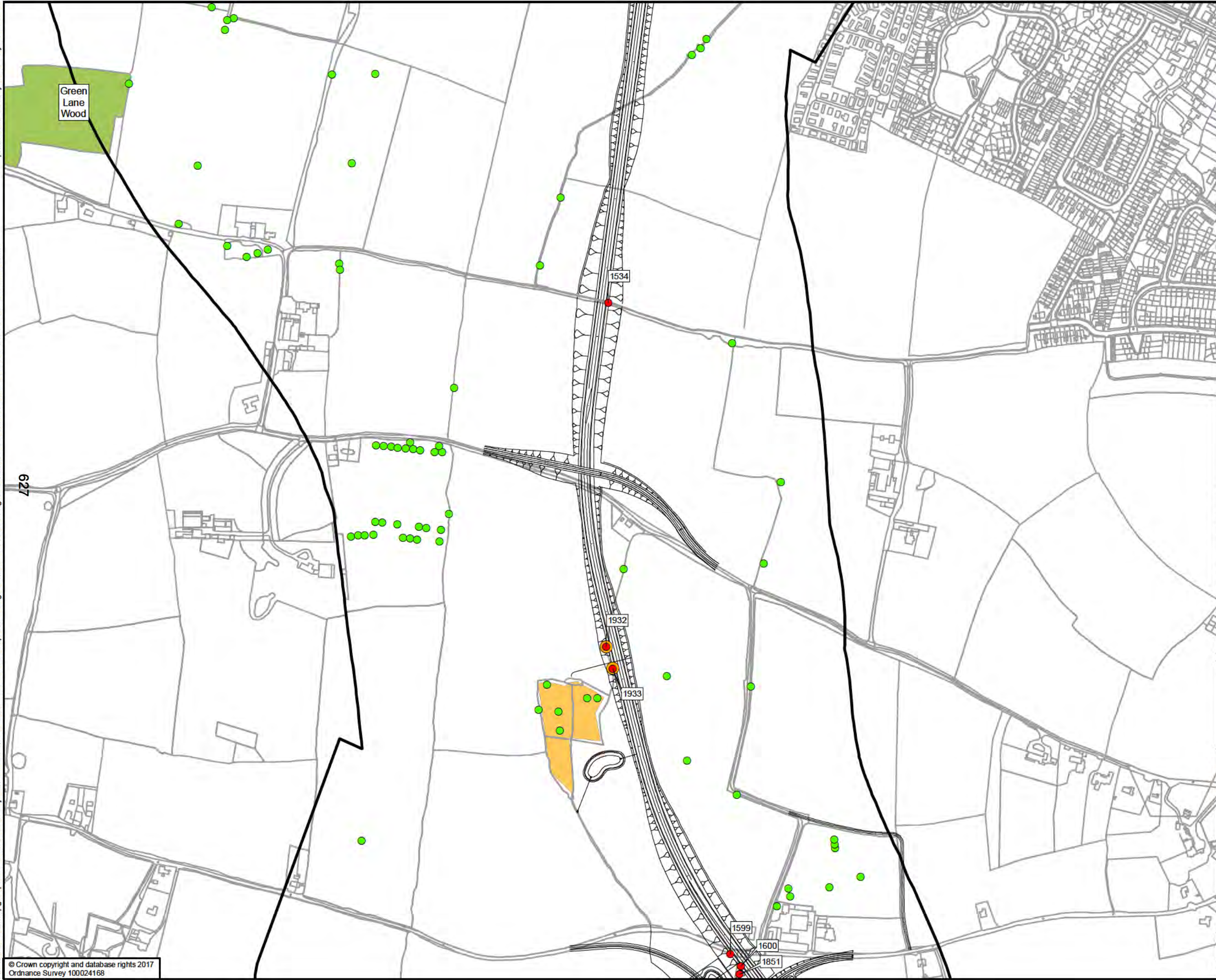
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Proposed Scheme - Orange Option

Study Area

Tree to be retained

Tree to be removed

Tree with TPO

Ancient Woodland

Group of Trees with TPO

050100200

Metres

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STATUS

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FIGURE 2
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PAGE 4 OF 10

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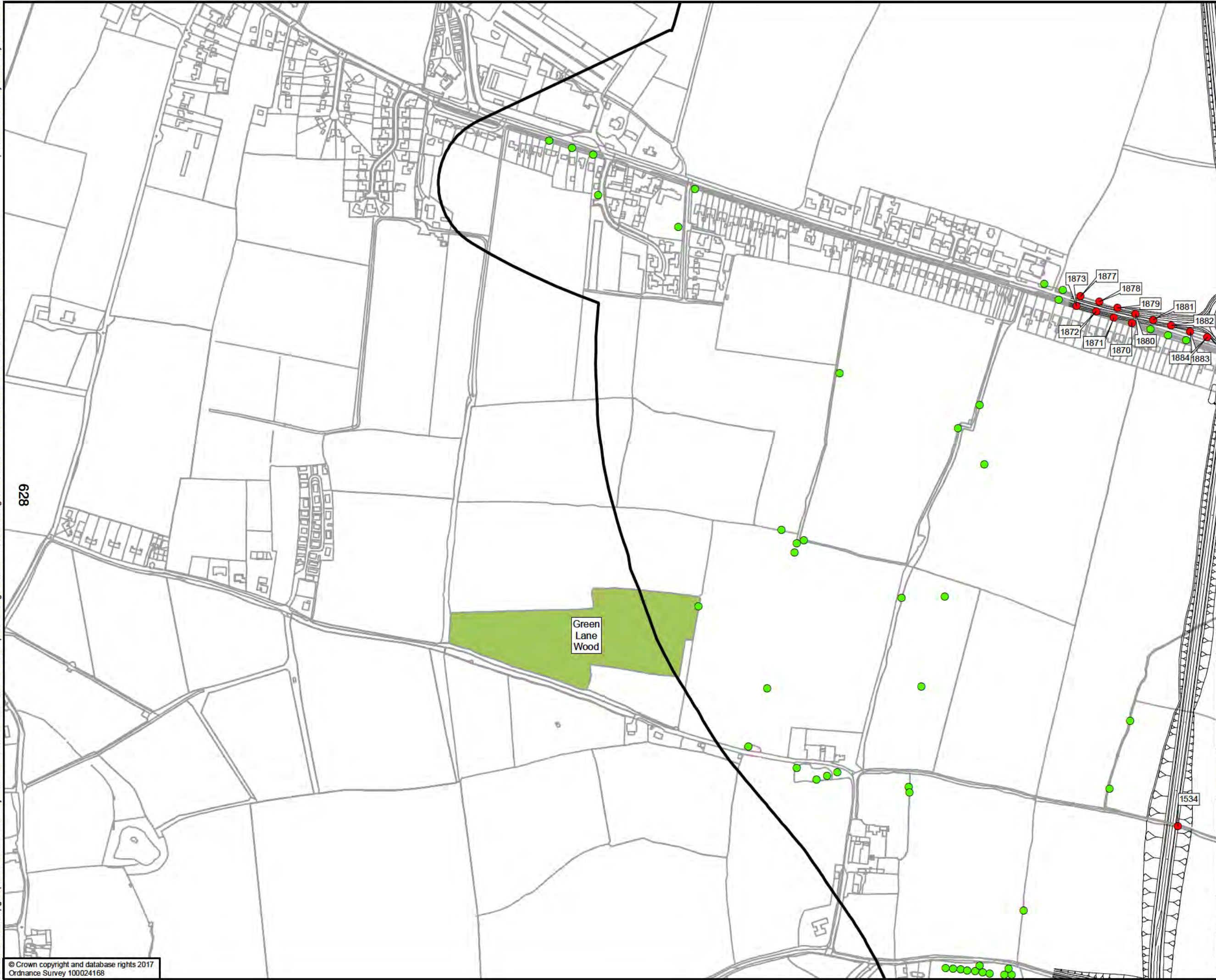
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Proposed Scheme - Orange Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

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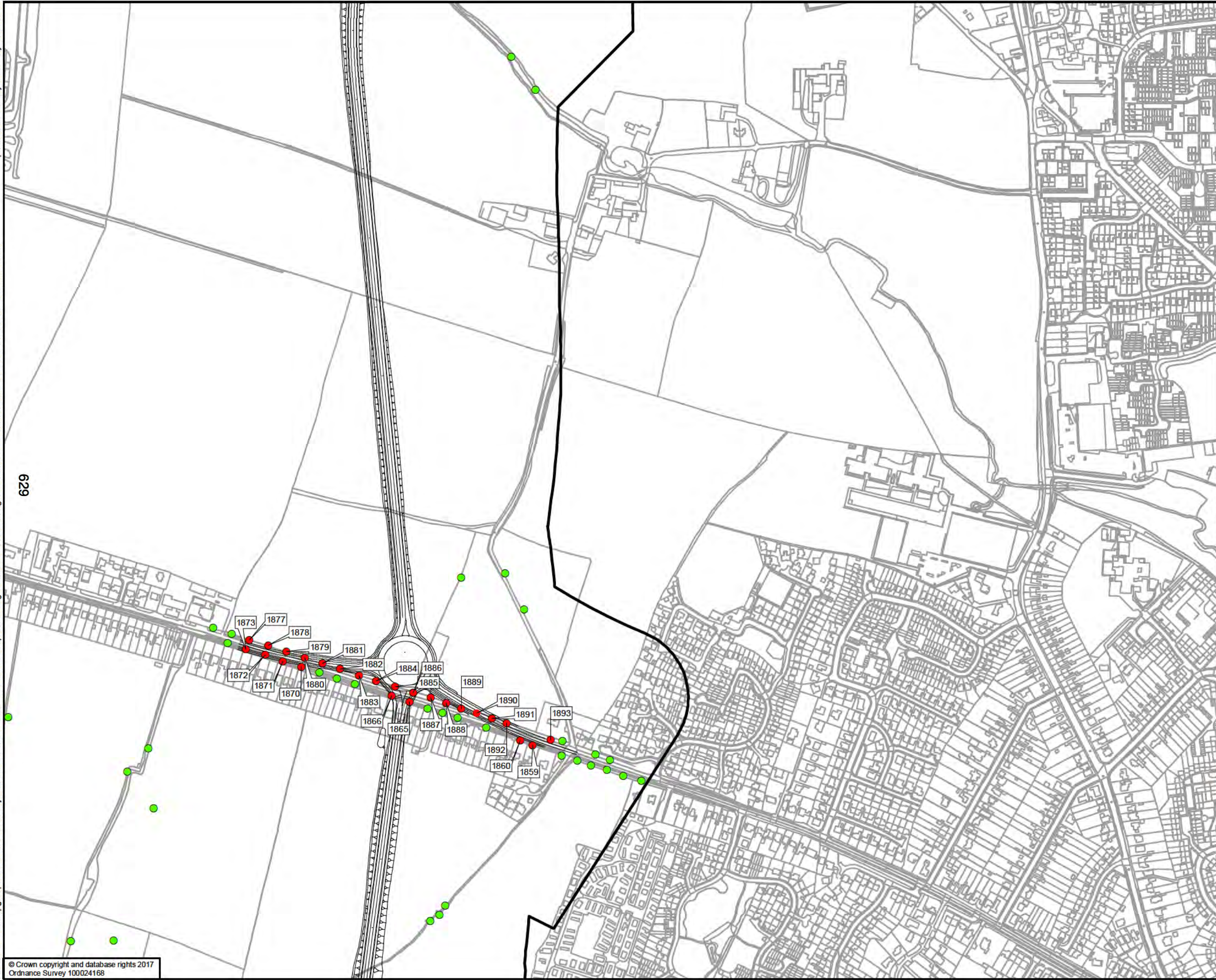
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Proposed Scheme - Orange Option

Study Area

Tree to be retained

Tree to be removed

050100200

Metres

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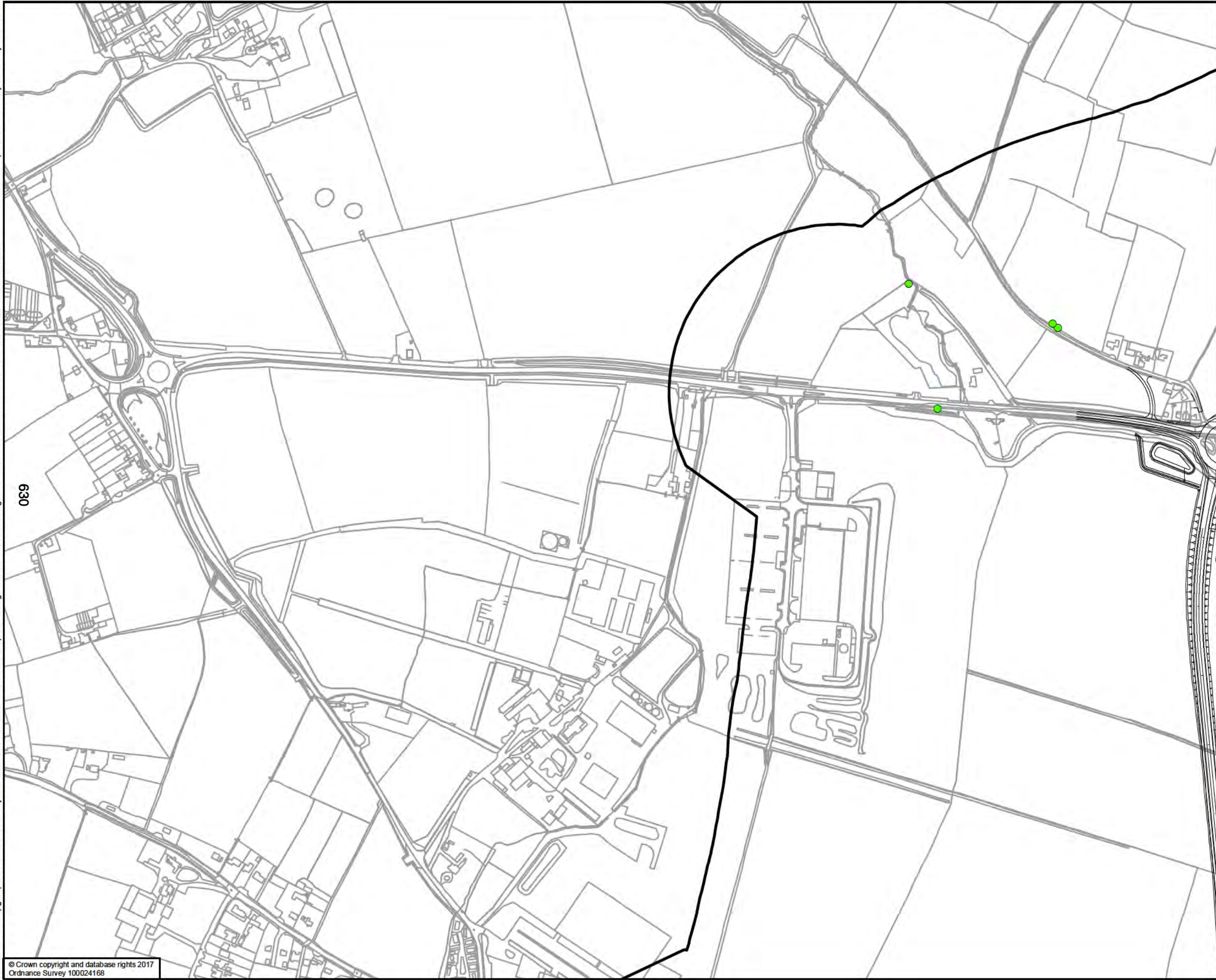
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Proposed Scheme - Orange Option

Study Area

Tree to be retained

050100200

Metres

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FIGURE 2
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Proposed Scheme - Orange Option

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

0

50

100

200

Metres

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FIGURE 2
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Proposed Scheme - Orange Option

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

0

50

100

200

Metres

DRAWING STATUS

STATUS

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FIGURE 2
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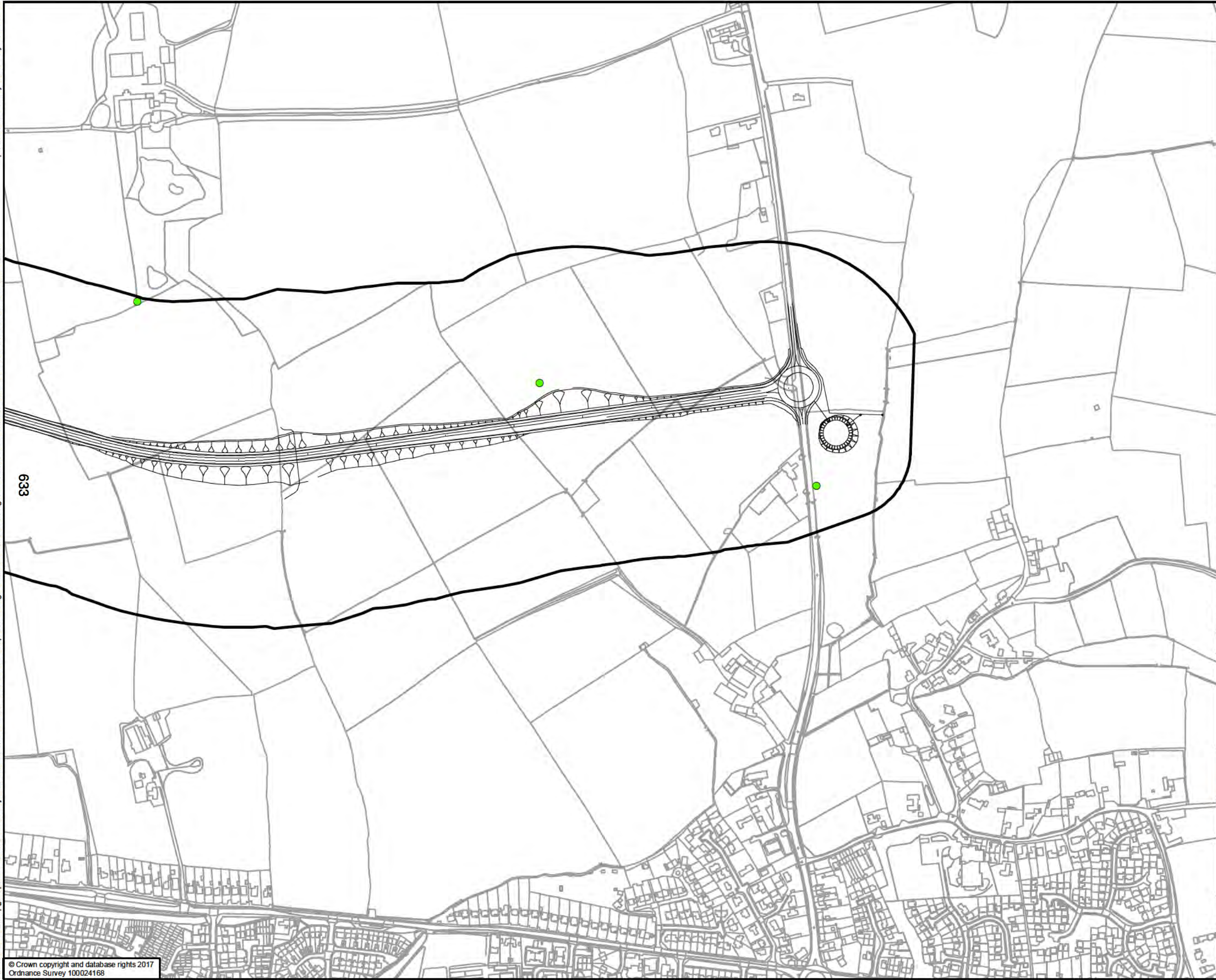
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Proposed Scheme - Orange Option

Study Area

Tree to be retained

050100200

Metres

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FIGURE 2
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Proposed Scheme - Cyan Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

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STATUS

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FIGURE 3
ARBORICULTURAL IMPACT PLAN
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Proposed Scheme - Cyan Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

er Stretton Sugwas Swainshi Upper Breinton kthall Lower Breinton Clefonger Breinton

Shelwick Helmer

Lower Bullington Dinedor

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STATUS

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FIGURE 3
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - CYAN
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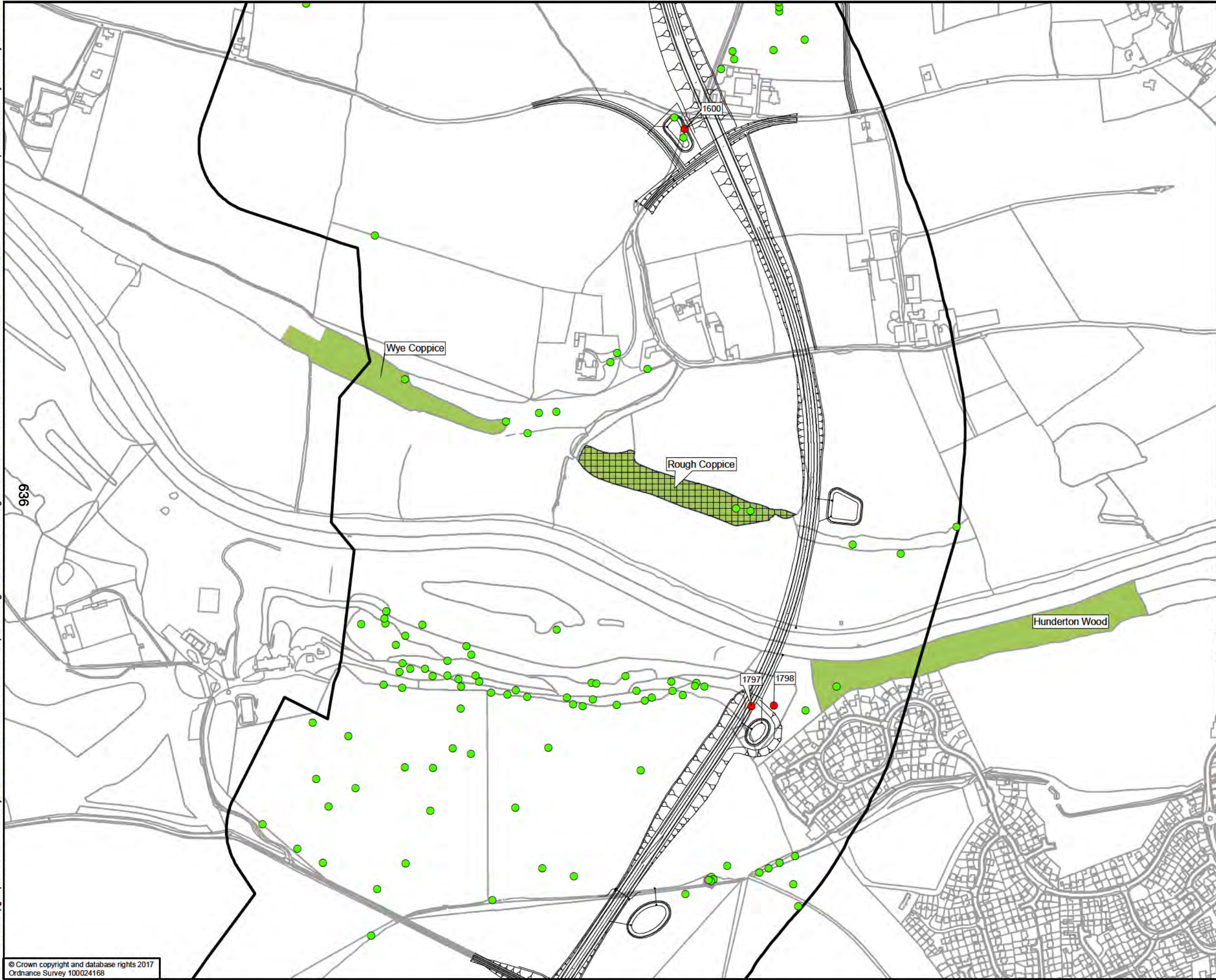
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Proposed Scheme - Cyan Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 3
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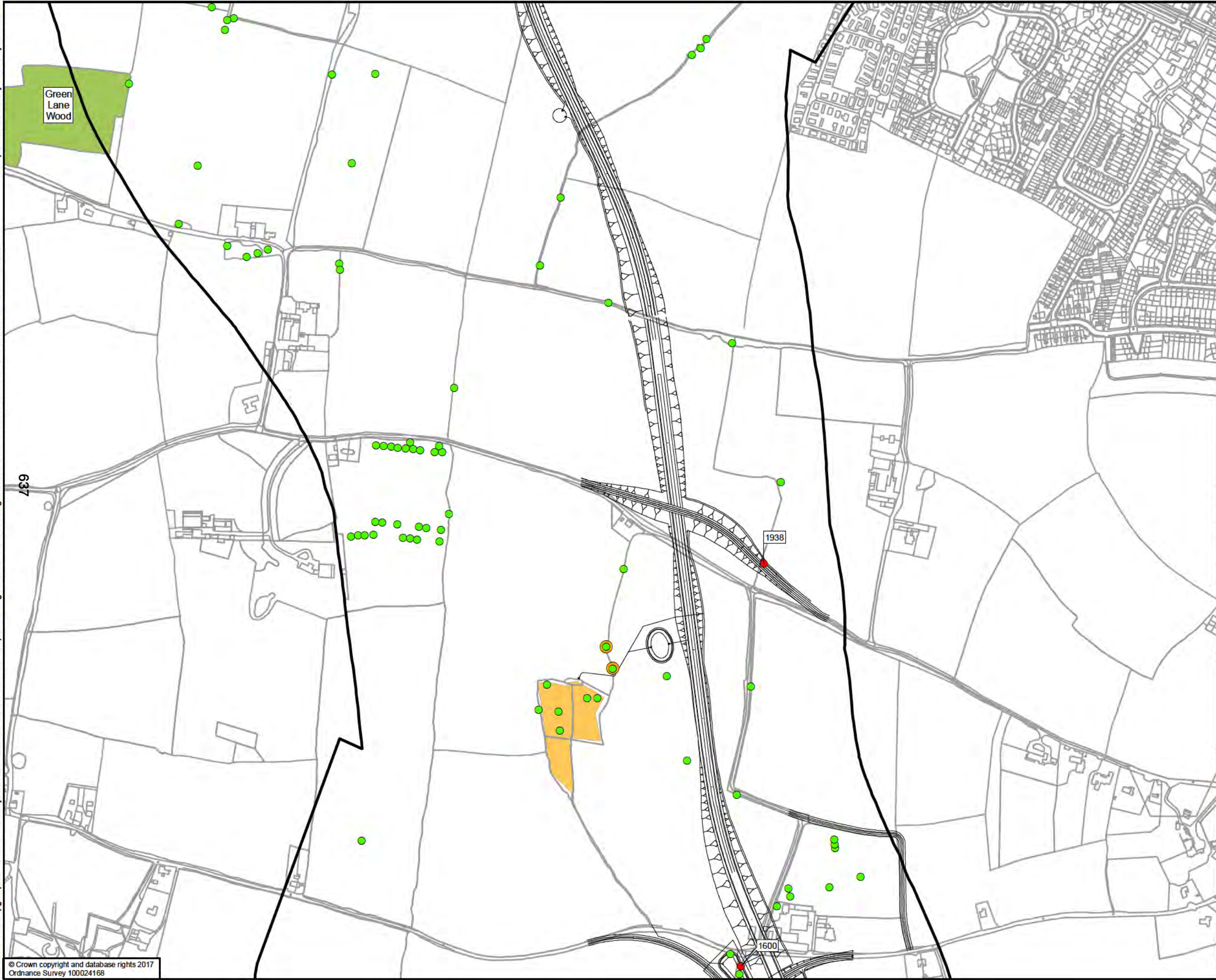
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Proposed Scheme - Cyan Option

Study Area

Tree to be retained

Tree to be removed

Tree with TPO

Ancient Woodland

Group of Trees with TPO

050100200

Metres

Stretton Sugwas

Swainshill

Upper Brinton

Lower Brinton

Cleington

Stretton Sugwas

Swainshill

Upper Brinton

Lower Brinton

Cleington

Stretton Sugwas

Swainshill

Upper Brinton

Lower Brinton

Cleington

DRAWING STATUS

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FIGURE 3
ARBORICULTURAL IMPACT PLAN
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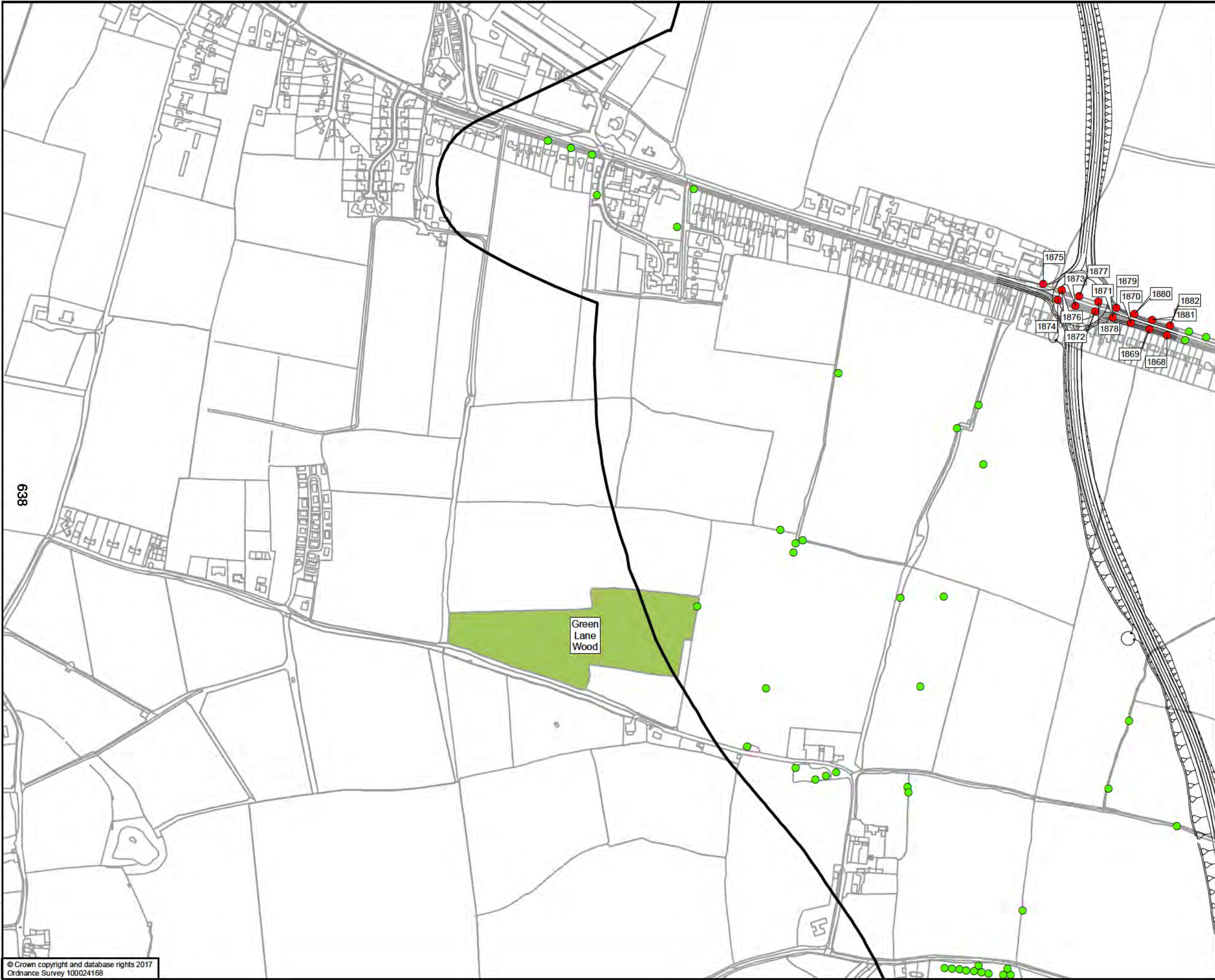
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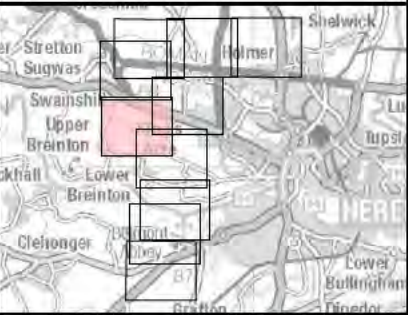
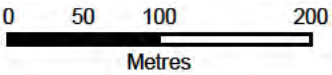
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- Proposed Scheme - Cyan Option
- Study Area
- Tree to be retained
- Tree to be removed
- Ancient Woodland



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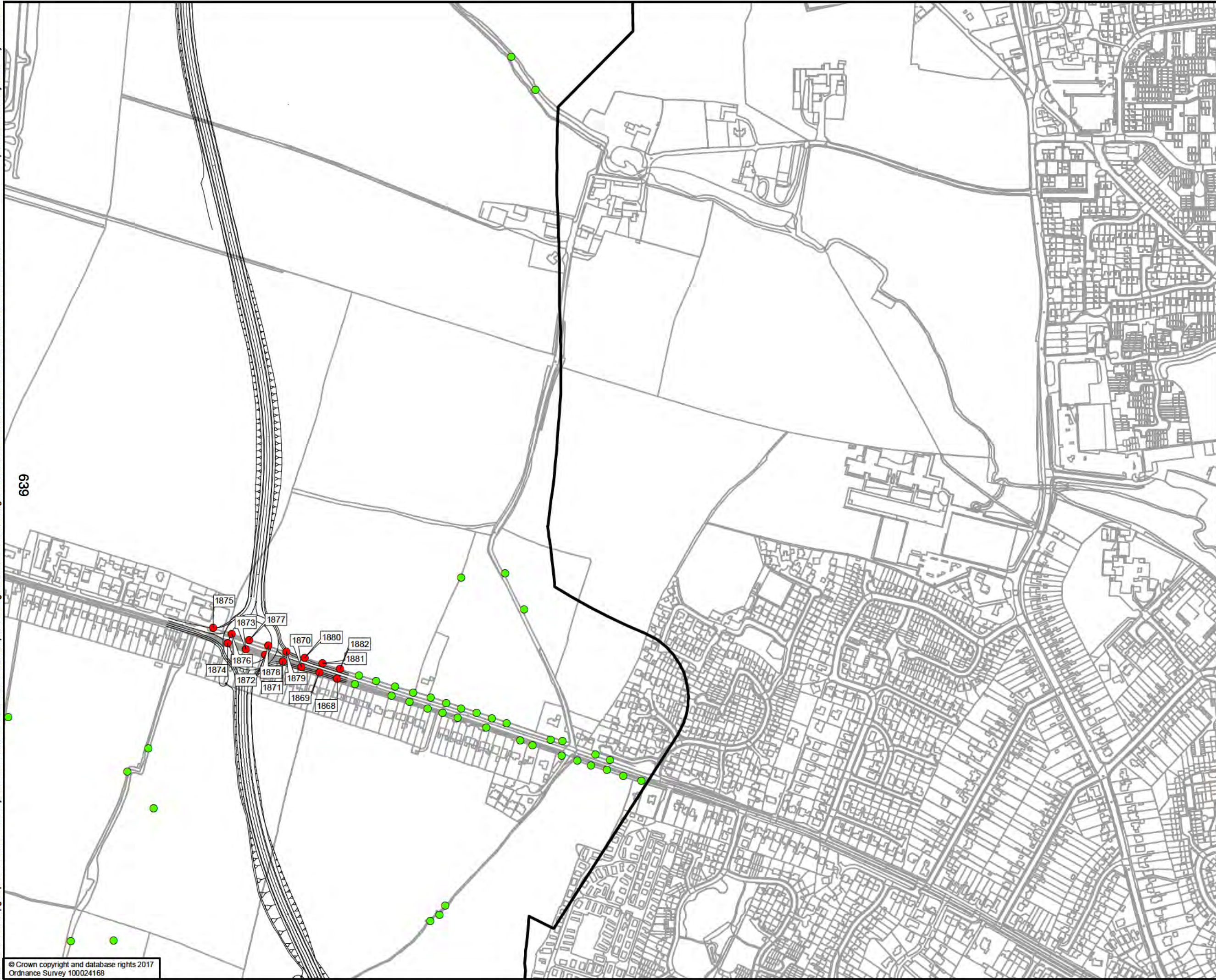
CLIENT
Balfour Beatty Herefordshire Council
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HEREFORD TRANSPORTATION PACKAGE
HEREFORD BYPASS

TITLE
FIGURE 3
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - CYAN
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SCALE @ A3 1:5,000	CHECKED JM	APPROVED MT
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Proposed Scheme - Cyan Option

Study Area

Tree to be retained

Tree to be removed

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 3
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - CYAN
PAGE 6 OF 10

SCALE @ A3
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Proposed Scheme - Cyan Option

Study Area

Tree to be retained

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 3
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - CYAN
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SCALE @ A3
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Proposed Scheme - Cyan Option

Study Area

Tree to be retained

Group of Trees with TPO

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 3
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - CYAN
PAGE 8 OF 10

SCALE @ A3
1:5,000

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PROJECT NO
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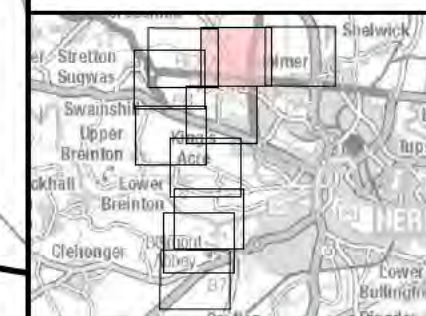
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 Proposed Scheme - Cyan Option
 Study Area
 Tree to be retained
 Tree to be removed
 Group of Trees with TPO



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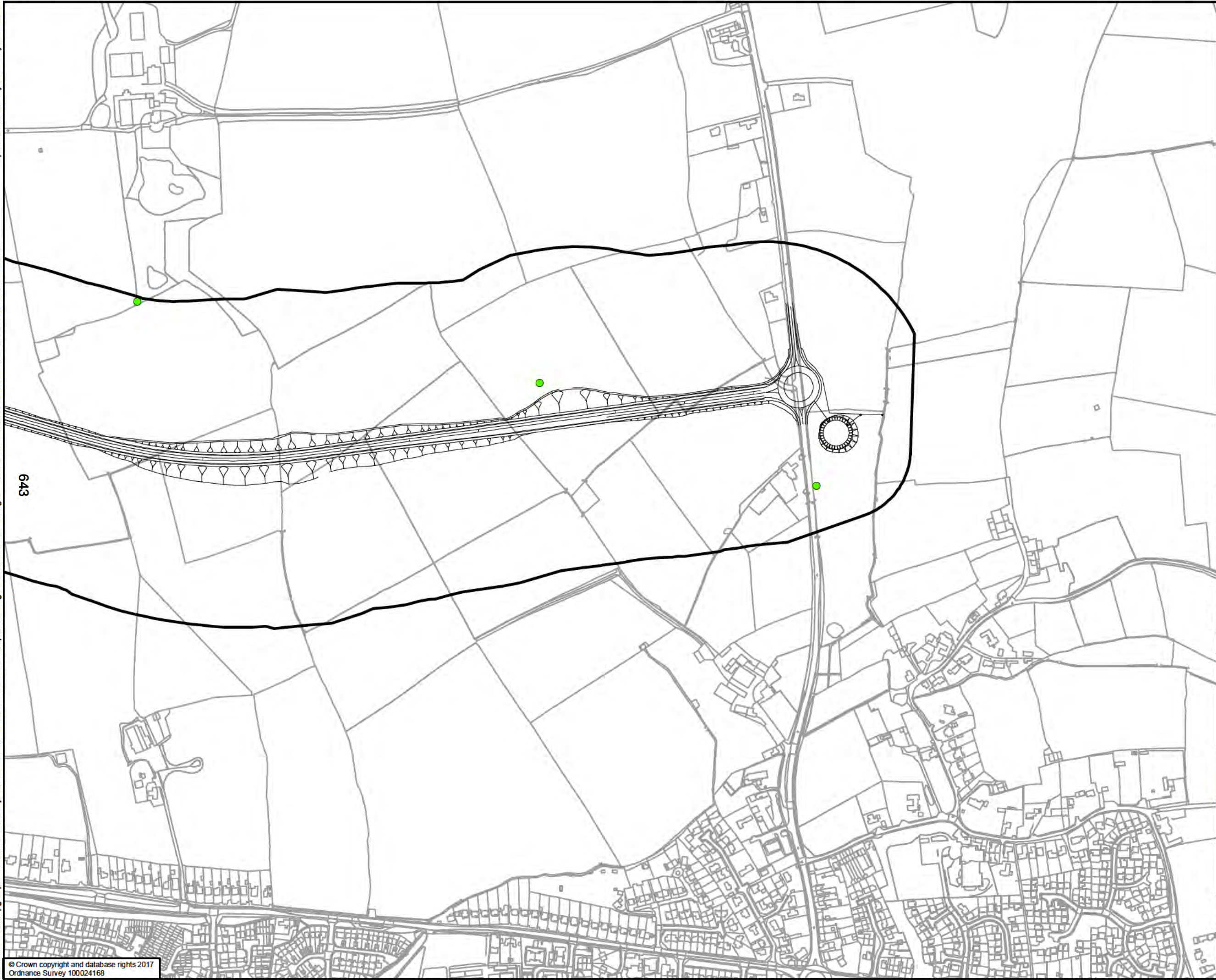
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ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - CYAN
PAGE 9 OF 10

SCALE @ A3 1:5,000	CHECKED JM	APPROVED MT
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Proposed Scheme - Cyan Option

Study Area

Tree to be retained

0 50 100 200

Metres

DRAWING STATUS

STATUS

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FIGURE 3
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - CYAN
PAGE 10 OF 10

SCALE @ A3 1:5,000	CHECKED JM	APPROVED MT
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Proposed Scheme - Yellow Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 4
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - YELLOW
PAGE 1 OF 10

SCALE @ A3
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Proposed Scheme - Yellow Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

0 50 100 200

Metres

STATUS

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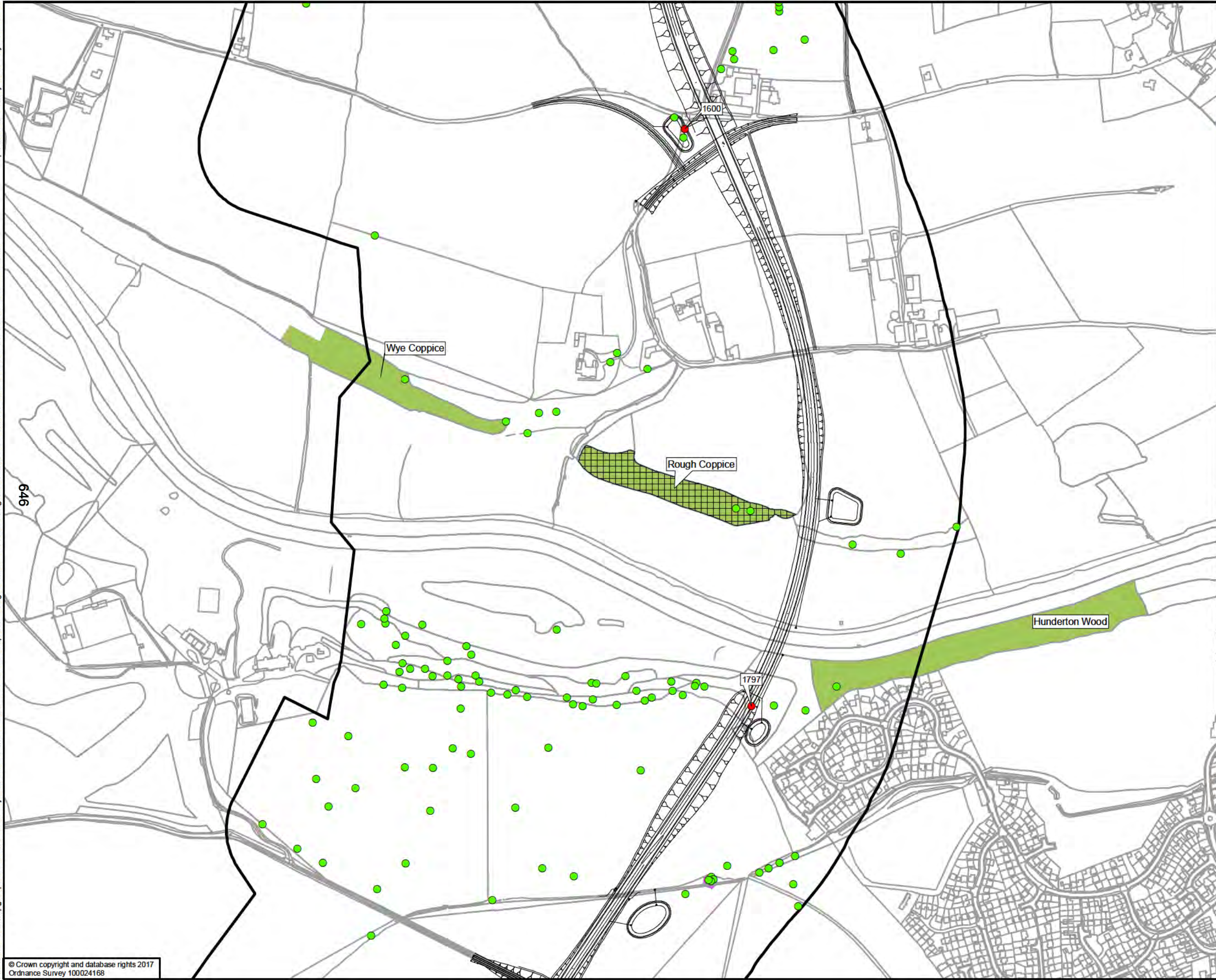
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FIGURE 4
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - YELLOW
PAGE 2 OF 10

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Proposed Scheme - Yellow Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 4
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PROPOSED SCHEME - YELLOW
PAGE 3 OF 10

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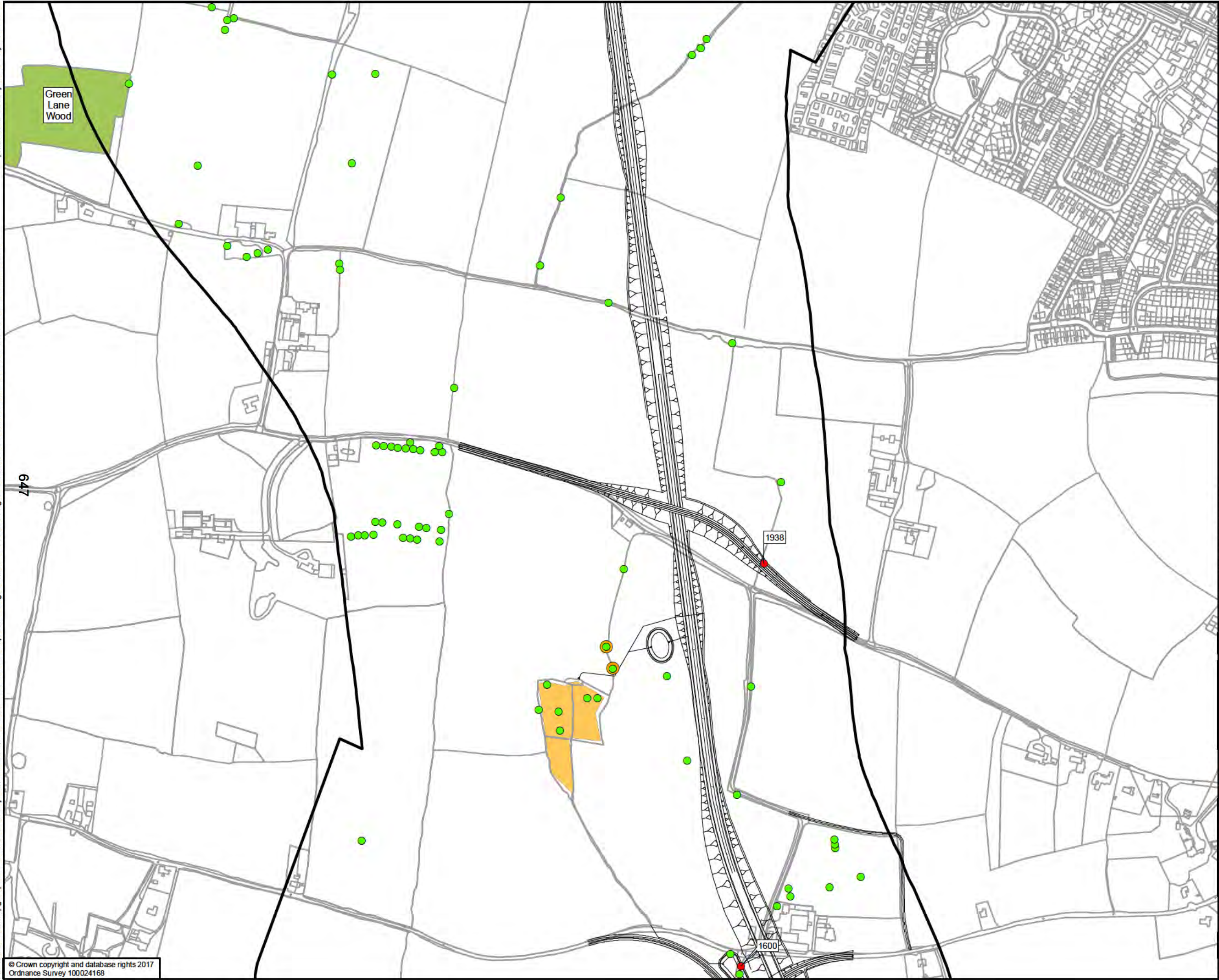
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Proposed Scheme - Yellow Option

Study Area

Tree to be retained

Tree to be removed

Tree with TPO

Ancient Woodland

Group of Trees with TPO

050100200

Metres

Stretton Sugwas

Swainshi

Upper Brinton

Lower Brinton

Clethonger

Stretton

Shelwick

Lower Bullington

Dinedor

STATUS

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FIGURE 4

ARBORICULTURAL IMPACT PLAN

PROPOSED SCHEME - YELLOW

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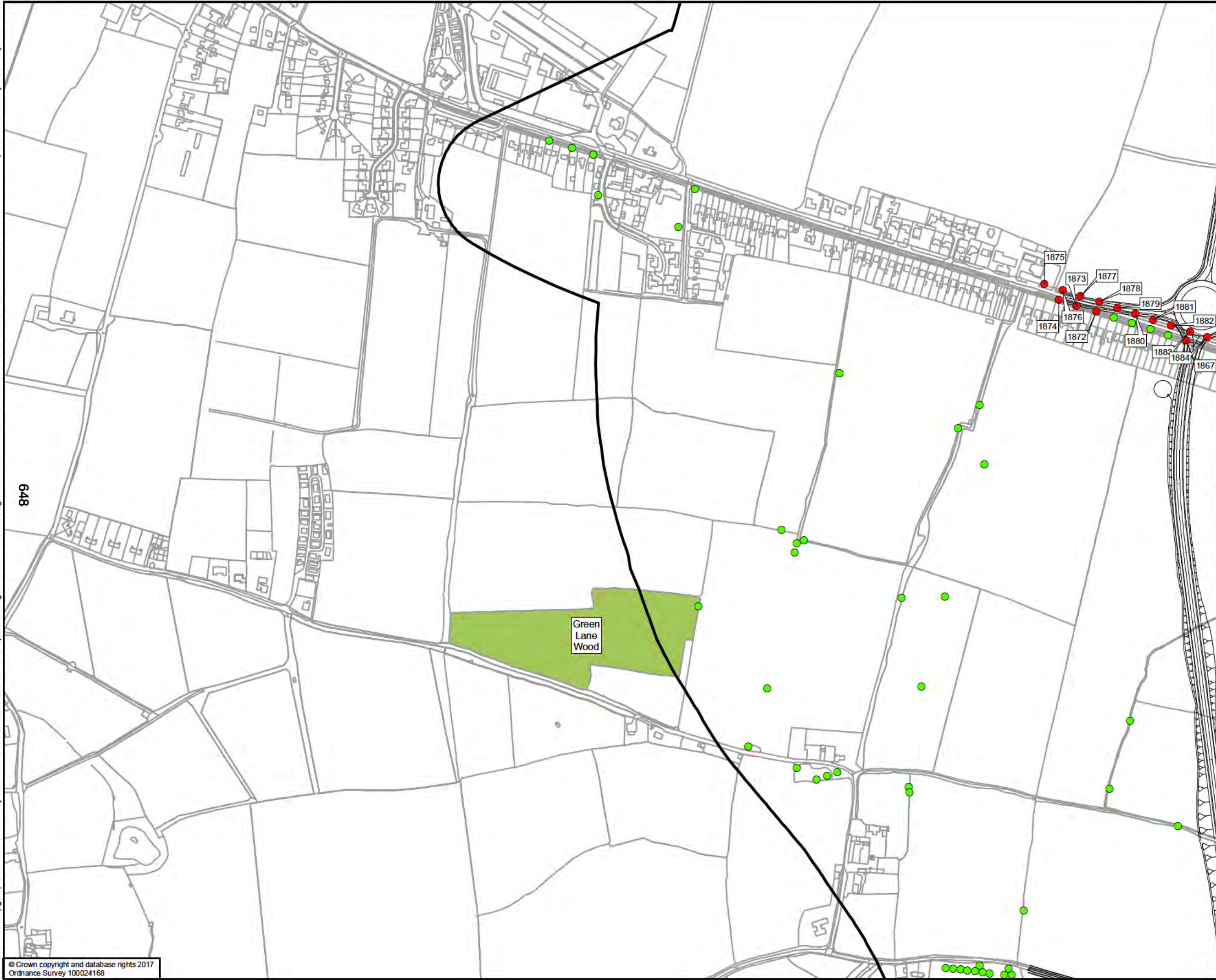
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648



Proposed Scheme - Yellow Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

0 50 100 200

Metres

DRAWING STATUS

STATUS

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FIGURE 4
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - YELLOW
PAGE 5 OF 10

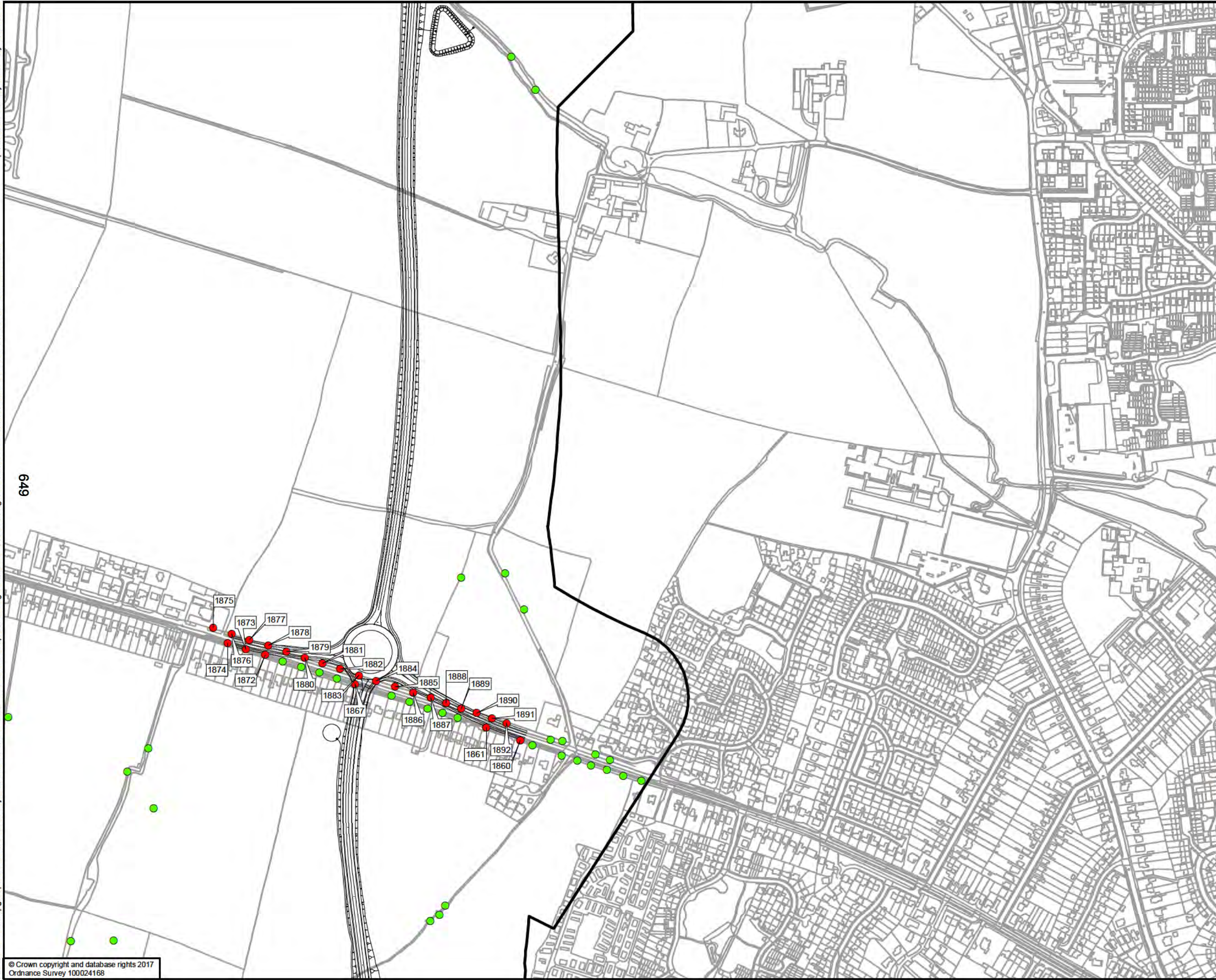
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Proposed Scheme - Yellow Option

Study Area

Tree to be retained

Tree to be removed

050100200

Metres

DRAWING STATUSSTATUS

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FIGURE 4
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - YELLOW
PAGE 6 OF 10

SCALE @ A3
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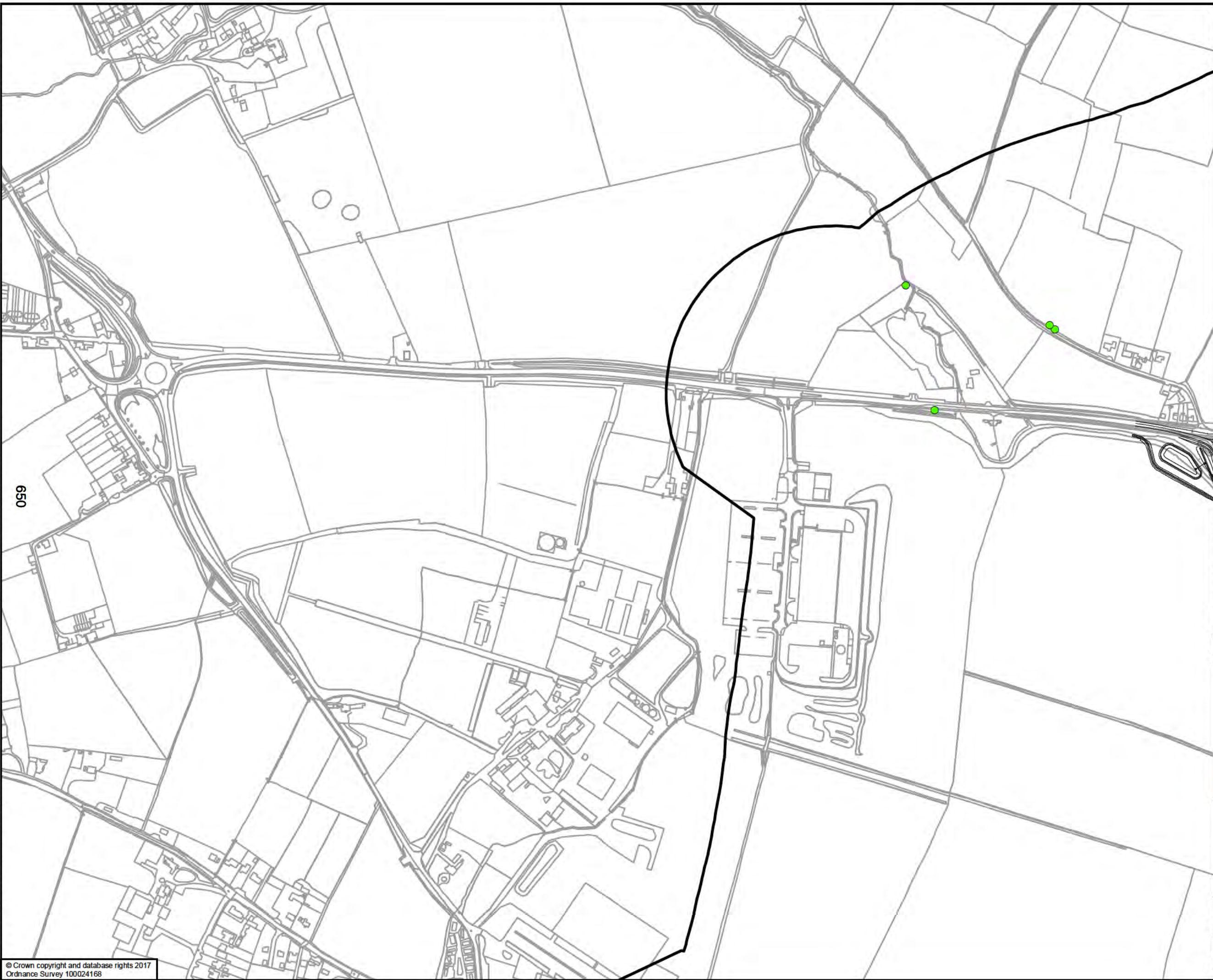
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— Proposed Scheme - Yellow Option

Study Area

● Tree to be retained

0 50 100 200

Metres

STATUS

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FIGURE 4
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - YELLOW
PAGE 7 OF 10

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Proposed Scheme - Yellow Option

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

0 50 100 200
Metres

STATUS

wsp

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FIGURE 4
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - YELLOW
PAGE 8 OF 10

SCALE @ A3 1:5,000	CHECKED JM	APPROVED MT
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Proposed Scheme - Yellow Option

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

050100200

Metres

DRAWING STATUSSTATUS

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FIGURE 4
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - YELLOW
PAGE 9 OF 10

SCALE @ A3
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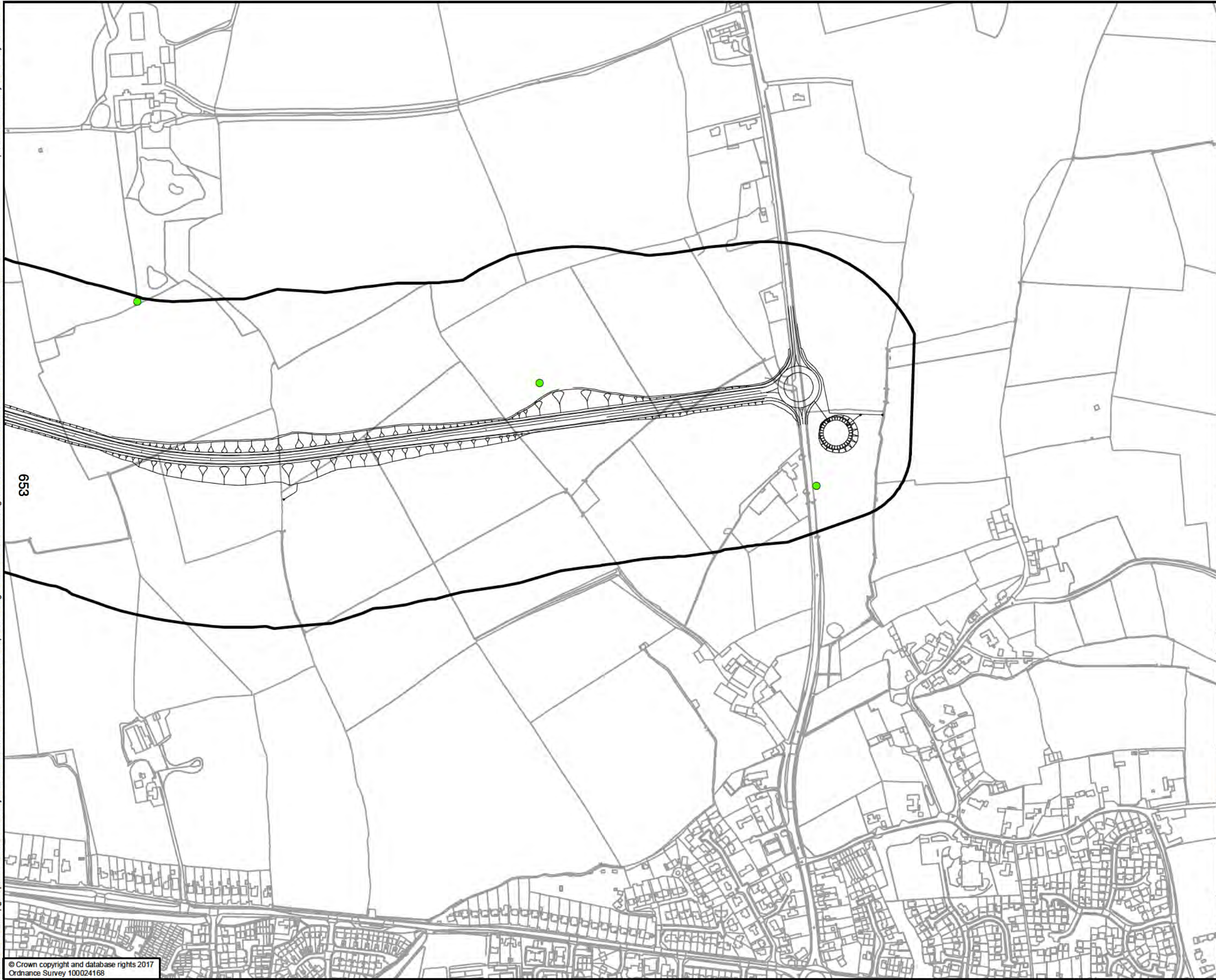
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Proposed Scheme - Yellow Option

Study Area

Tree to be retained

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 4
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - YELLOW
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654



Proposed Scheme - Red Op ion

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

DRAWING STATUS

STATUS

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CLIENT

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TITLE

FIGURE 5
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - RED
PAGE 1 OF 10

SCALE @ A3
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Proposed Scheme - Red Op ion

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

0 50 100 200

Metres

DRAWING STATUS

STATUS

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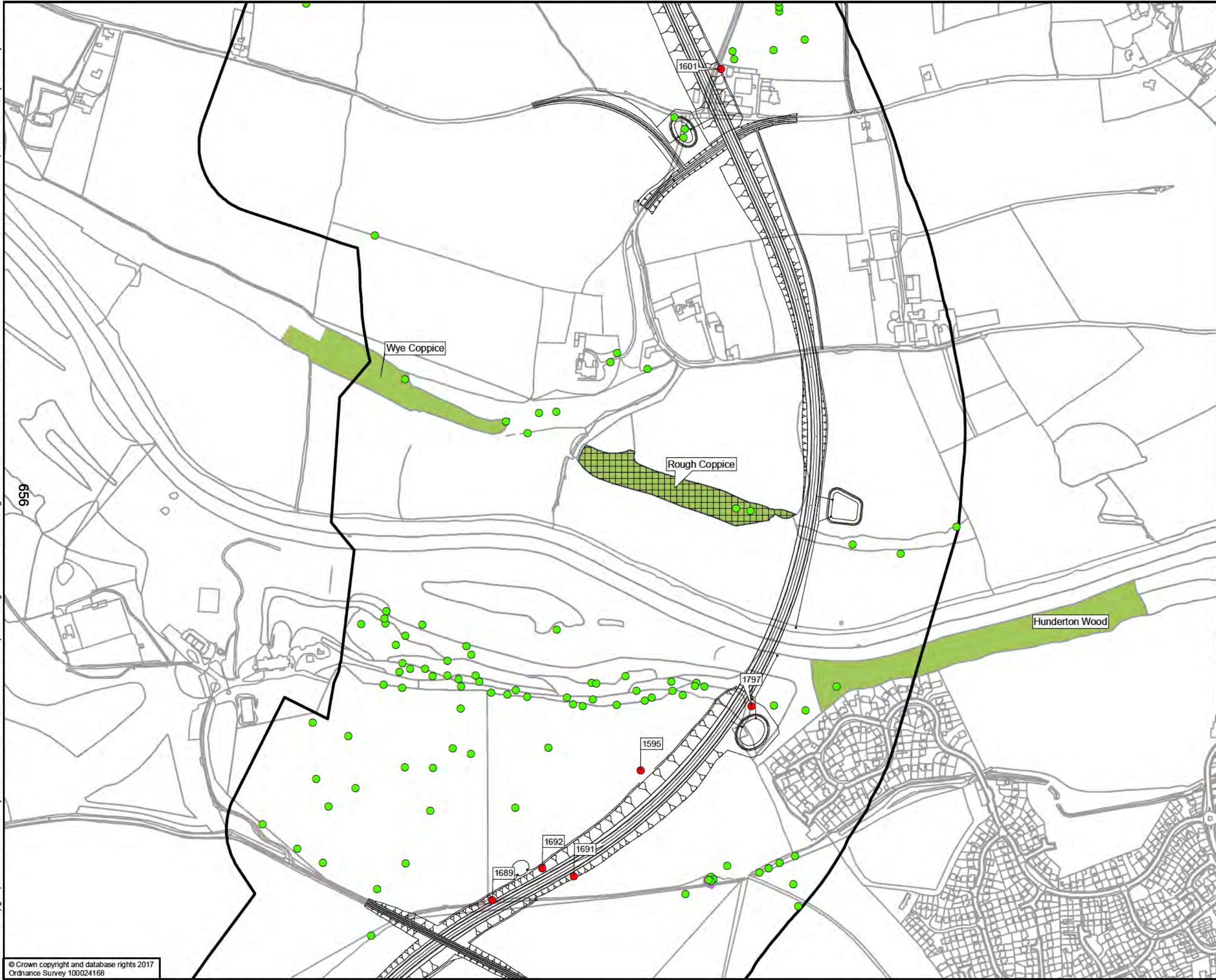
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ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - RED
PAGE 2 OF 10

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Proposed Scheme - Red Op ion

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

DRAWING STATUS

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TITLE

FIGURE 5
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - RED
PAGE 3 OF 10

SCALE @ A3
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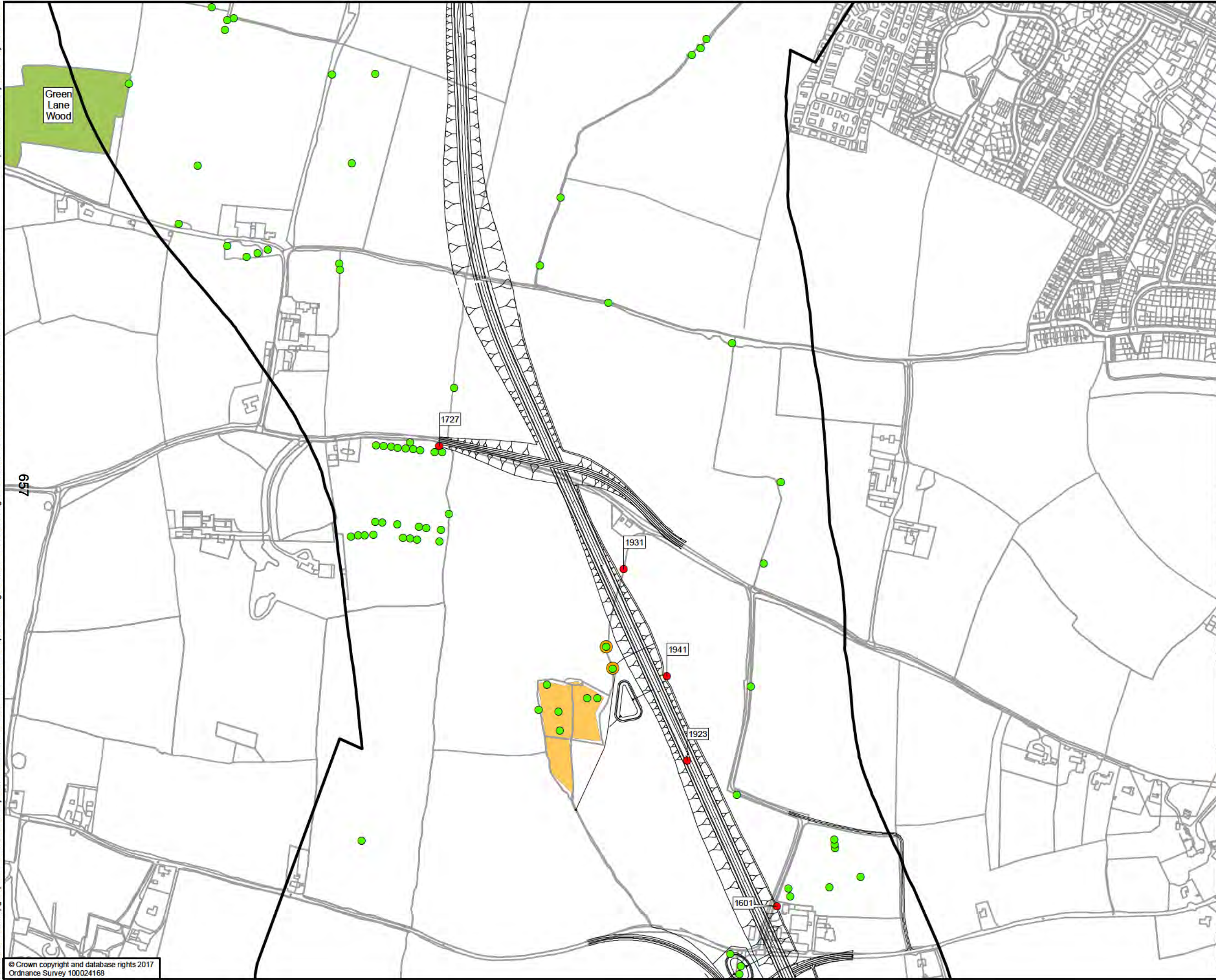
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Proposed Scheme - Red Op ion

Study Area

Tree to be retained

Tree to be removed

Tree with TPO

Ancient Woodland

Group of Trees with TPO

050100200

Metres

Stretton

Sugwas

Swainshi

Upper

Brinton

Chall

Lower

Brinton

Cleonger

Alley

Griffon

Shelwick

Upper

Lower

Bullington

Dinedor

STATUS

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FIGURE 5
ARBORICULTURAL IMPACT PLAN
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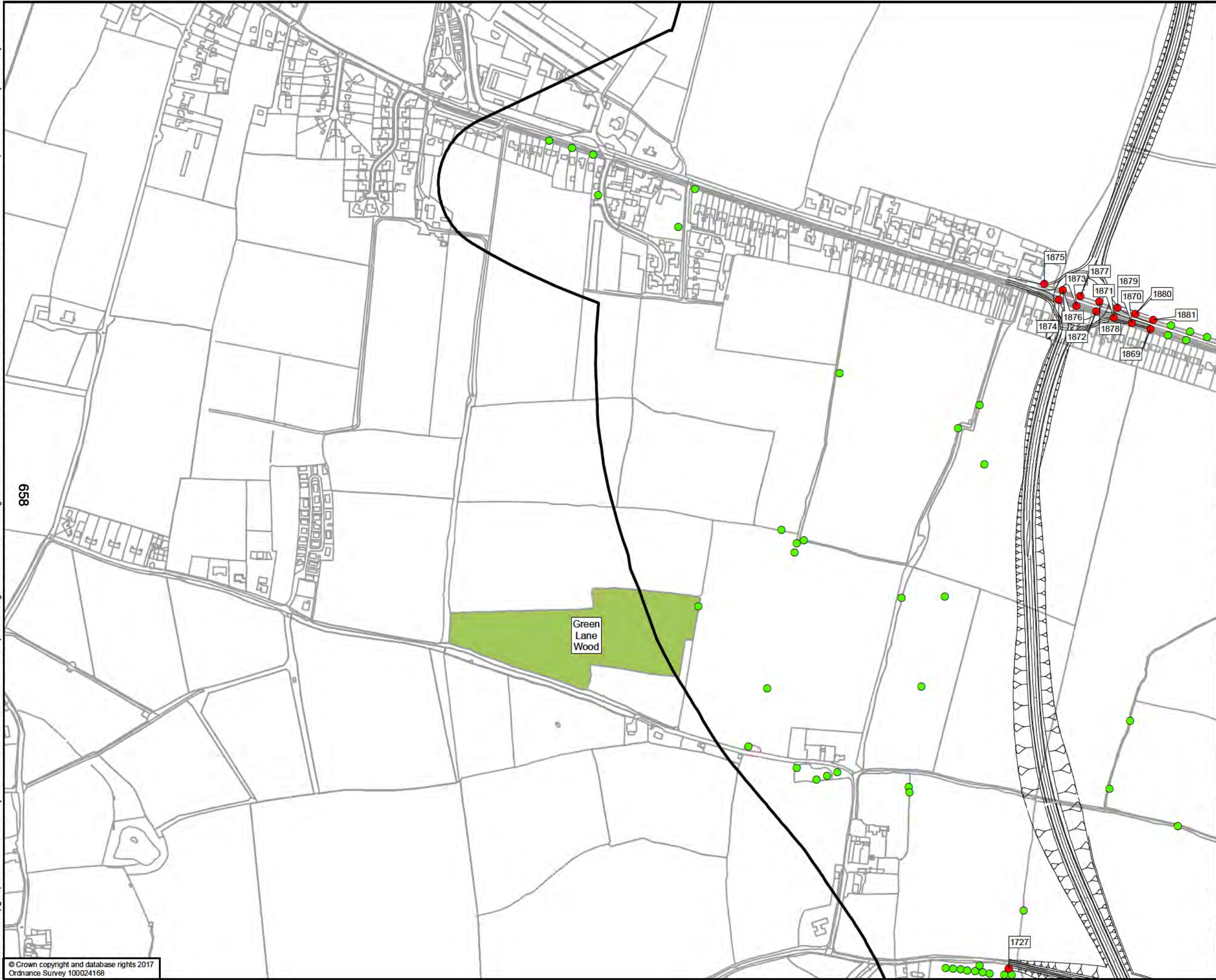
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Proposed Scheme - Red Op ion

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

DRAWING STATUS

STATUS

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HEREFORD BYPASS

TITLE

FIGURE 5
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - RED
PAGE 5 OF 10

SCALE @ A3
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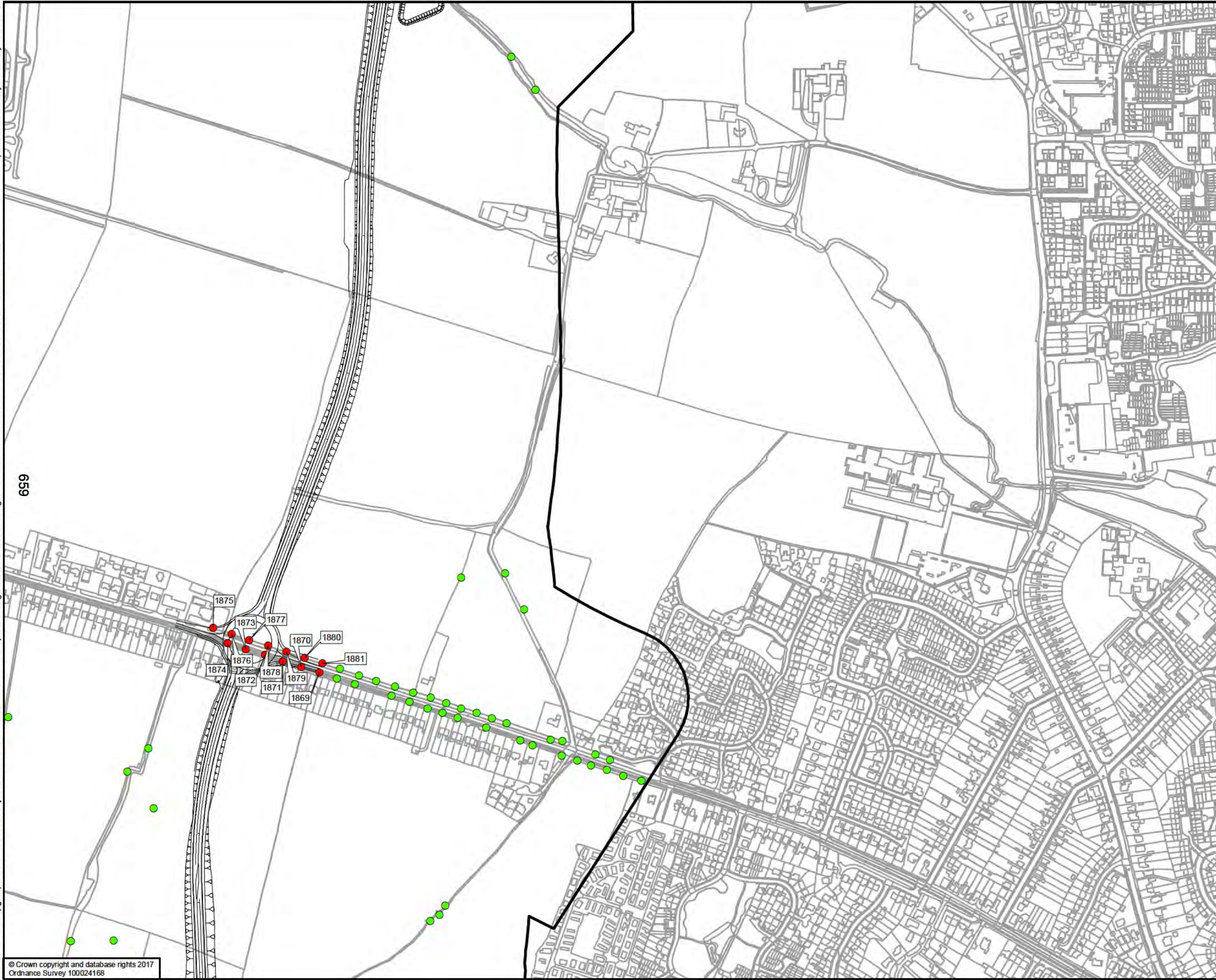
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Proposed Scheme - Red Op ion

Study Area

Tree to be retained

Tree to be removed

050100200

Metres

DRAWING STATUSSTATUS

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CLIENT

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TITLE

FIGURE 5
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PROPOSED SCHEME - RED
PAGE 6 OF 10

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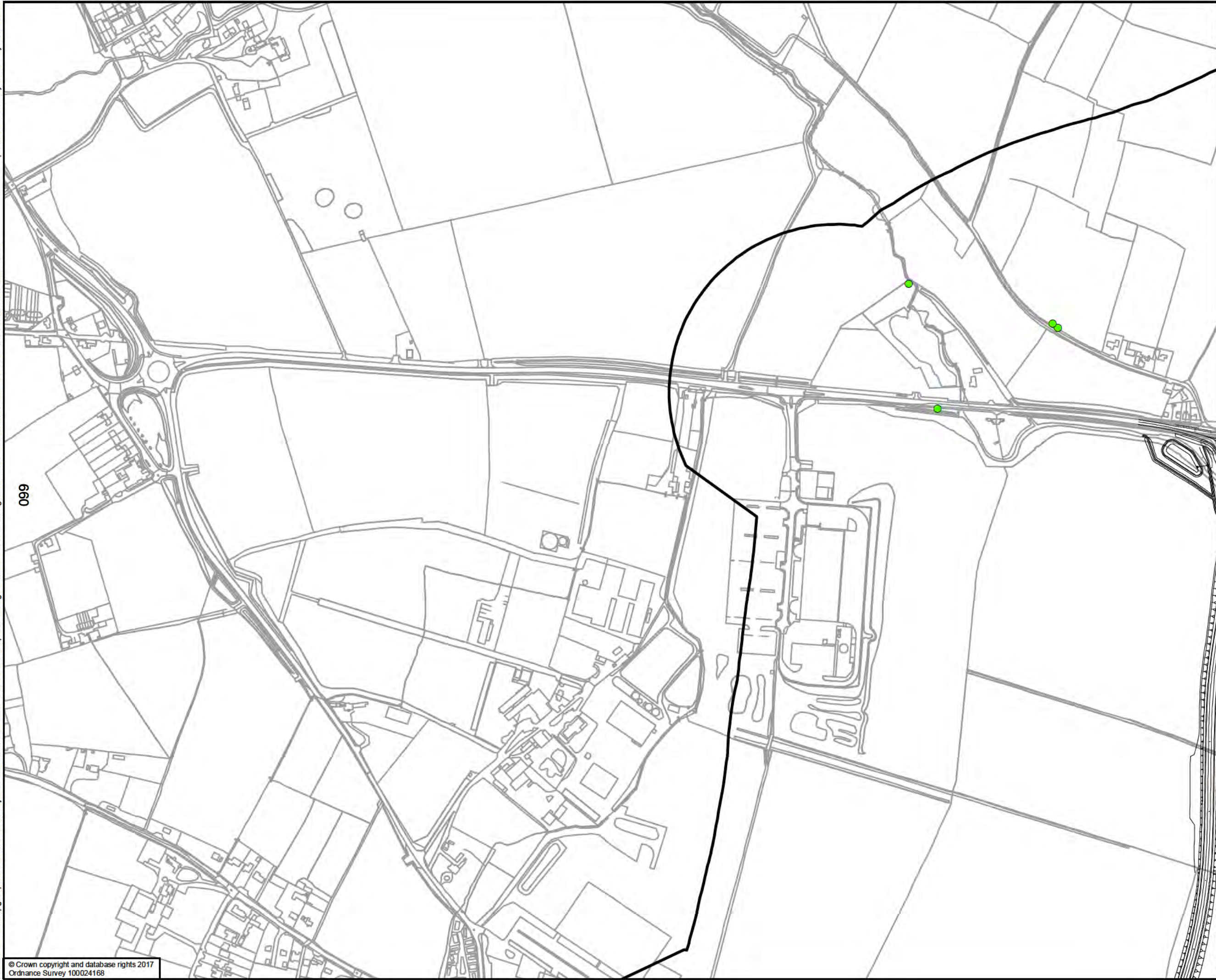
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099



Proposed Scheme - Red Op ion

Study Area

Tree to be retained

050100200

Metres

DRAWING STATUS

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FIGURE 5
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Proposed Scheme - Red Op ion

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 5
ARBORICULTURAL IMPACT PLAN
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Proposed Scheme - Red Op ion

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

050100200

Metres

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FIGURE 5
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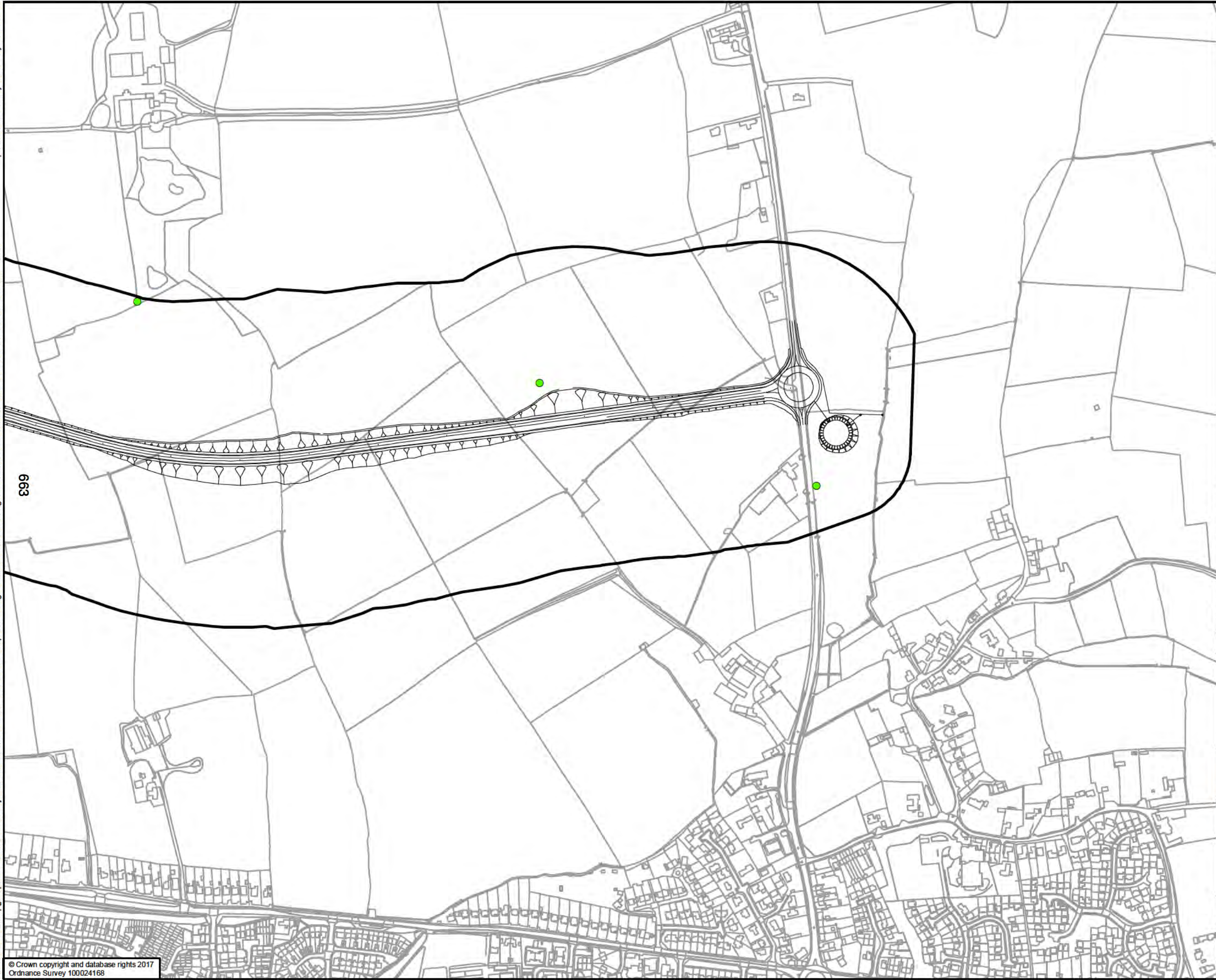
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Proposed Scheme - Red Option

Study Area

Tree to be retained

050100200

Metres

DRAWING STATUS

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FIGURE 5
ARBORICULTURAL IMPACT PLAN
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Proposed Scheme - Olive Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

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STATUS

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FIGURE 6
ARBORICULTURAL IMPACT PLAN
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PAGE 1 OF 10

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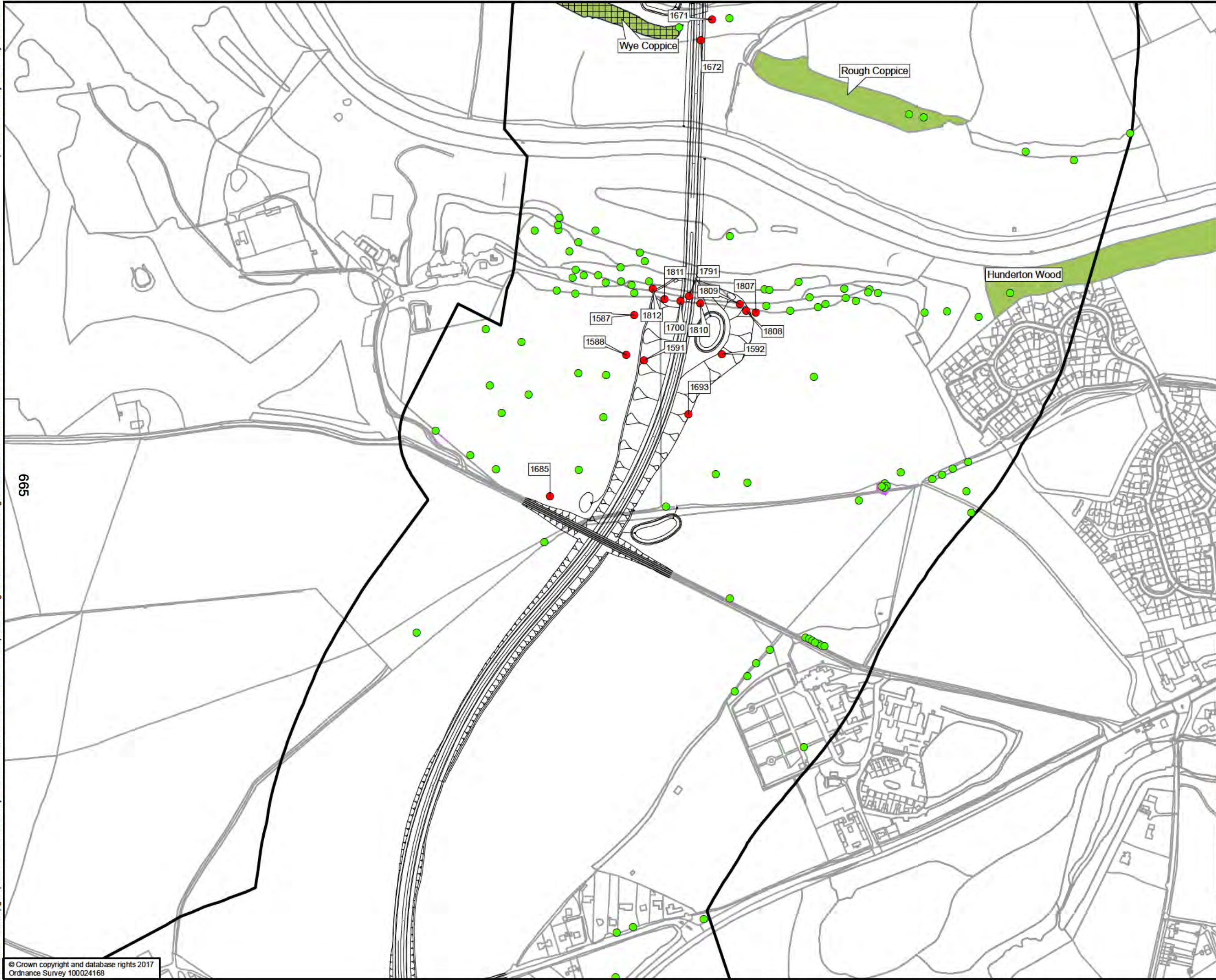
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Proposed Scheme - Olive Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

er Stretton Sugwas Swainshi Upper Brinton Lower Brinton Clewonger Brinton

Shelwick Helmer

HERF

Lower Bullingham

DRAWING STATUS

STATUS

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FIGURE 6
ARBORICULTURAL IMPACT PLAN
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PAGE 2 OF 10

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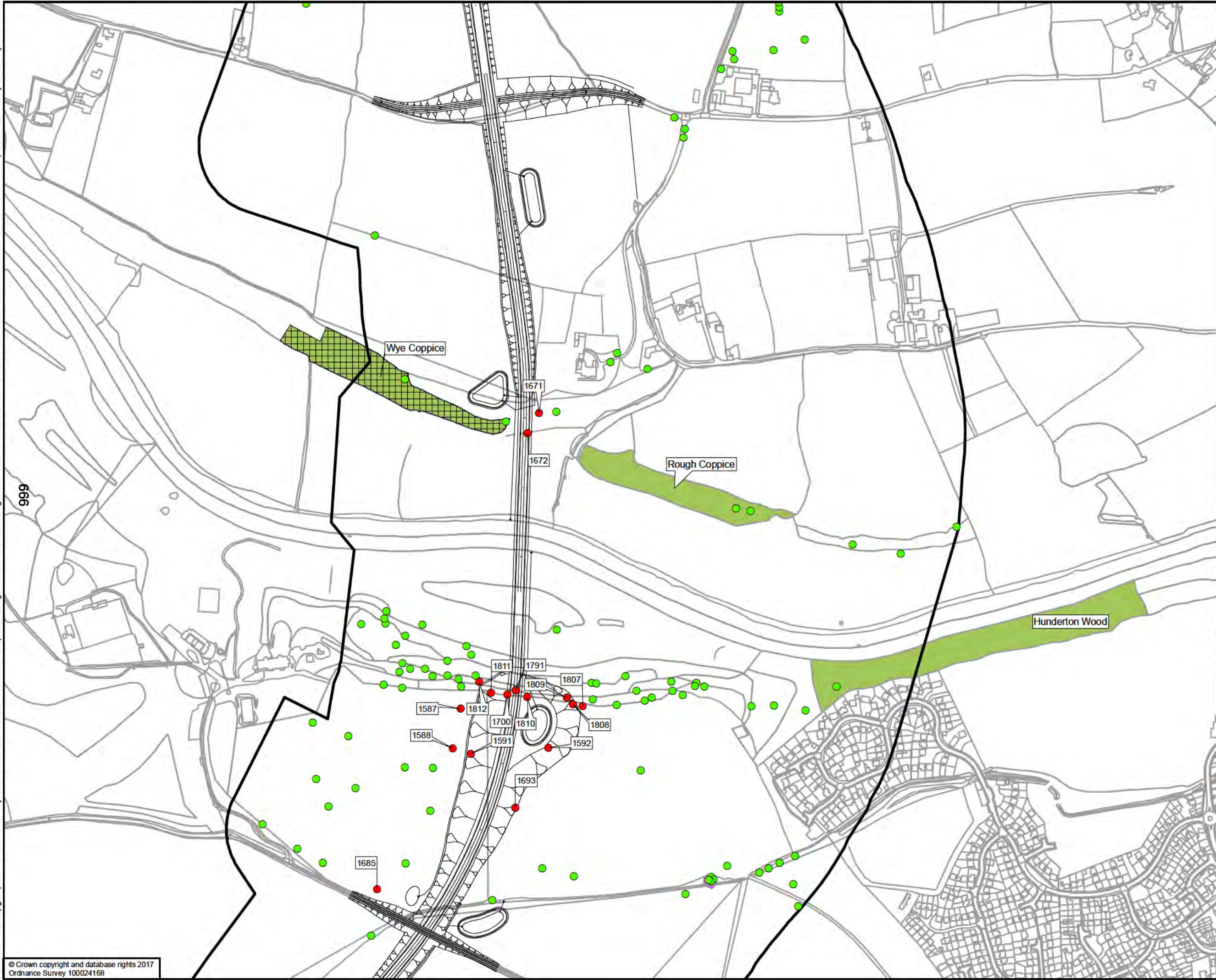
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Proposed Scheme - Olive Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

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FIGURE 6
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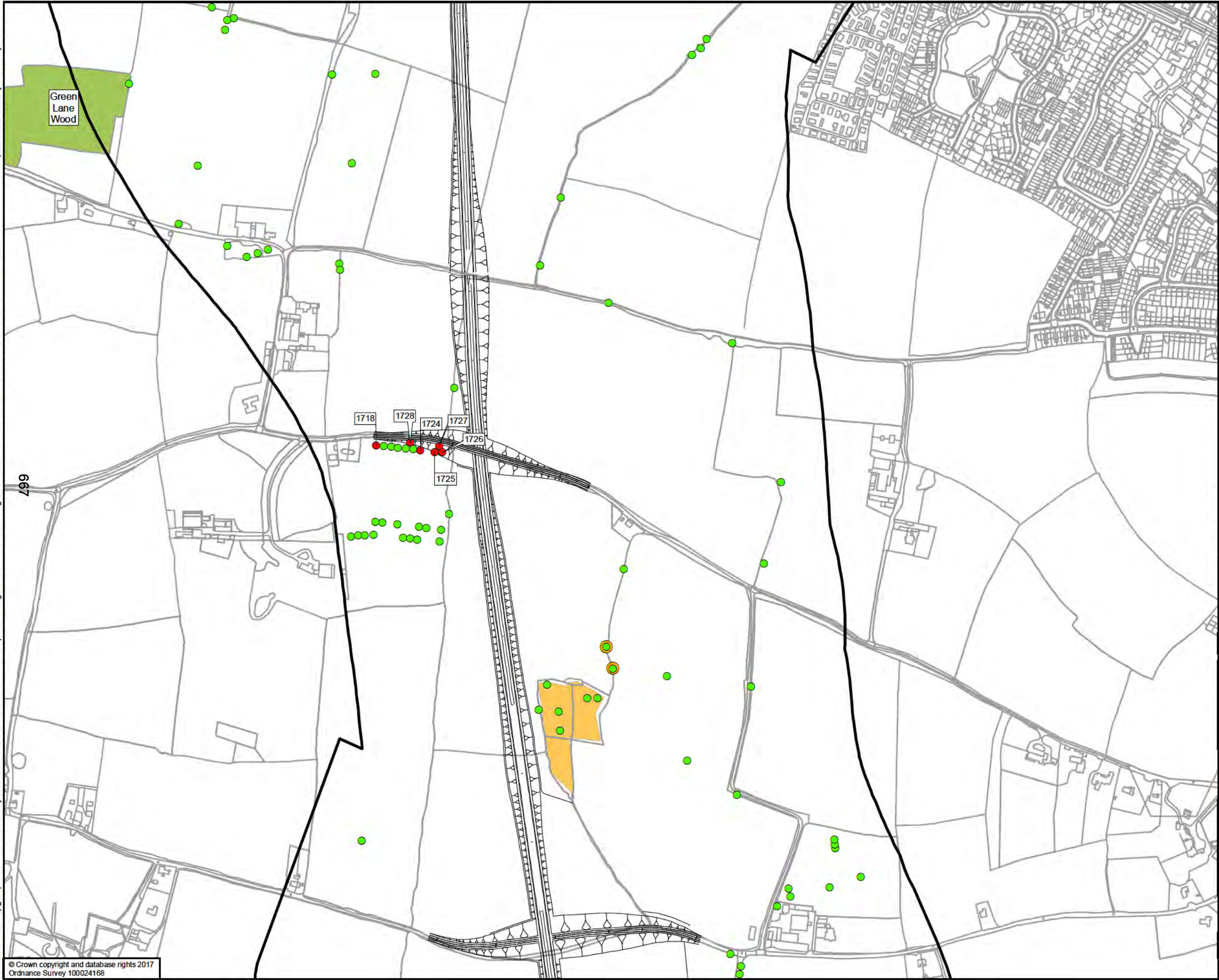
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Proposed Scheme - Olive Option

Study Area

Tree to be retained

Tree to be removed

Tree with TPO

Ancient Woodland

Group of Trees with TPO

050100200

Metres

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FIGURE 6
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PROPOSED SCHEME - OLIVE
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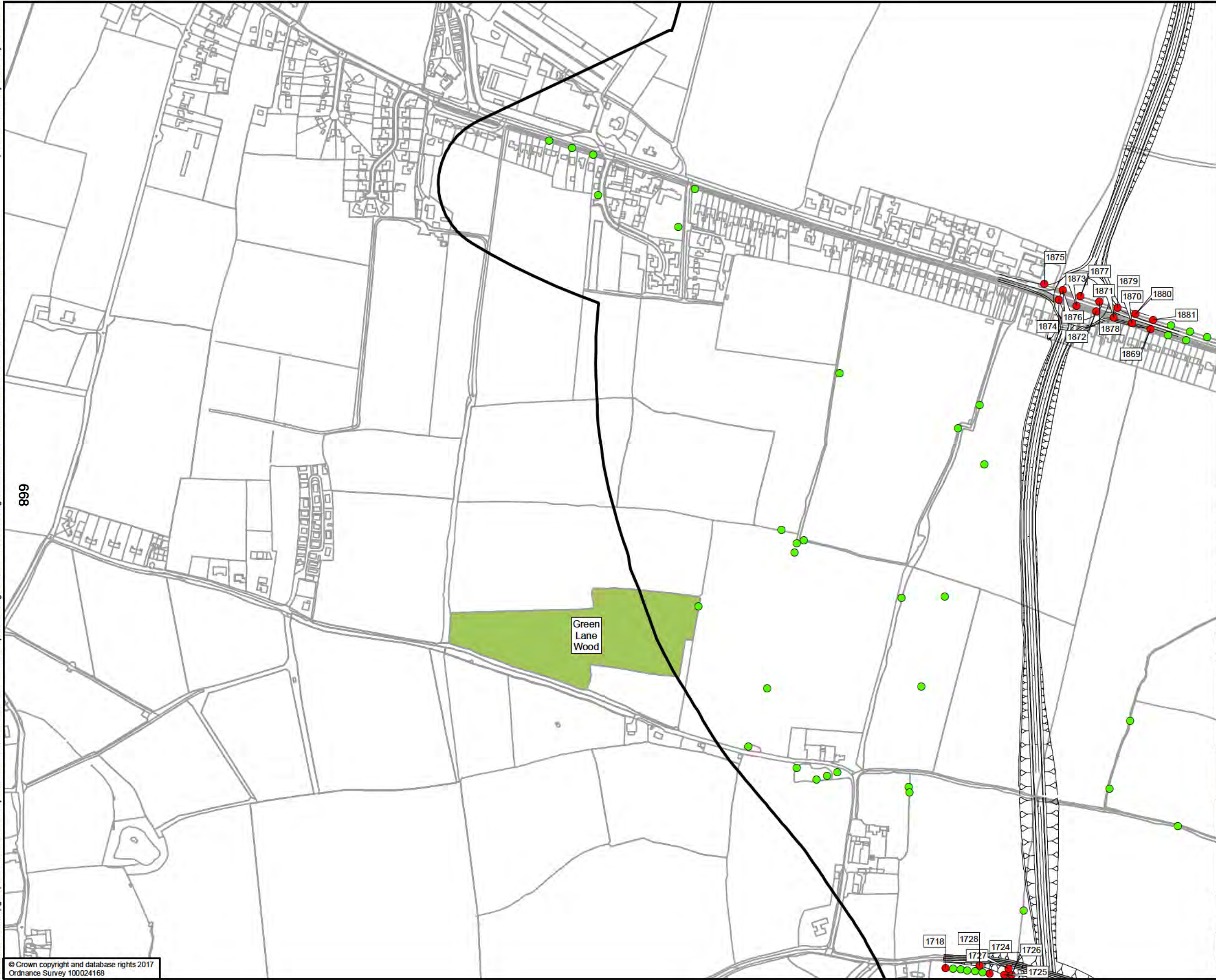
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Proposed Scheme - Olive Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 6
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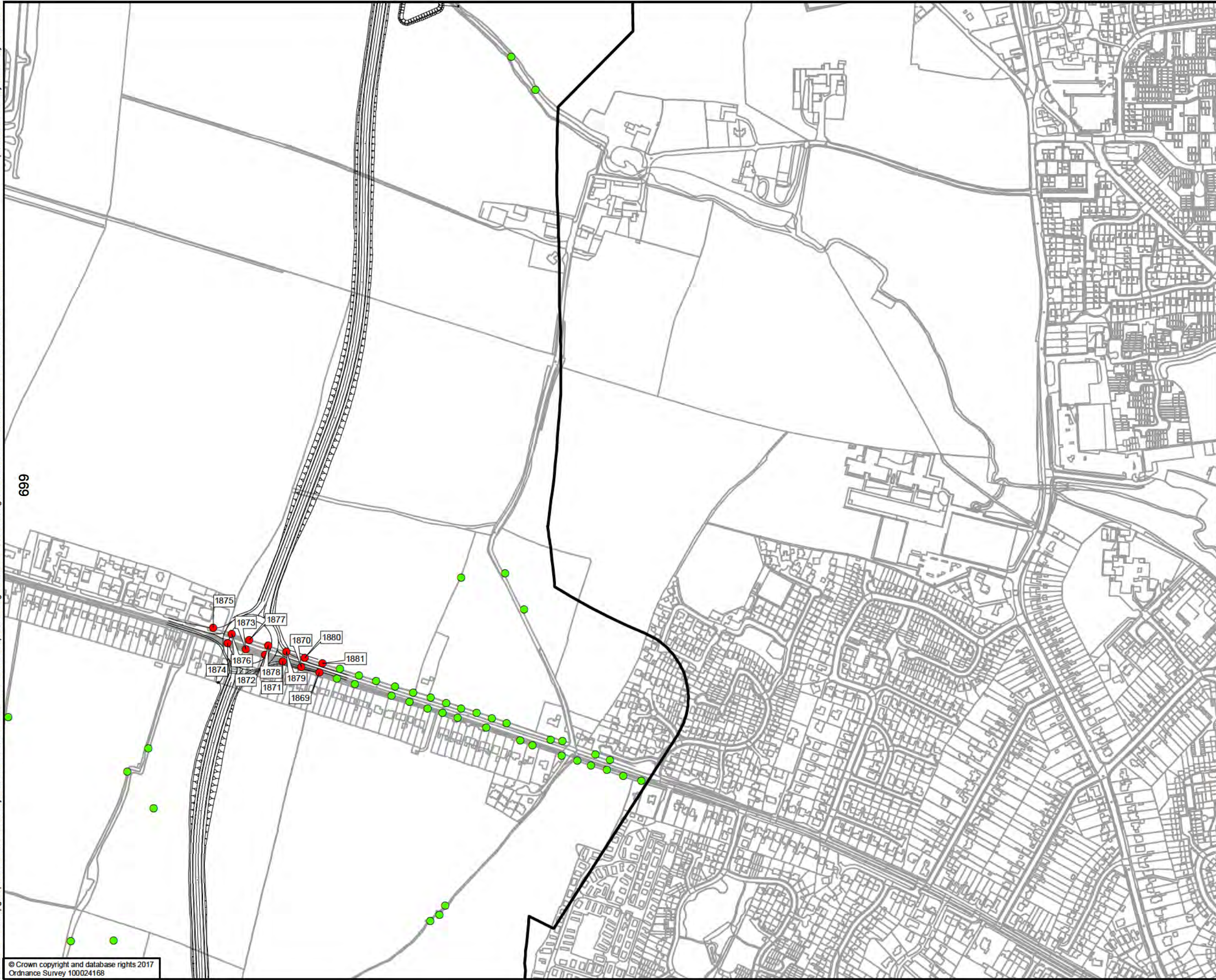
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Proposed Scheme - Olive Option

Study Area

Tree to be retained

Tree to be removed

050100200

Metres

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FIGURE 6
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - OLIVE
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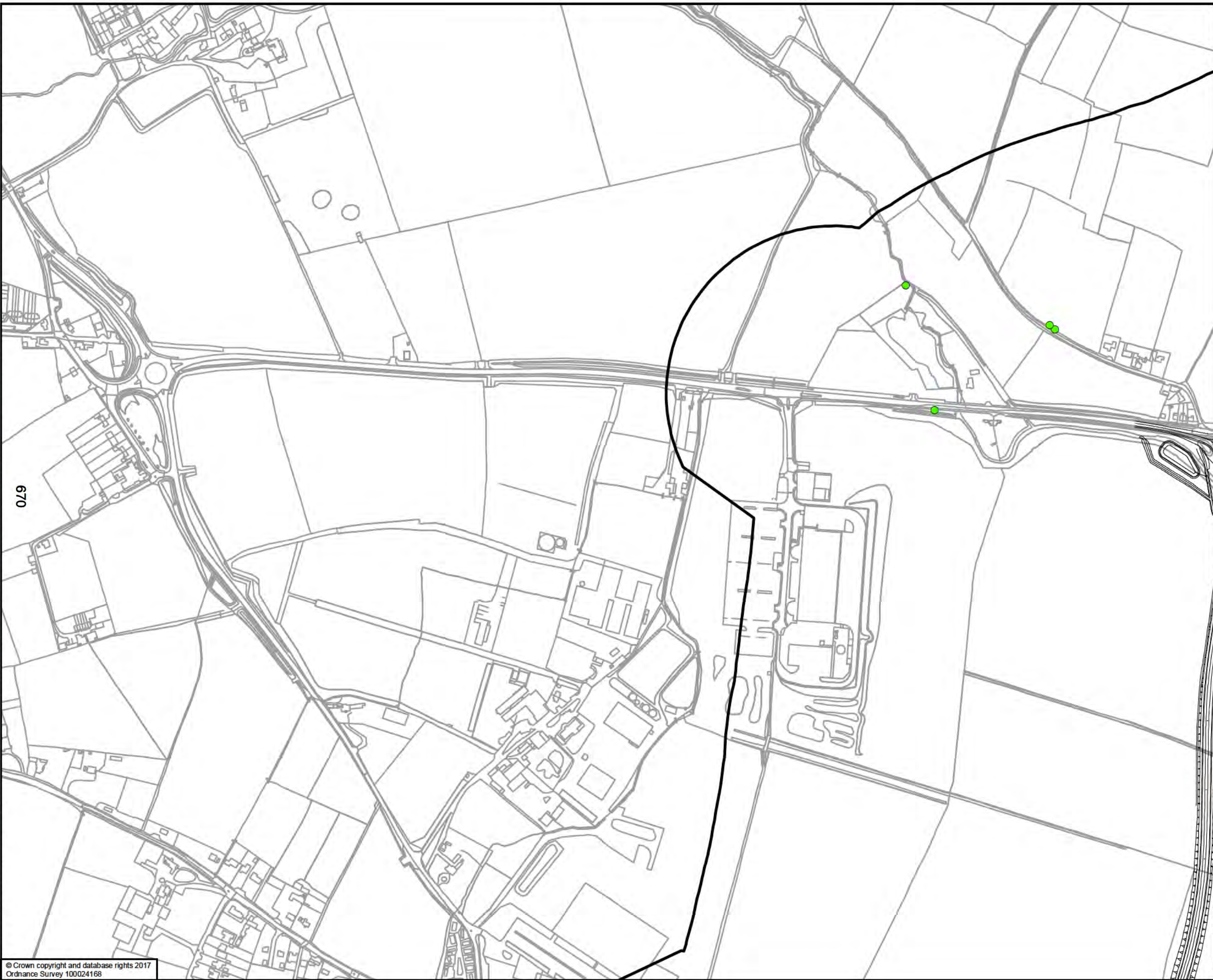
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— Proposed Scheme - Olive Option

Study Area

● Tree to be retained

0 50 100 200
Metres

STRETTON SUGWAS
SWAINSHALL
UPPER BREINTON
LOWER BREINTON
CLECHONGER
STRETTON
HELMER
SHELWICK
LOWER BULLINGHAM

DRAWING STATUS STATUS

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FIGURE 6
ARBORICULTURAL IMPACT PLAN
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Proposed Scheme - Olive Option

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

050100200

Metres

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FIGURE 6
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Proposed Scheme - Olive Option

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

050100200

Metres

DRAWING STATUS

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FIGURE 6
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - OLIVE
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SCALE @ A3
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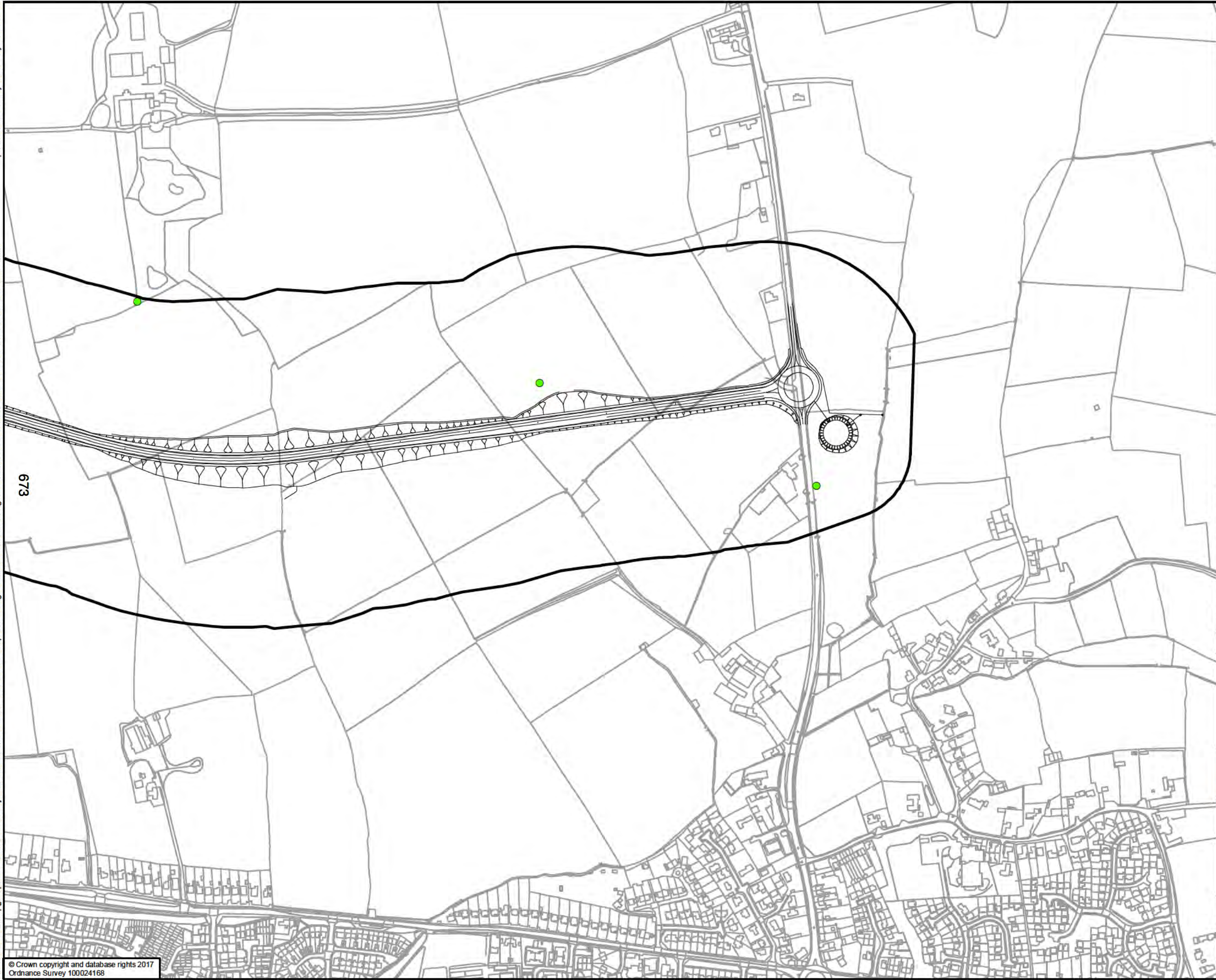
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Proposed Scheme - Olive Option

Study Area

Tree to be retained

0 50 100 200

Metres

DRAWING STATUS

STATUS

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FIGURE 6
ARBORICULTURAL IMPACT PLAN
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Proposed Scheme - Black 1 Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 7
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - BLACK 1
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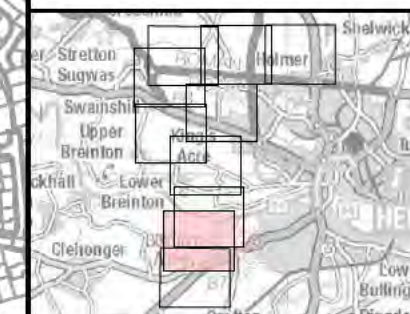
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 Proposed Scheme - Black 1 Option
 Study Area
 Tree to be retained
 Tree to be removed
 Incursion into ancient woodland buffer zone
 Ancient Woodland
 Category A Tree Groups



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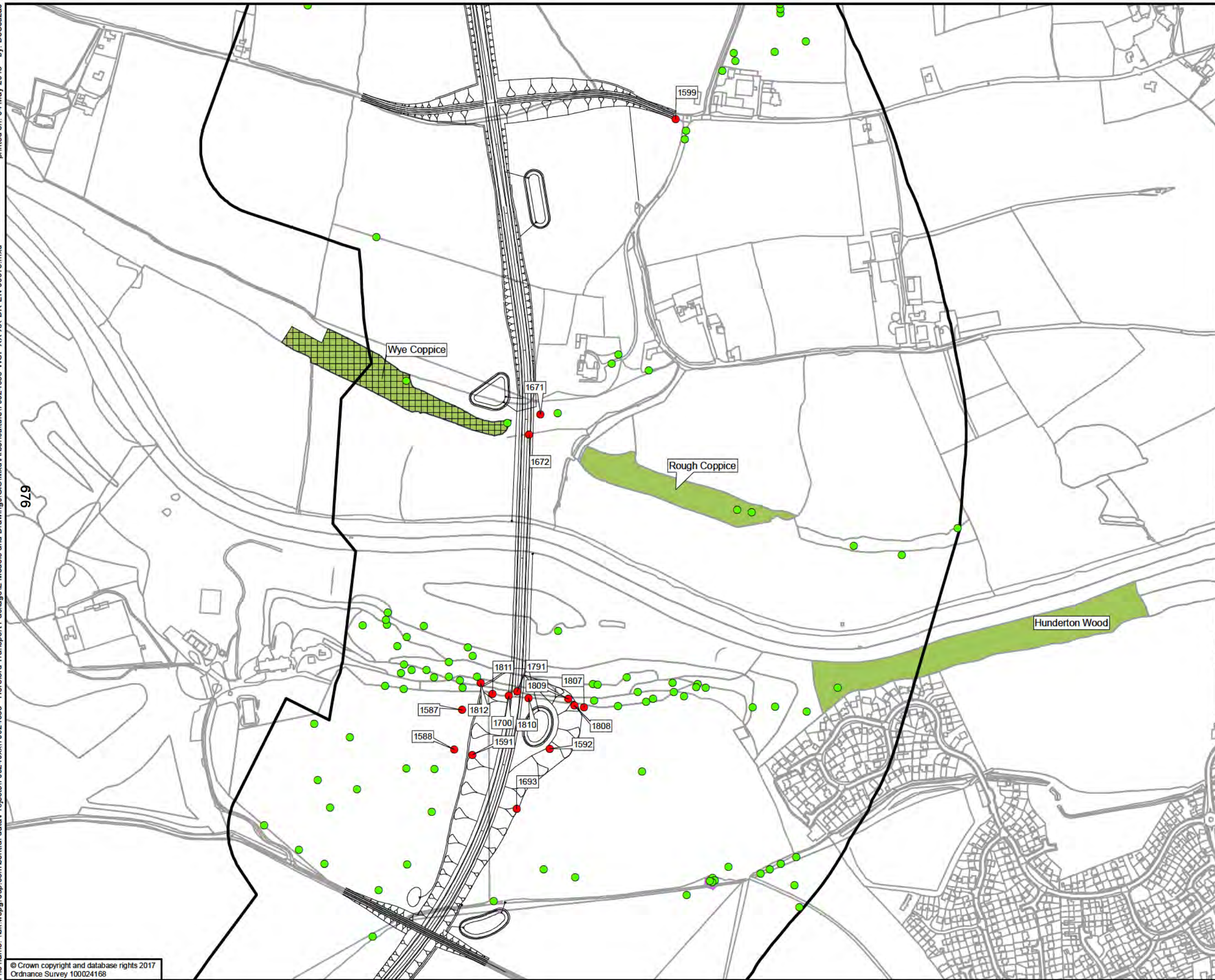
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FIGURE 7
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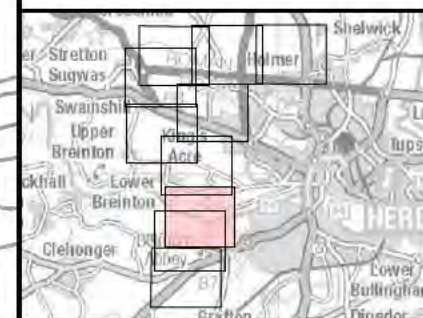
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 Proposed Scheme - Black 1 Option
 Study Area
 Tree to be retained
 Tree to be removed
 Incursion into ancient woodland buffer zone
 Ancient Woodland
 Category A Tree Groups



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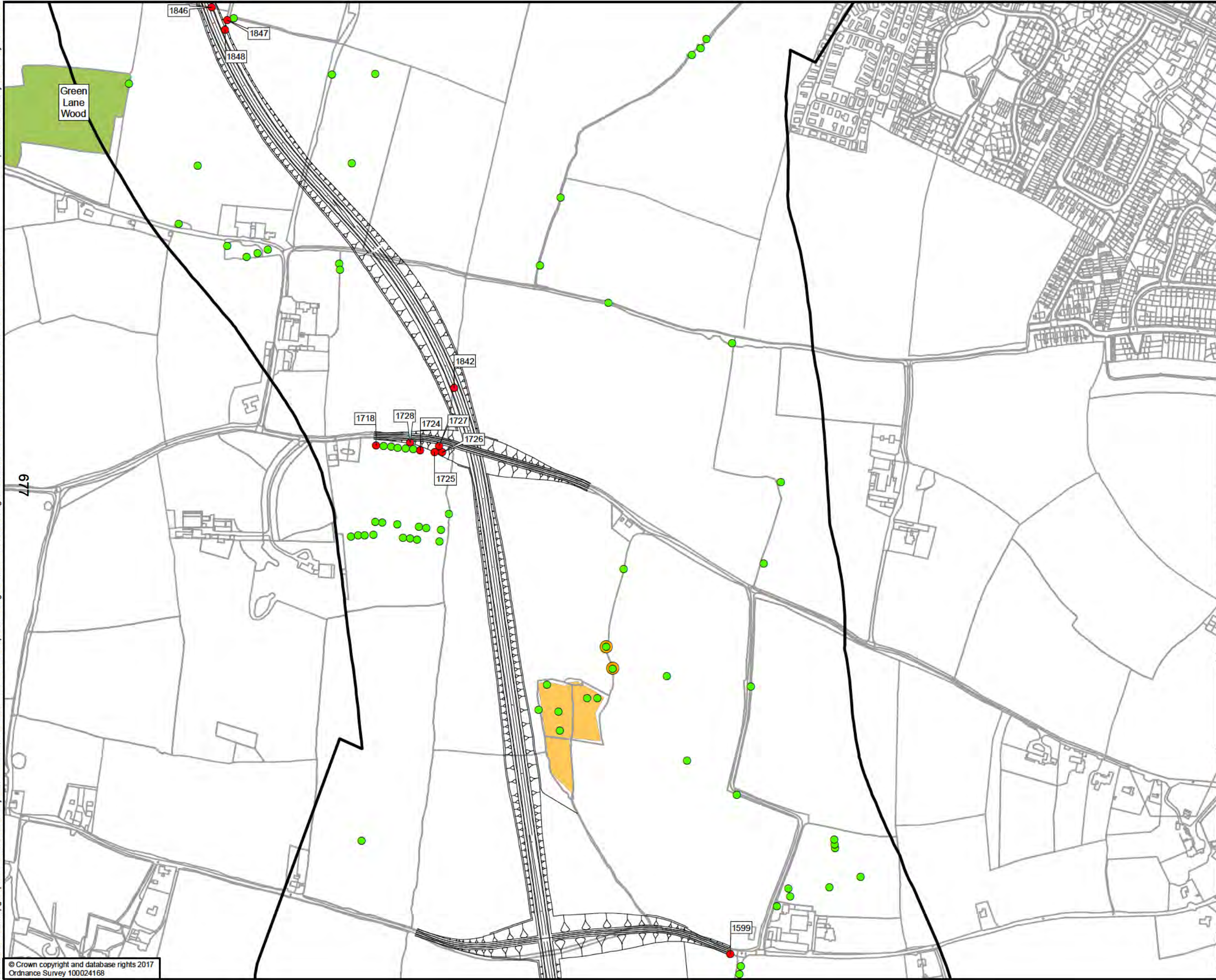
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ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - BLACK 1
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Proposed Scheme - Black 1 Option

Study Area

Tree to be retained

Tree to be removed

Tree with TPO

Ancient Woodland

Group of Trees with TPO

050100200

Metres

Stretton Sugwas

Swainshi

Upper Brinton

Lower Brinton

Clethonger

Stretton

Helmer

Shelwick

Lower Bullington

Dinedor

STATUS

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FIGURE 7
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - BLACK 1
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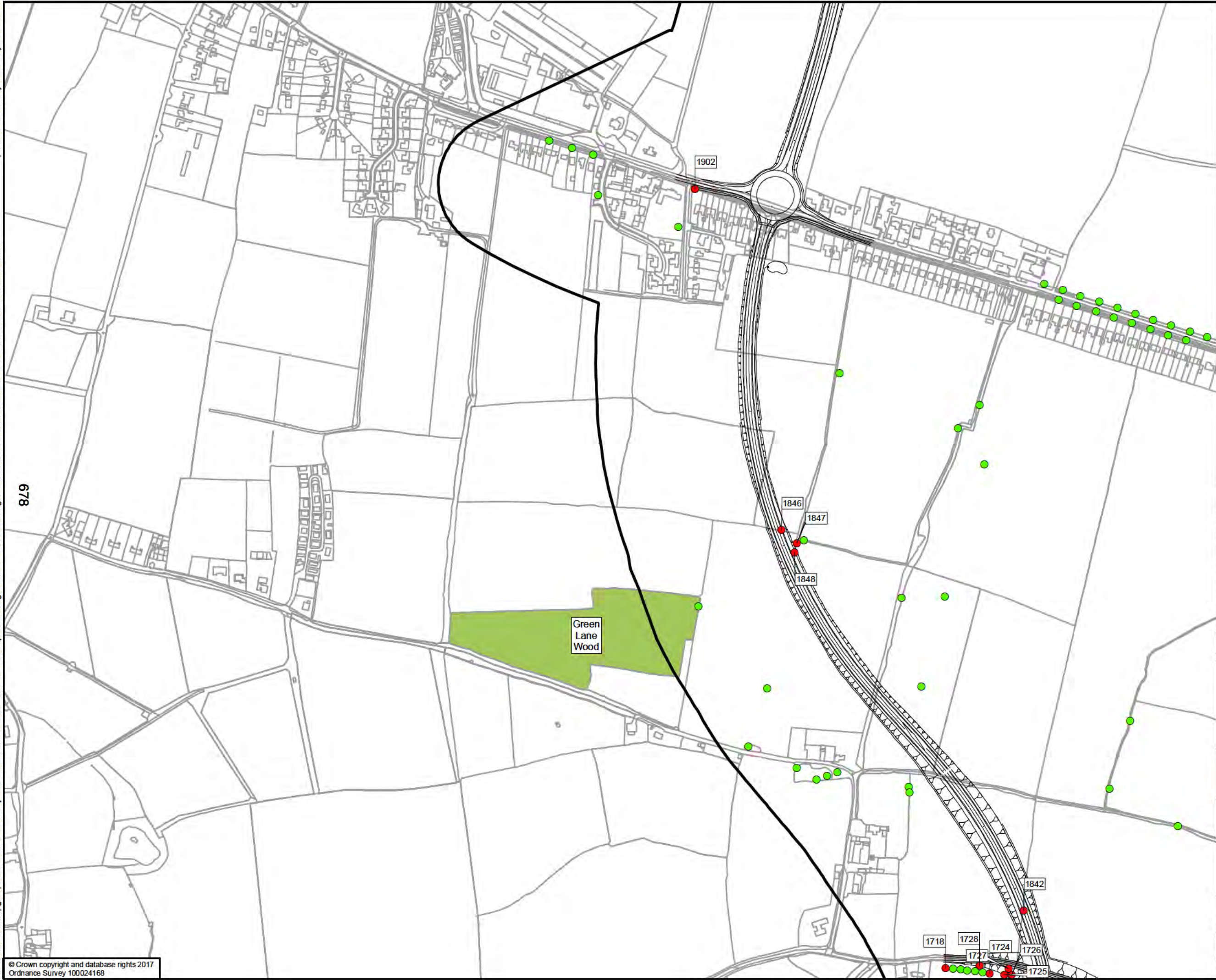
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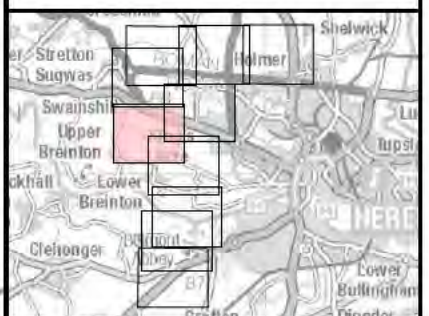
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- Proposed Scheme - Black 1 Option
- Study Area
- Tree to be retained
- Tree to be removed
- Ancient Woodland



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Kings Orchard, 1 Queen St, Bristol, BS2 0HQ
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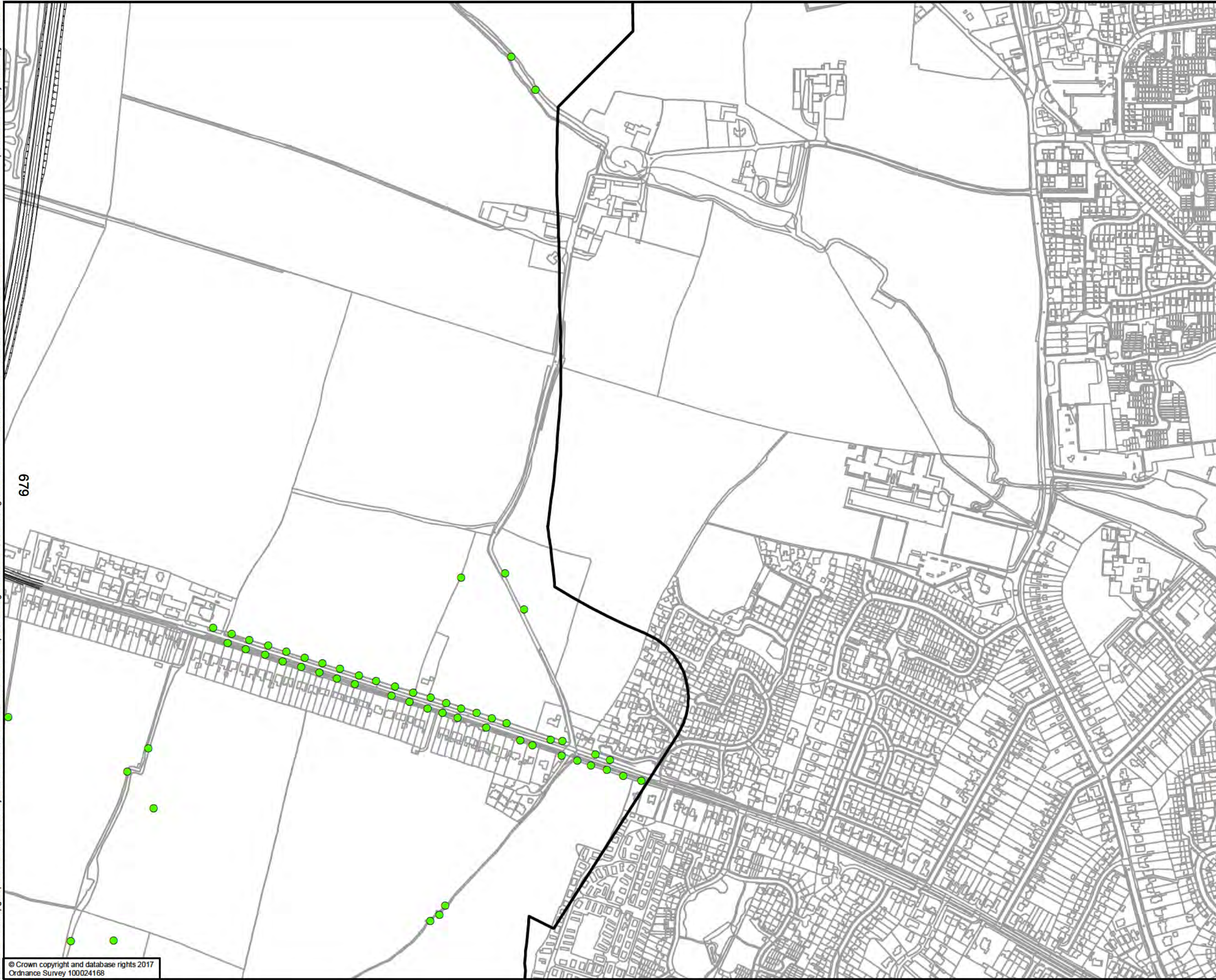
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HEREFORD BYPASS

TITLE
FIGURE 7
ARBORICULTURAL IMPACT PLAN
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PAGE 5 OF 10

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Proposed Scheme - Black 1 Option

Study Area

Tree to be retained

050100200

Metres

DRAWING STATUSSTATUS

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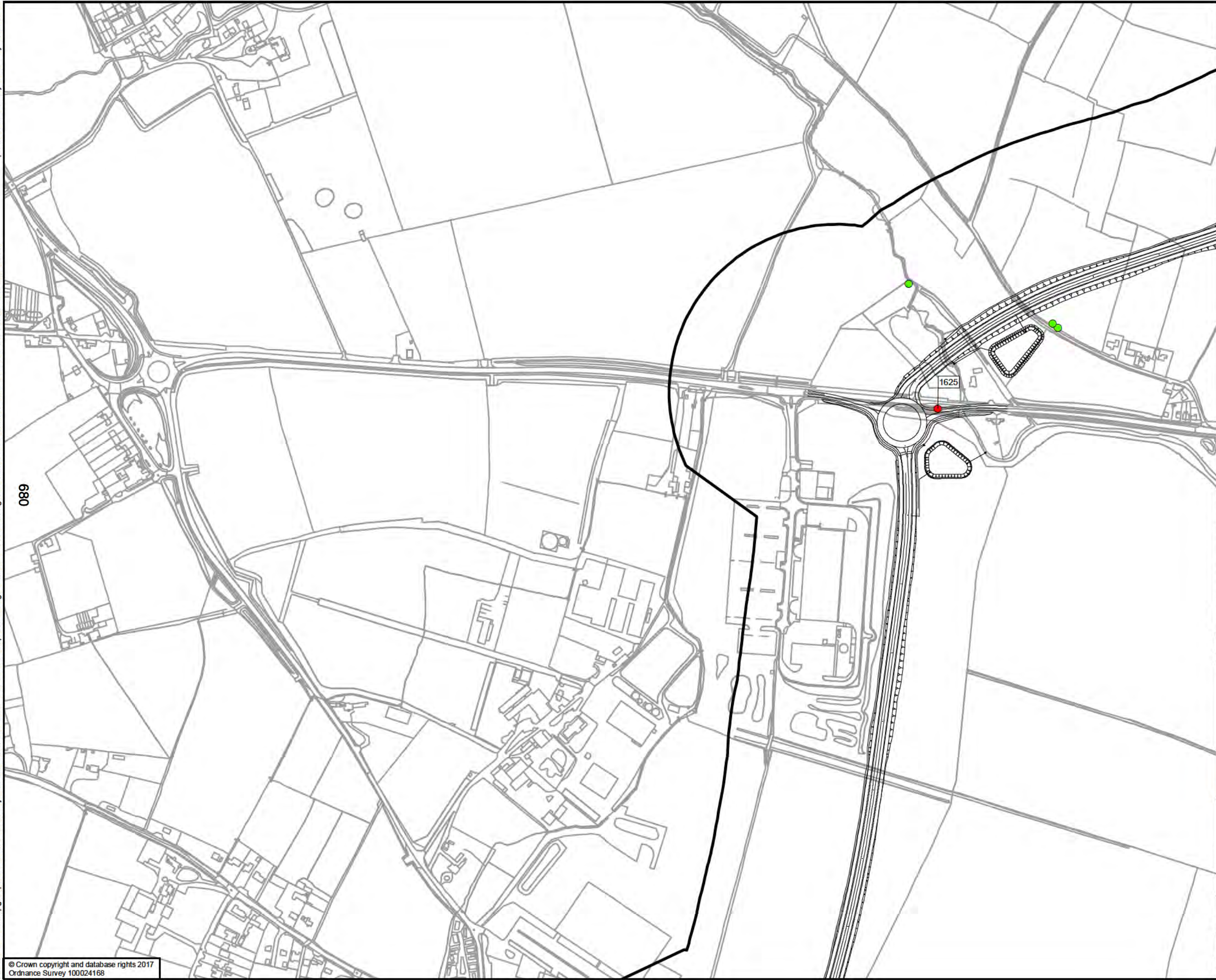
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089



Proposed Scheme - Black 1 Option

Study Area

Tree to be retained

Tree to be removed

0

50

100

200

Metres

DRAWING STATUS

STATUS

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PAGE 7 OF 10

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Proposed Scheme - Black 1 Option

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

0 50 100 200
Metres

STATUS

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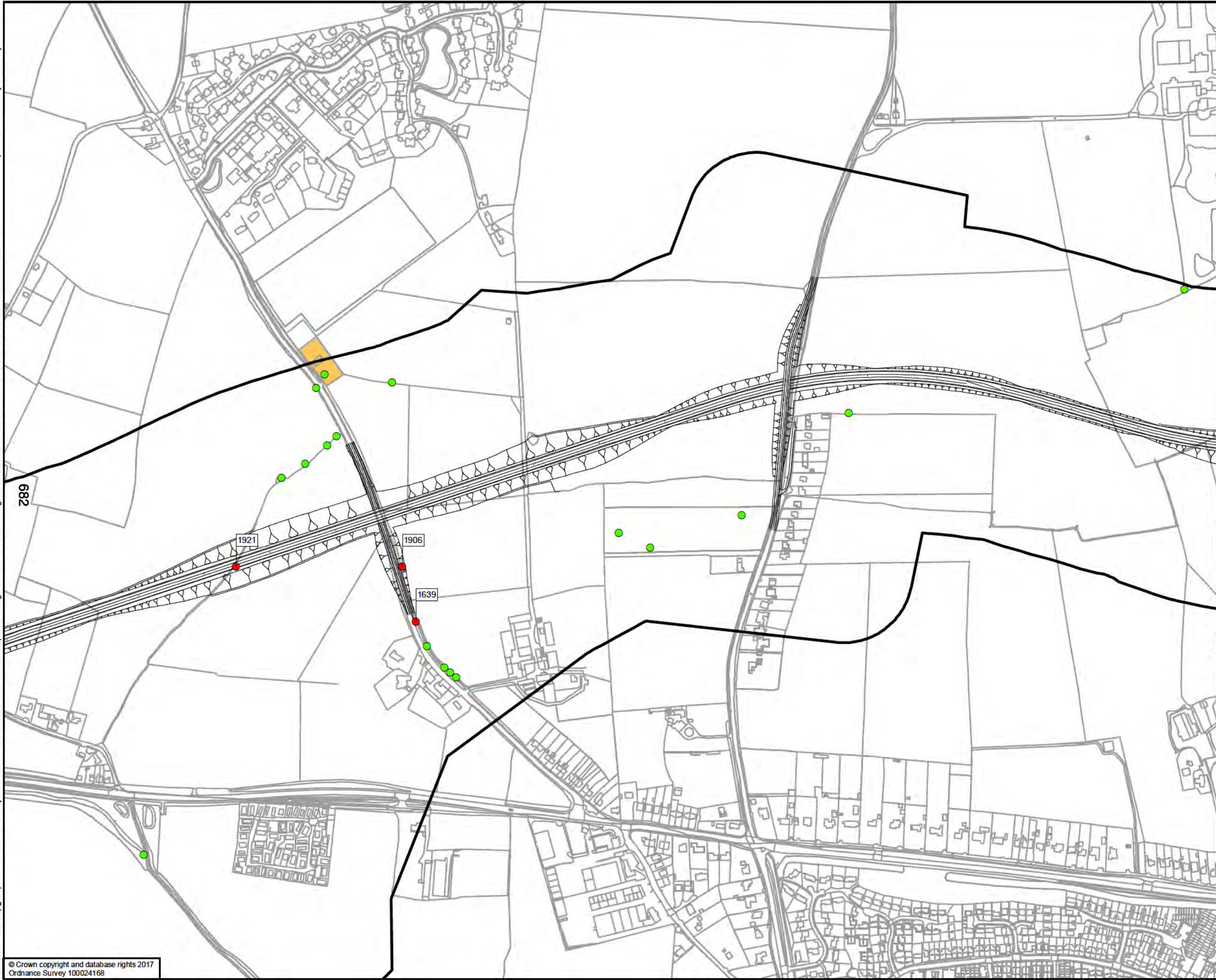
FIGURE 7
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - BLACK 1
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Proposed Scheme - Black 1 Option

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

050100200

Metres

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PAGE 9 OF 10

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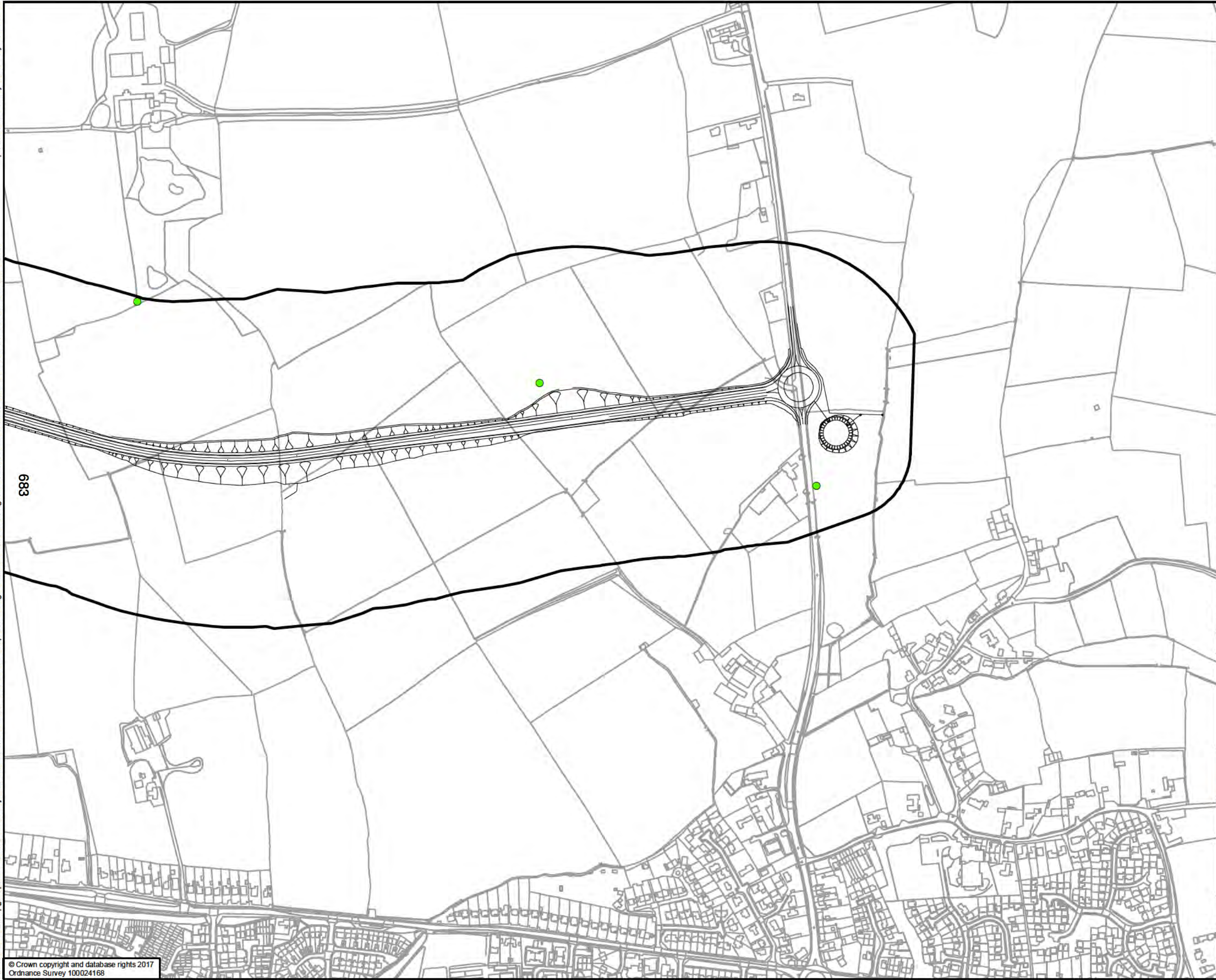
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Proposed Scheme - Black 1 Option

Study Area

Tree to be retained

050100200

Metres

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FIGURE 7
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - BLACK 1
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Proposed Scheme - Black 2 Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 8
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - BLACK 2
PAGE 1 OF 10

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Proposed Scheme - Black 2 Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

DRAWING STATUS

STATUS

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FIGURE 8
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PROPOSED SCHEME - BLACK 2
PAGE 2 OF 10

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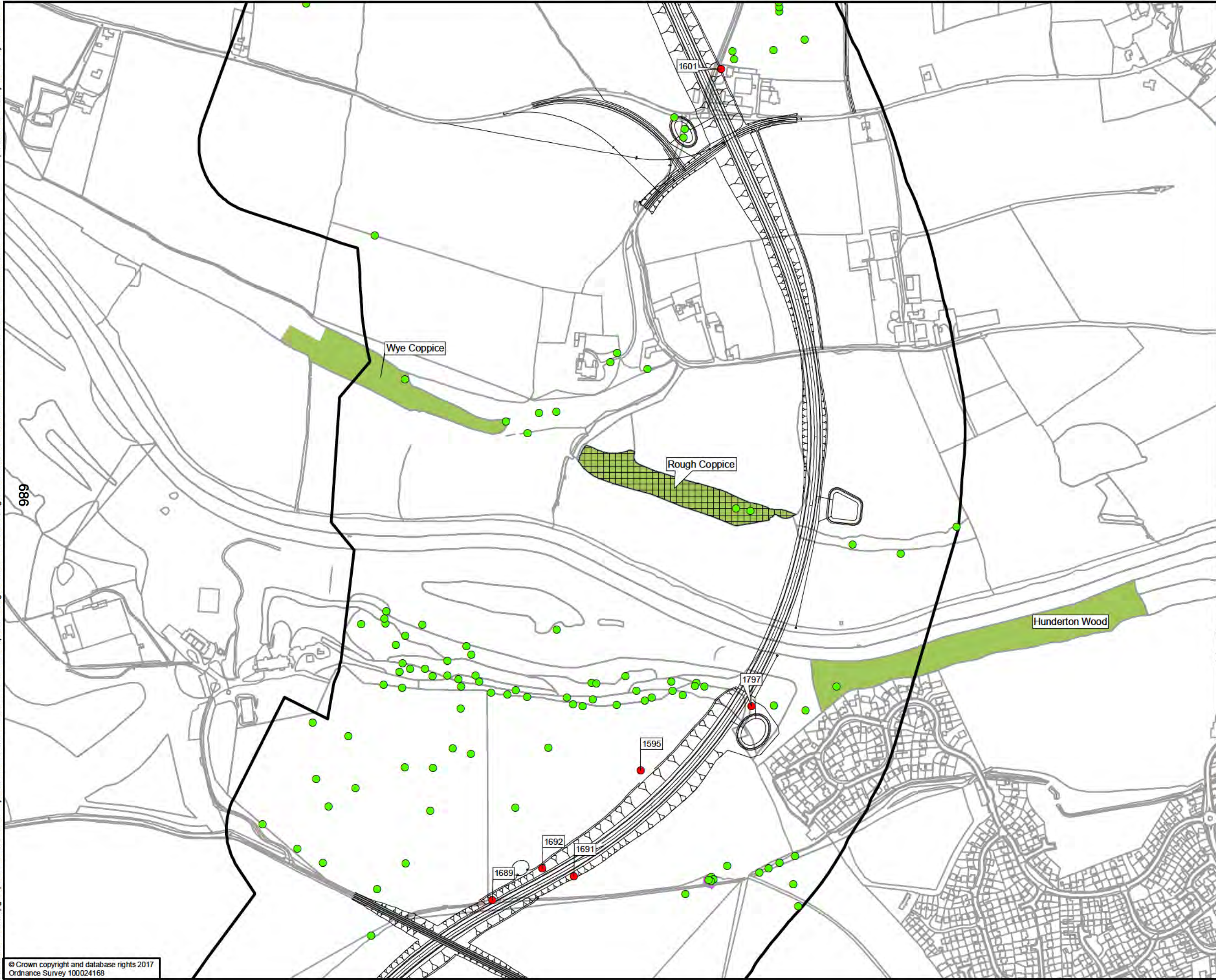
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Proposed Scheme - Black 2 Option

Study Area

Tree to be retained

Tree to be removed

Incursion into ancient woodland buffer zone

Ancient Woodland

Category A Tree Groups

050100200

Metres

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Proposed Scheme - Black 2 Option

Study Area

Tree to be retained

Tree to be removed

Tree with TPO

Ancient Woodland

Group of Trees with TPO

0 50 100 200 Metres

STATUS

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FIGURE 8
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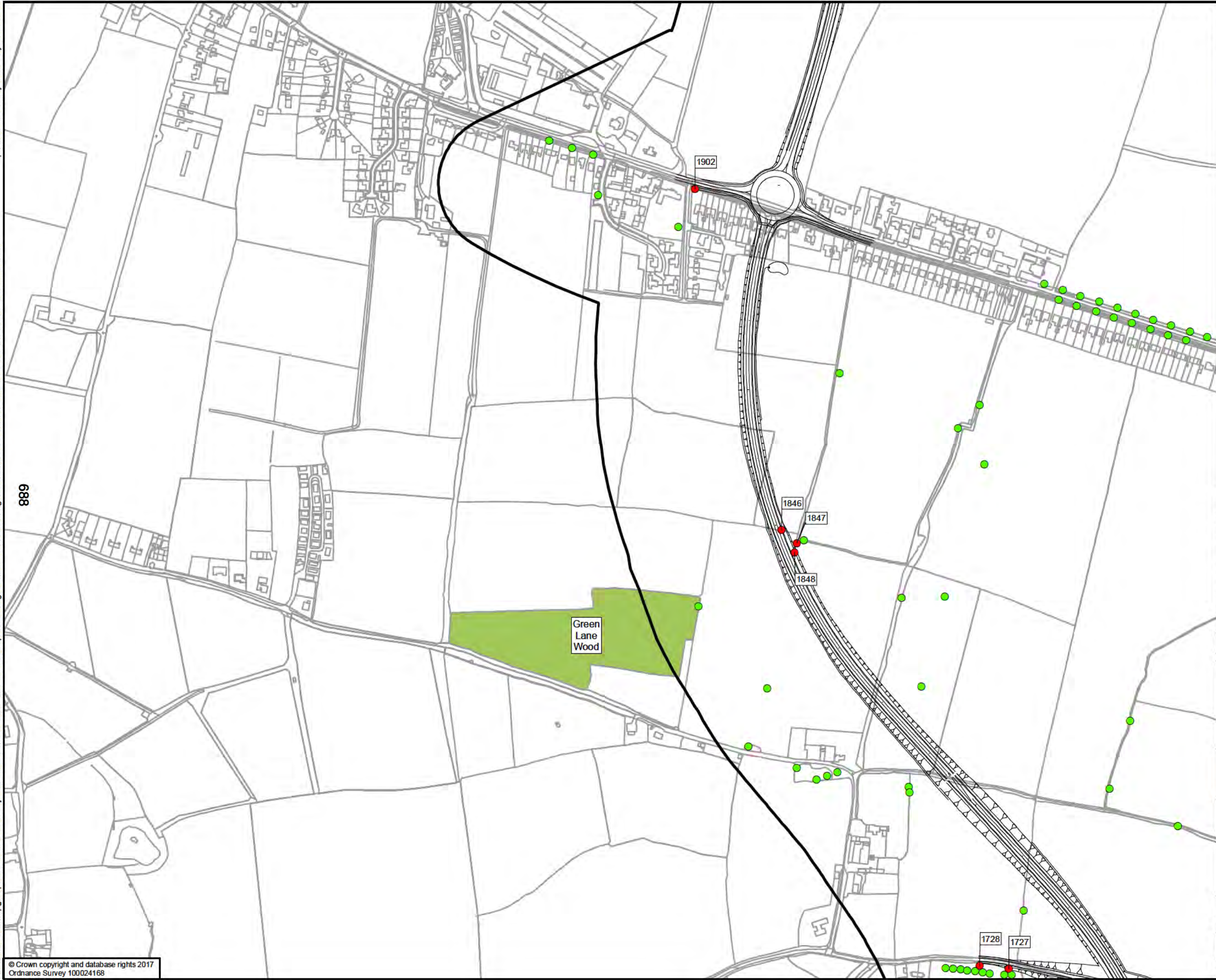
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889



Proposed Scheme - Black 2 Option

Study Area

Tree to be retained

Tree to be removed

Ancient Woodland

0

50

100

200

Metres

DRAWING STATUS

STATUS

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FIGURE 8
ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - BLACK 2
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SCALE @ A3
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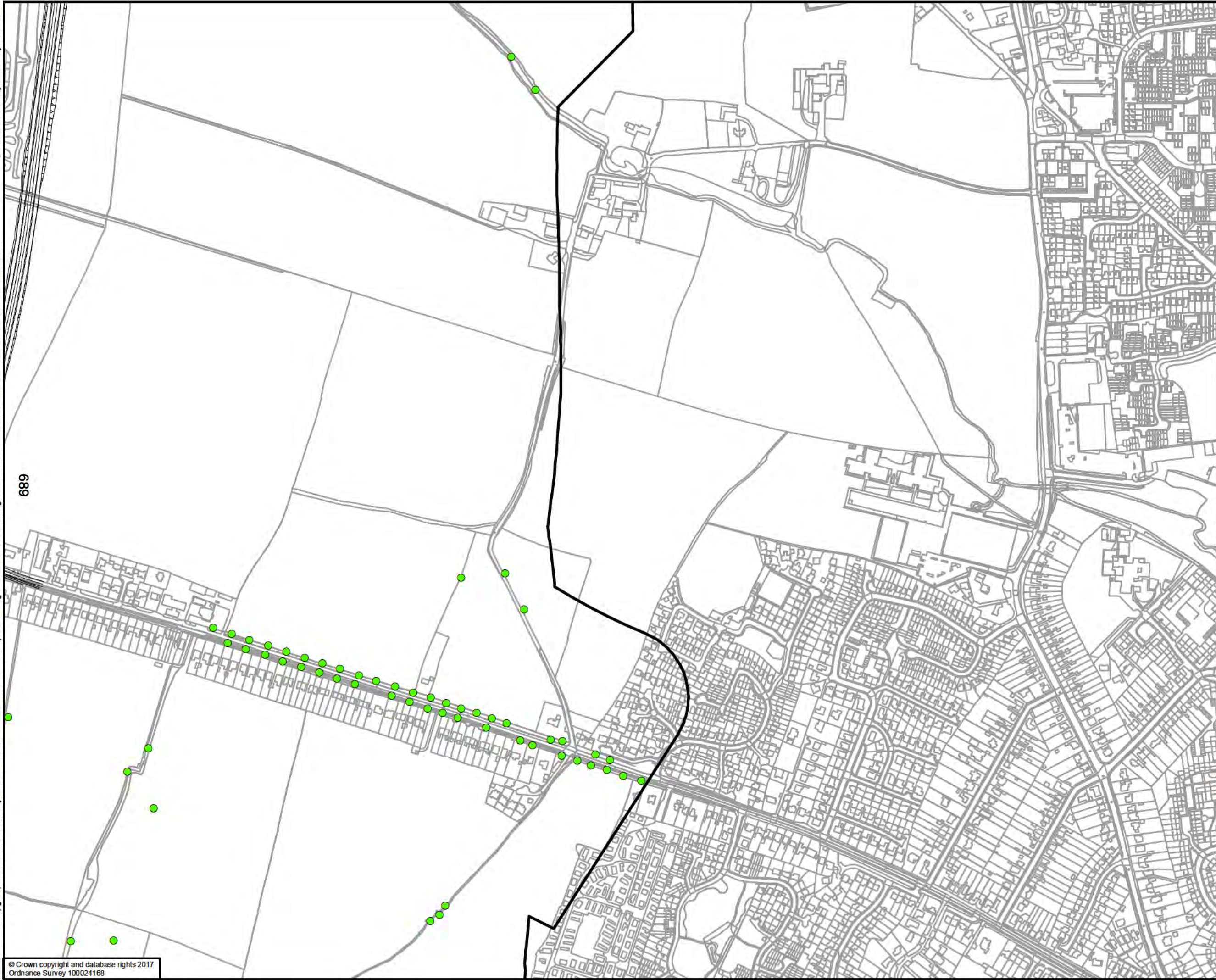
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689



Proposed Scheme - Black 2 Option

Study Area

Tree to be retained

0

50

100

200

Metres

DRAWING STATUS

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FIGURE 8
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PROPOSED SCHEME - BLACK 2
PAGE 6 OF 10

SCALE @ A3
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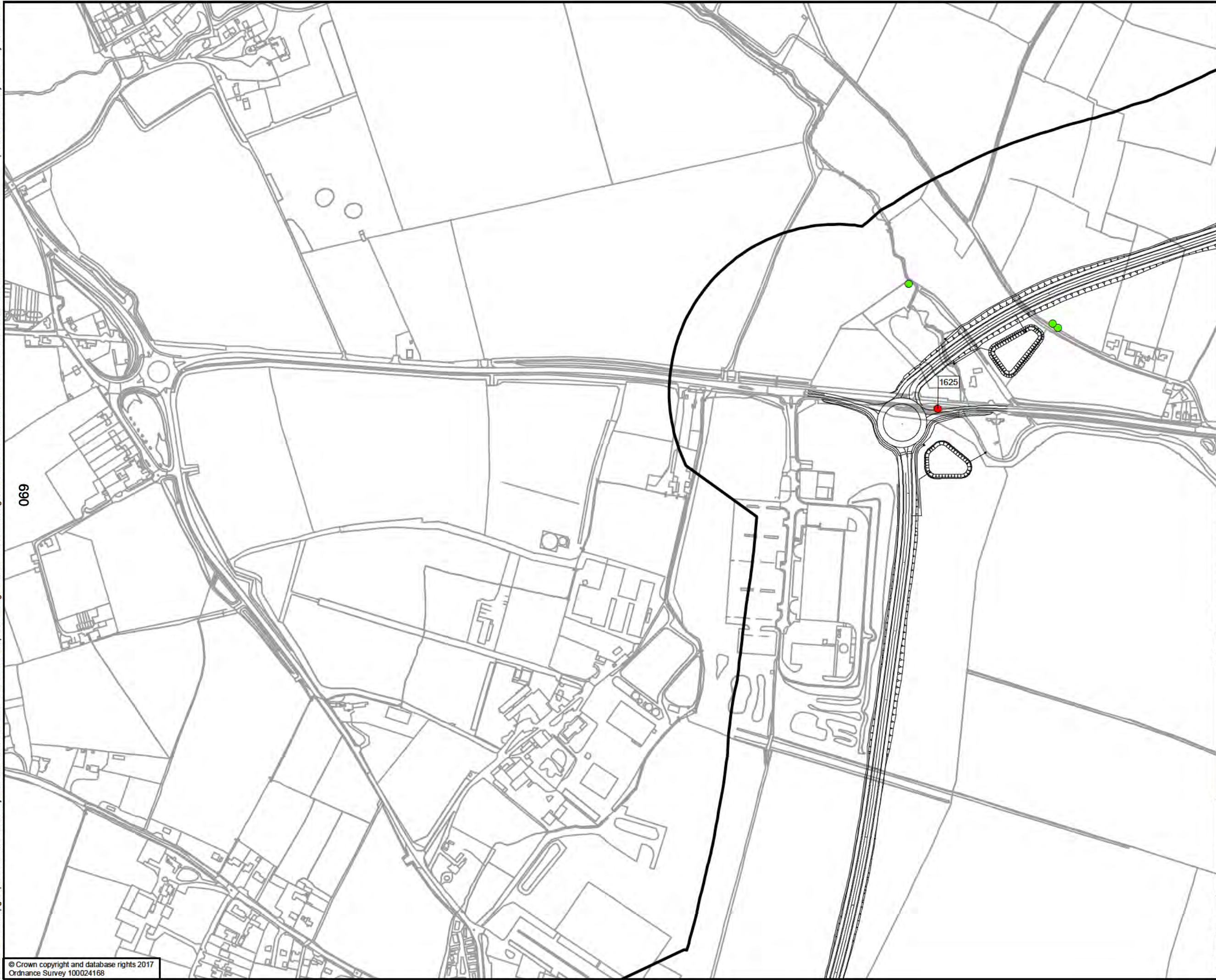
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069



Proposed Scheme - Black 2 Option

Study Area

Tree to be retained

Tree to be removed

0 50 100 200

Metres

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FIGURE 8
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Proposed Scheme - Black 2 Option
Study Area
Tree to be retained
Tree to be removed
Group of Trees with TPO

0 50 100 200
Metres

STATUS

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ARBORICULTURAL IMPACT PLAN
PROPOSED SCHEME - BLACK 2
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Proposed Scheme - Black 2 Option

Study Area

Tree to be retained

Tree to be removed

Group of Trees with TPO

050100200

Metres

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FIGURE 8
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PAGE 9 OF 10

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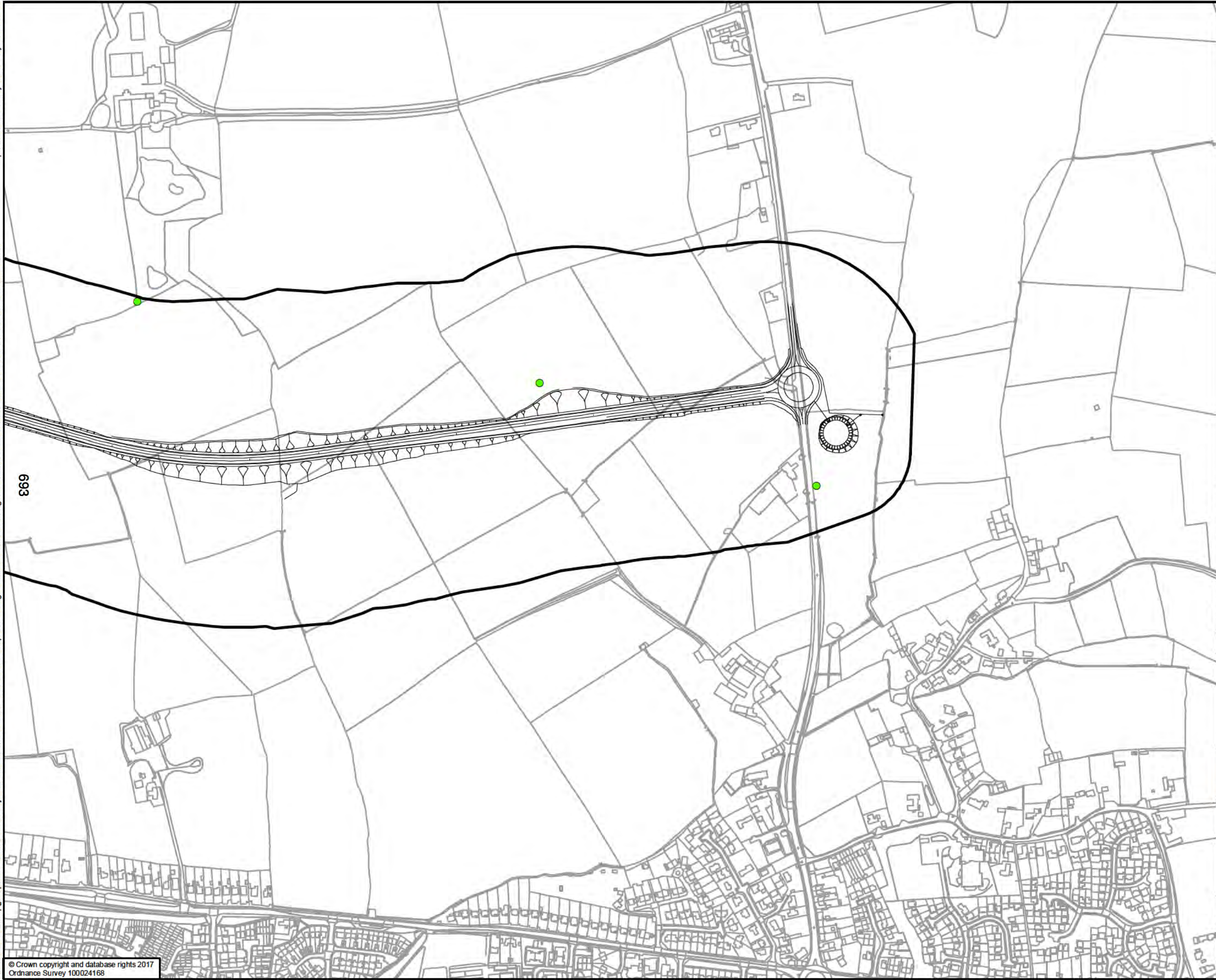
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Proposed Scheme - Black 2 Option

Study Area

Tree to be retained

050100200

Metres

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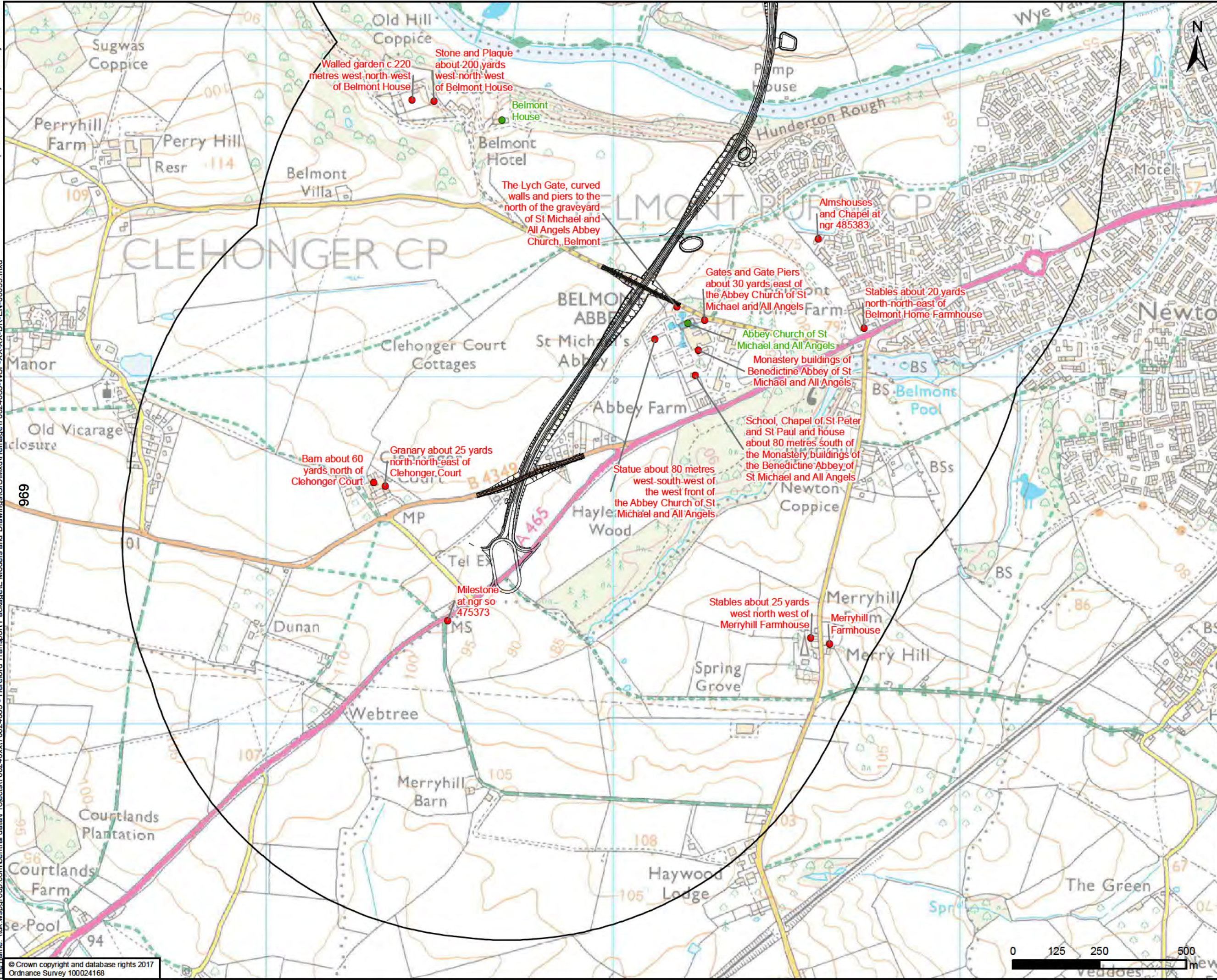
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Appendix 8-1

HERITAGE FIGURES

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— Proposed Option - Orange

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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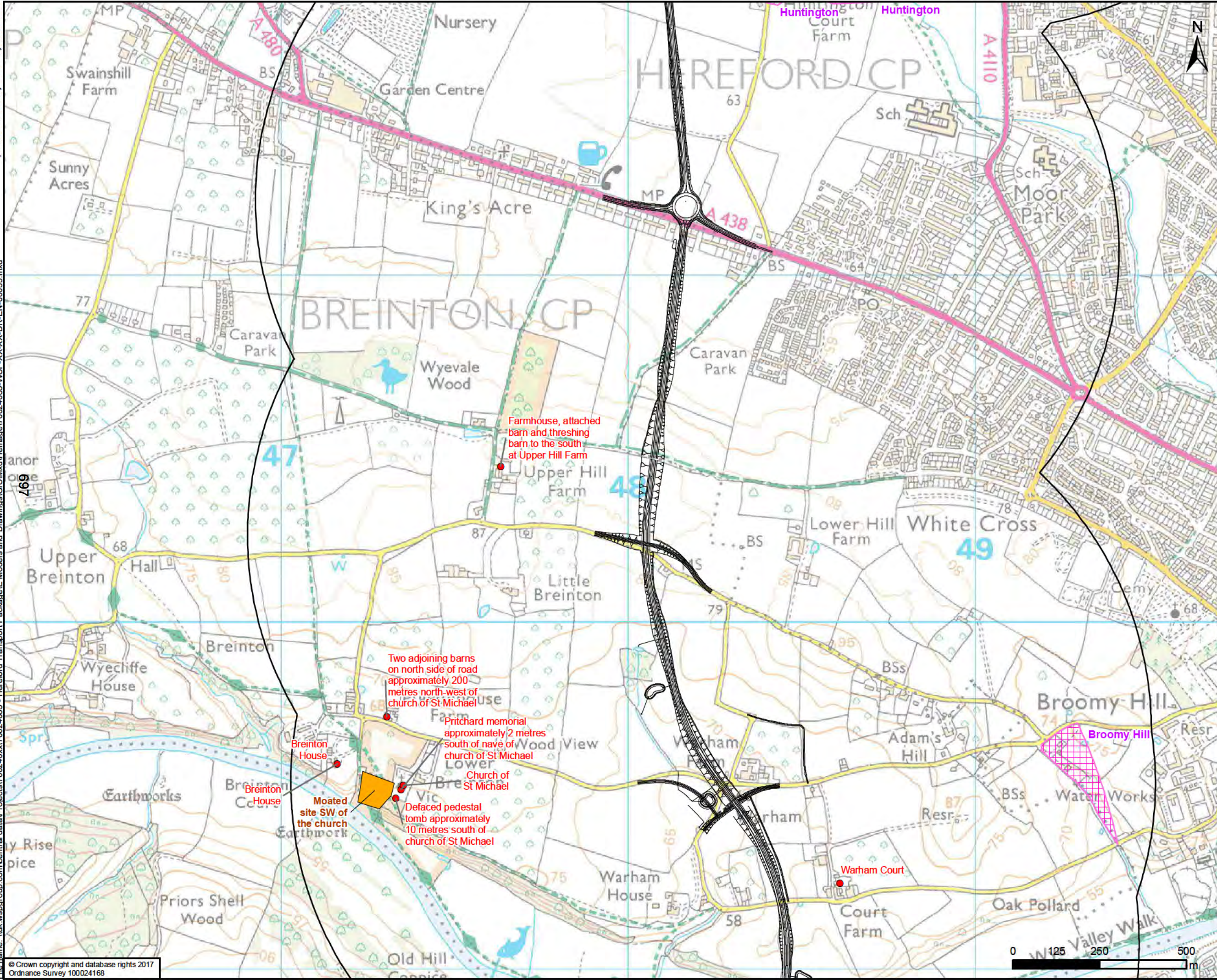
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FIGURE 8-1
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - ORANGE - PAGE 1 OF 4

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— Proposed Option - Orange

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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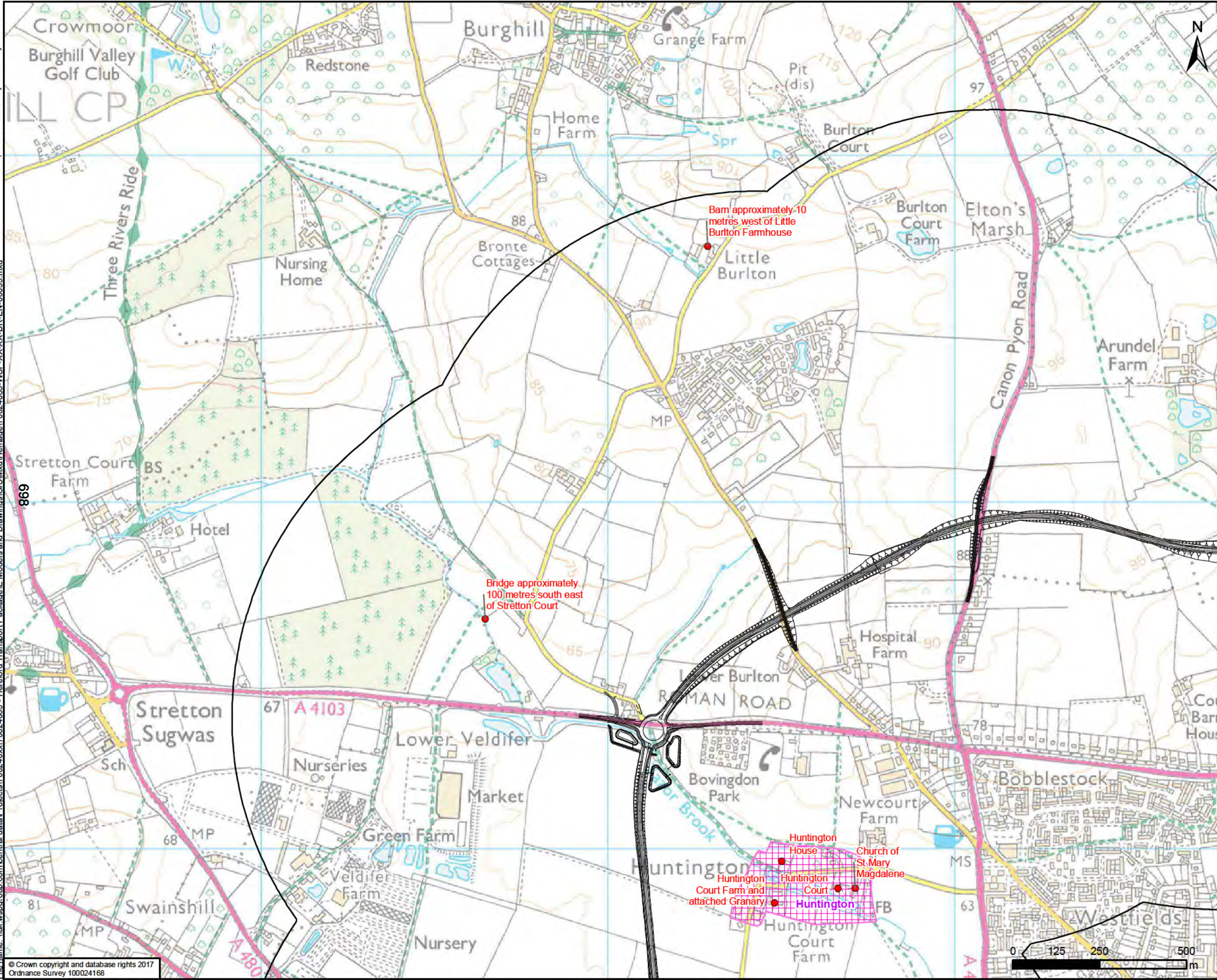
FIGURE 8-1
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - ORANGE - PAGE 2 OF 4

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— Proposed Option - Orange

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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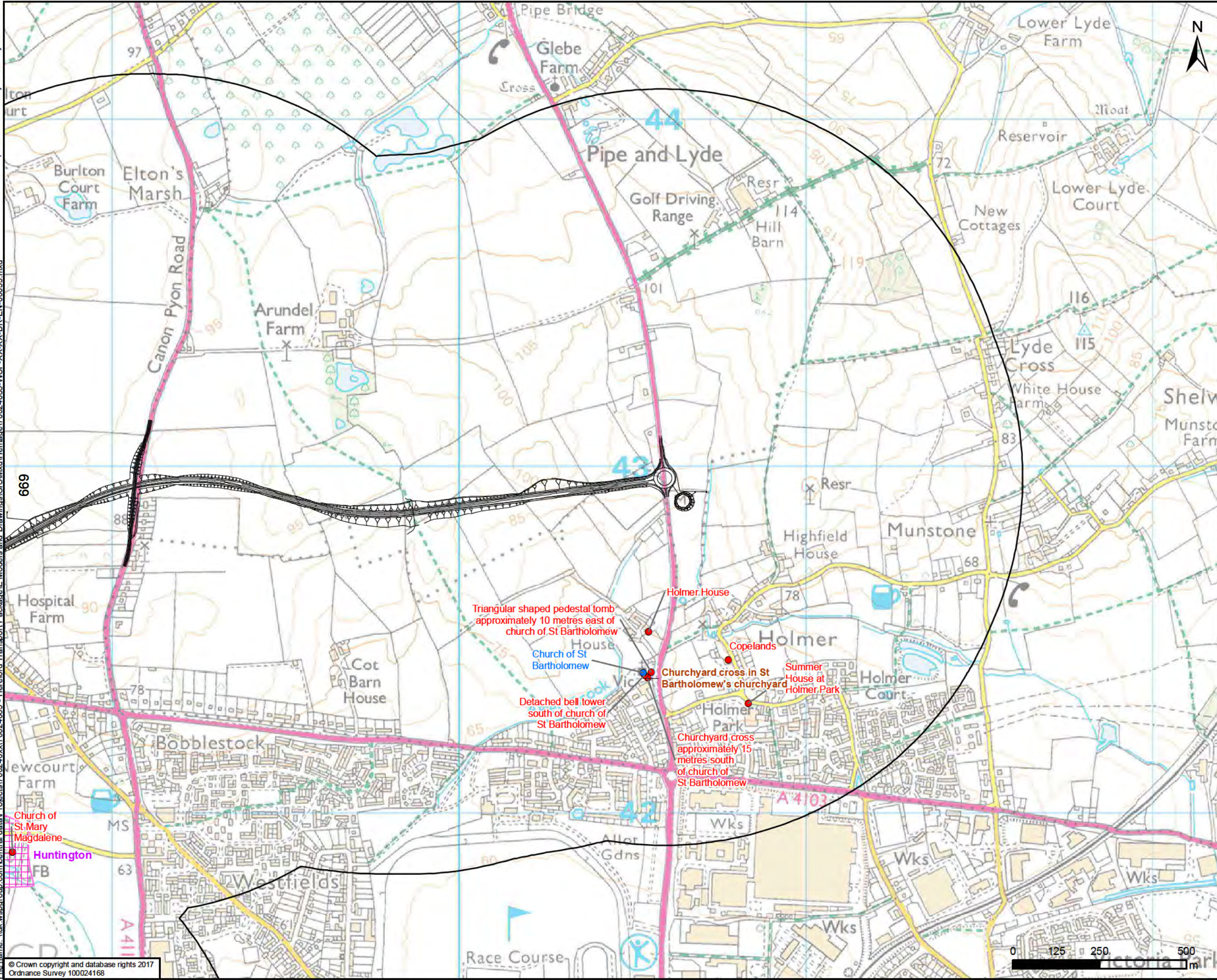
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HEREFORD TRANSPORTATION PACKAGE:
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FIGURE 8-1
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - ORANGE - PAGE 3 OF 4

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— Proposed Option - Orange

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
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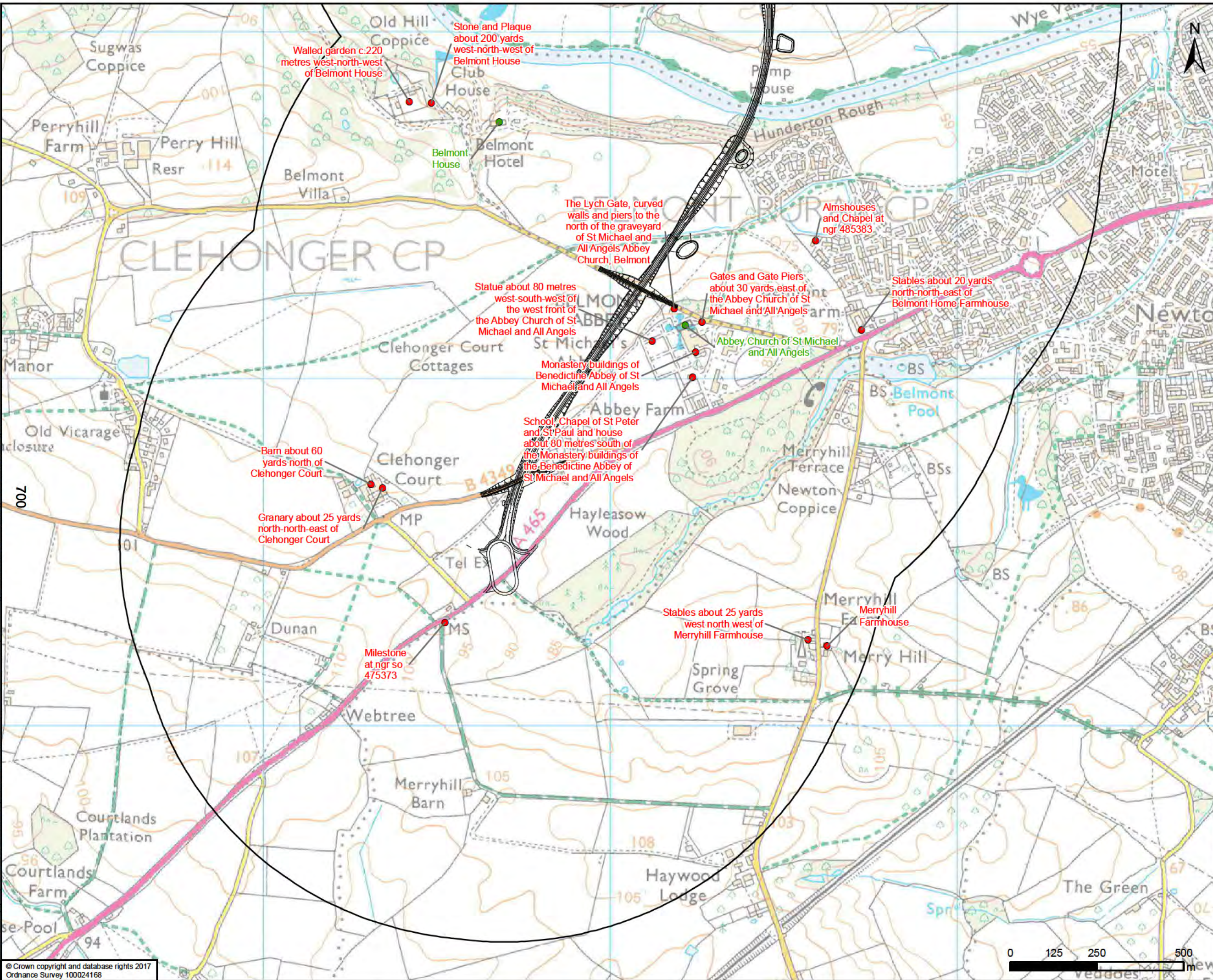
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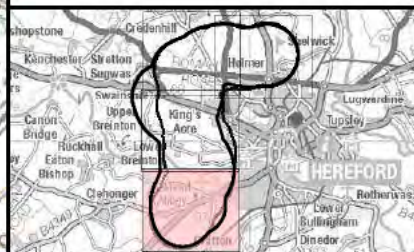
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LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - ORANGE - PAGE 4 OF 4

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-  Proposed Option - Cyan
 1km Study Area
 Conservation areas
 Scheduled Monument
Listed Buildings
 Grade I Listed Building
 Grade II* Listed Building
 Grade II Listed Building



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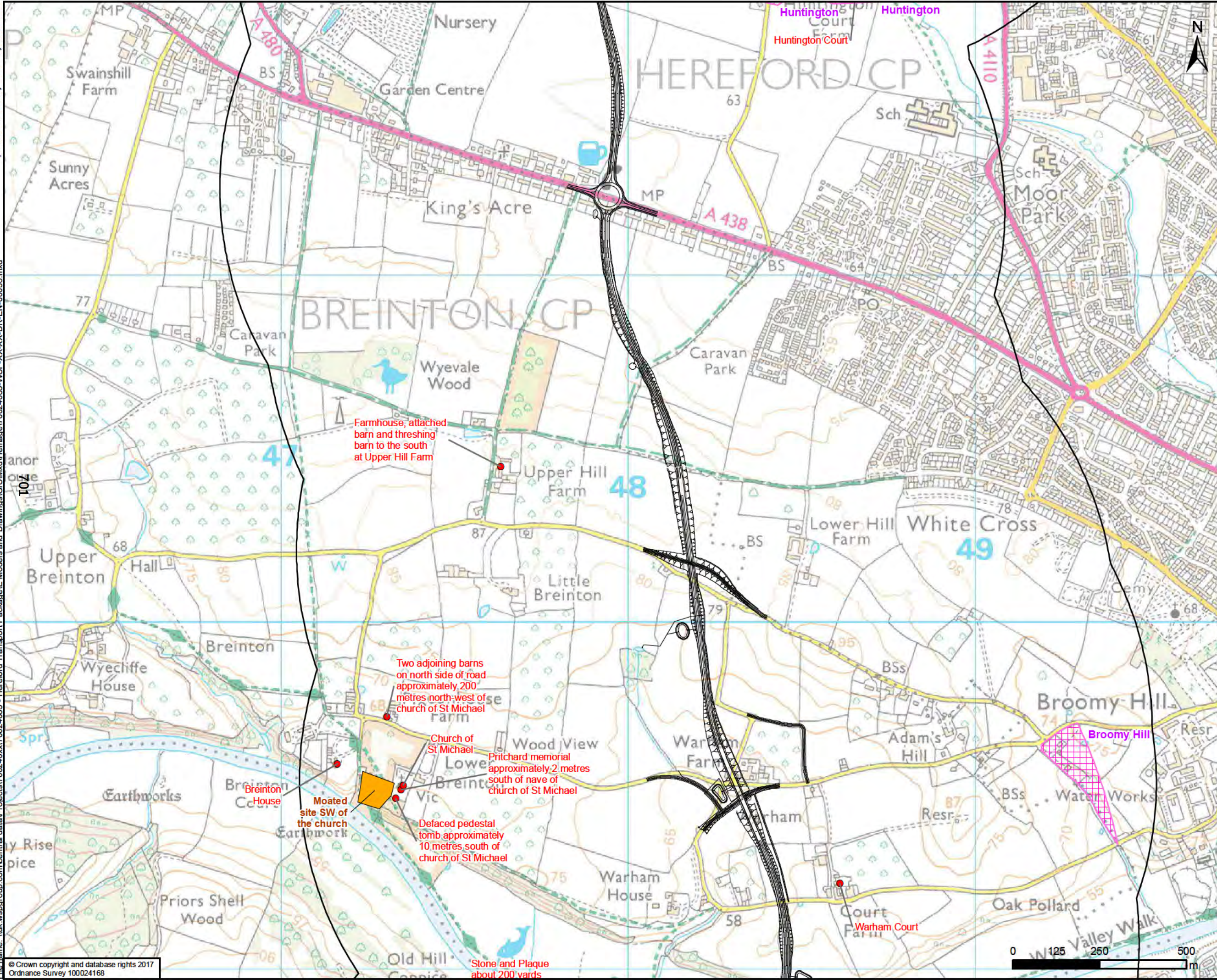
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FIGURE 8-2
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - CYAN - PAGE 1 OF 4

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Proposed Option - Cyan

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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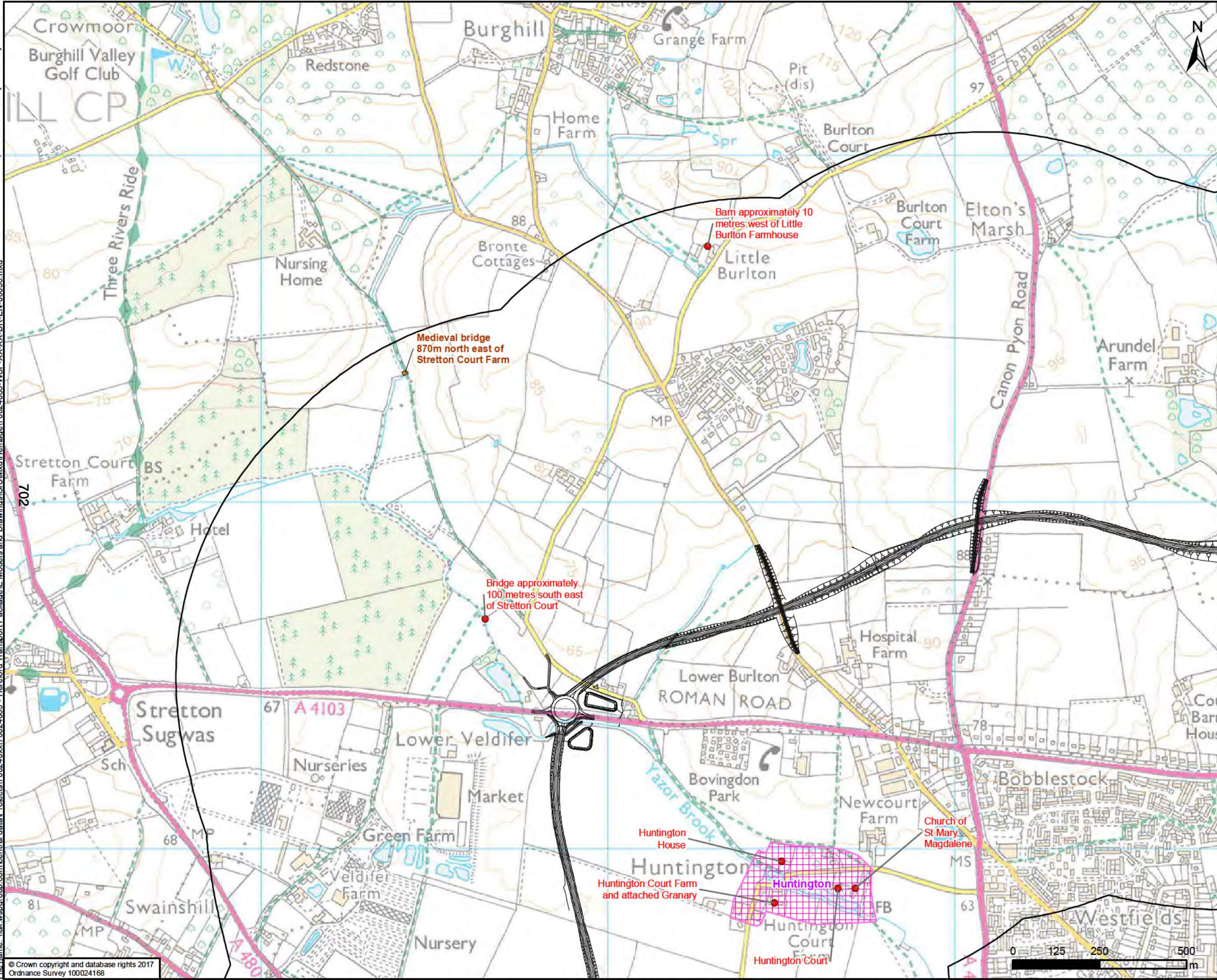
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LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - CYAN - PAGE 2 OF 4

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— Proposed Option - Cyan

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

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- Grade II* Listed Building
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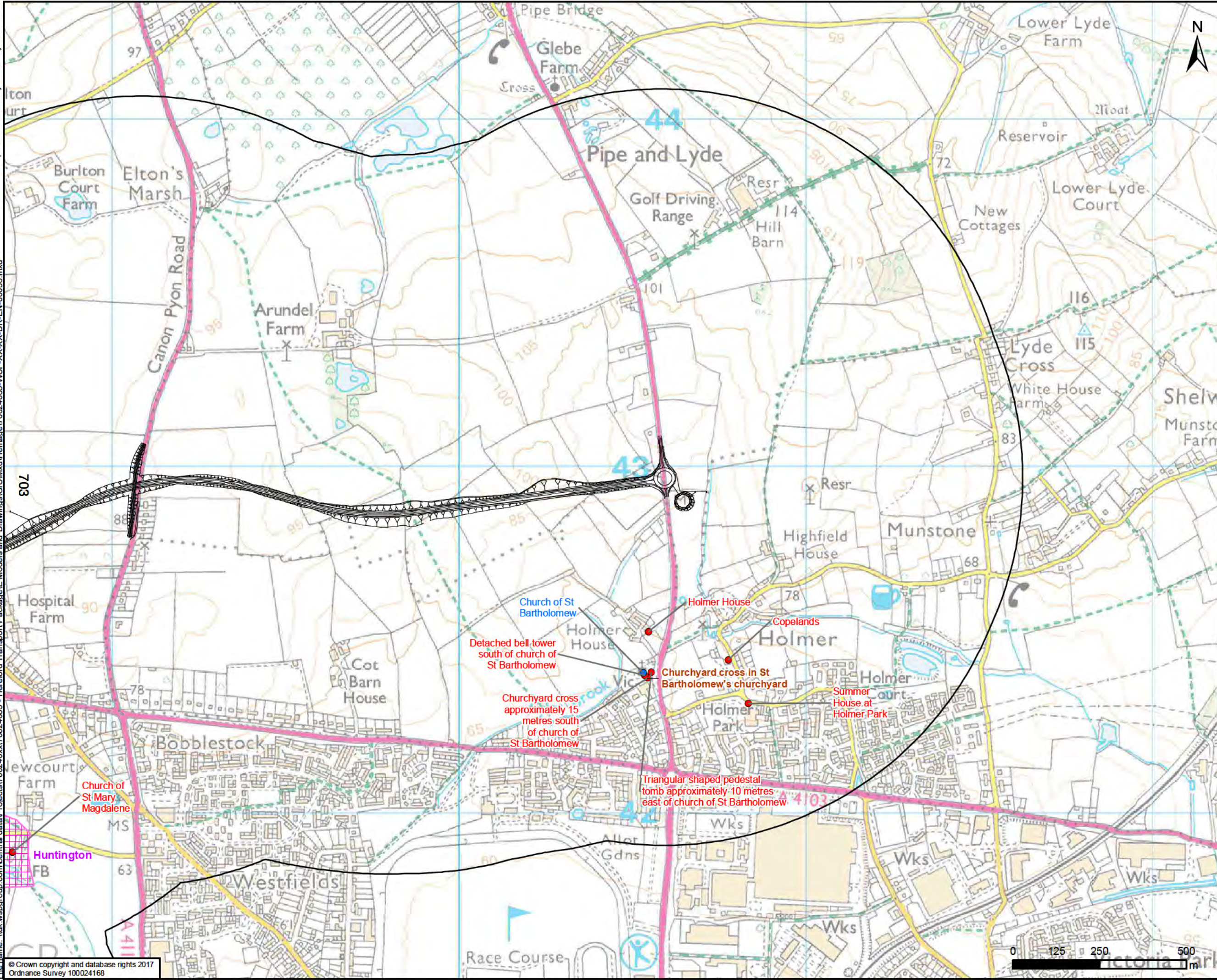
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FIGURE 8-2
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - CYAN - PAGE 3 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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— Proposed Option - Cyan

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

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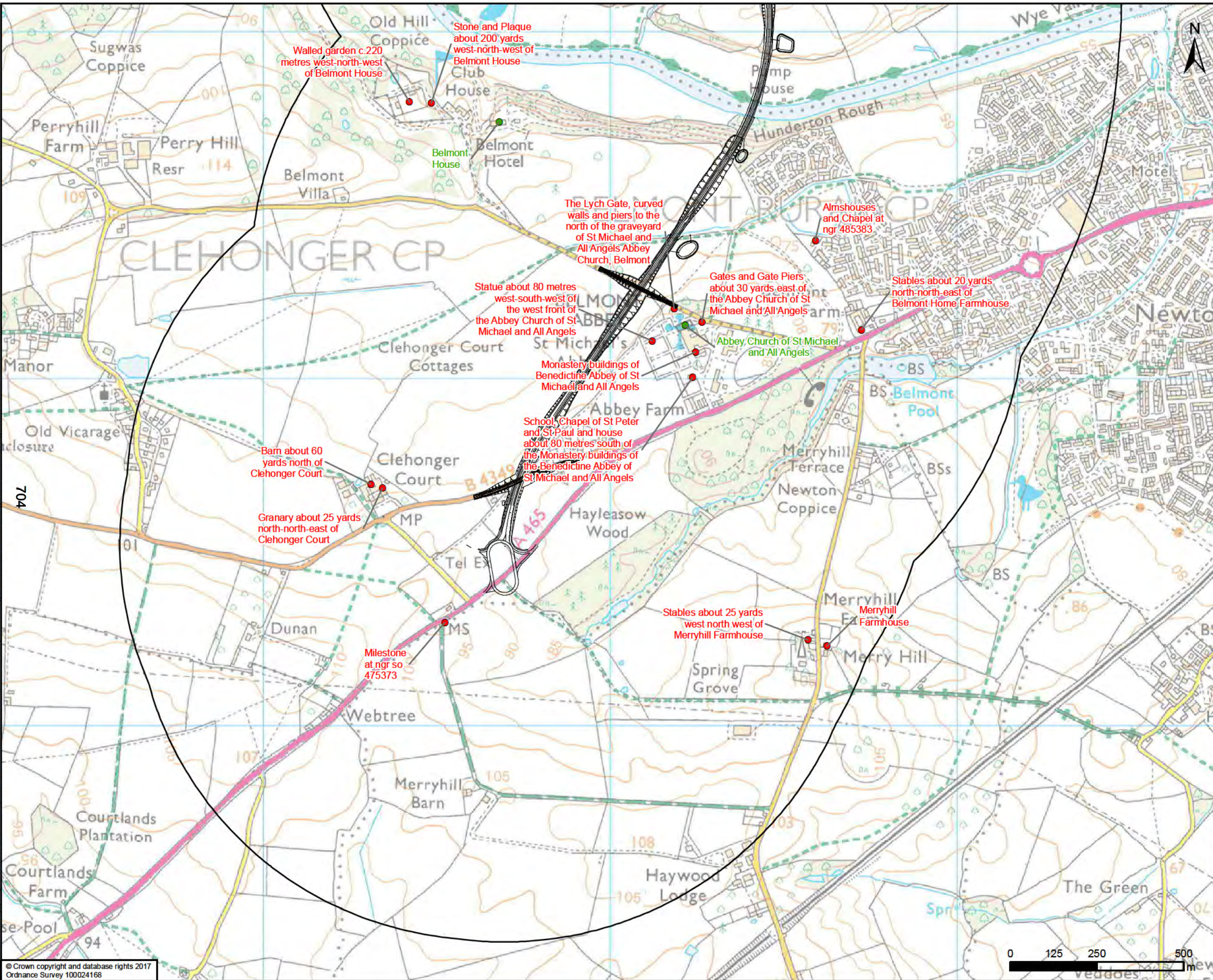
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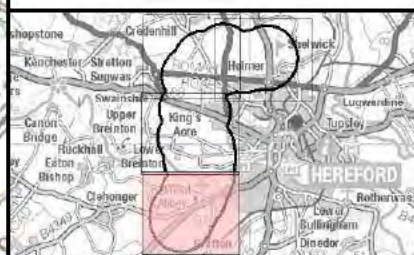
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LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - CYAN - PAGE 4 OF 4

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-  Proposed Option - Yellow
 1km Study Area
 Conservation areas
 Scheduled Monument
- Listed Buildings**
-  Grade I Listed Building
 -  Grade II* Listed Building
 -  Grade II Listed Building



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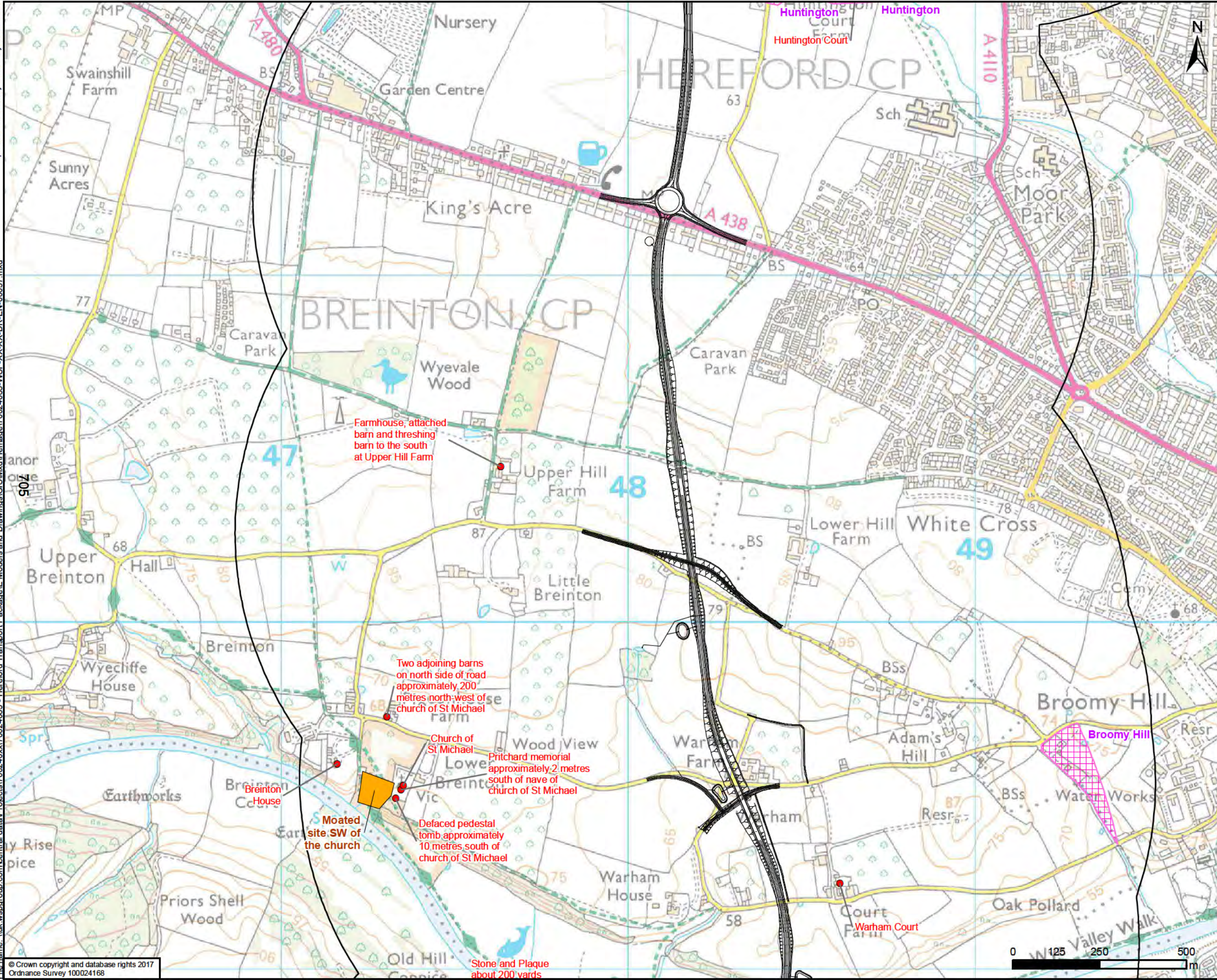
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LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - YELLOW - PAGE 1 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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— Proposed Option - Yellow

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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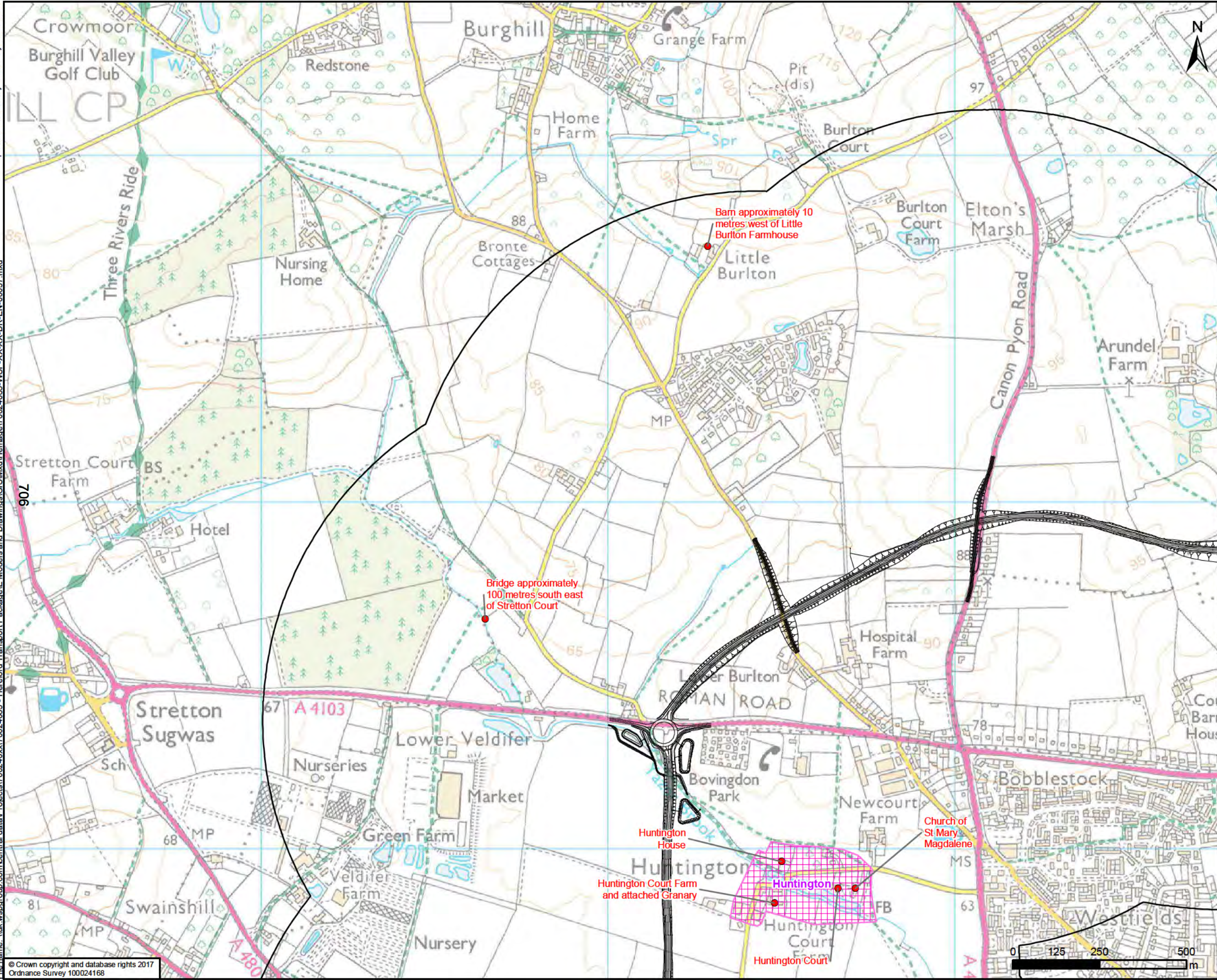
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Scheduled Monument

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- Grade II Listed Building

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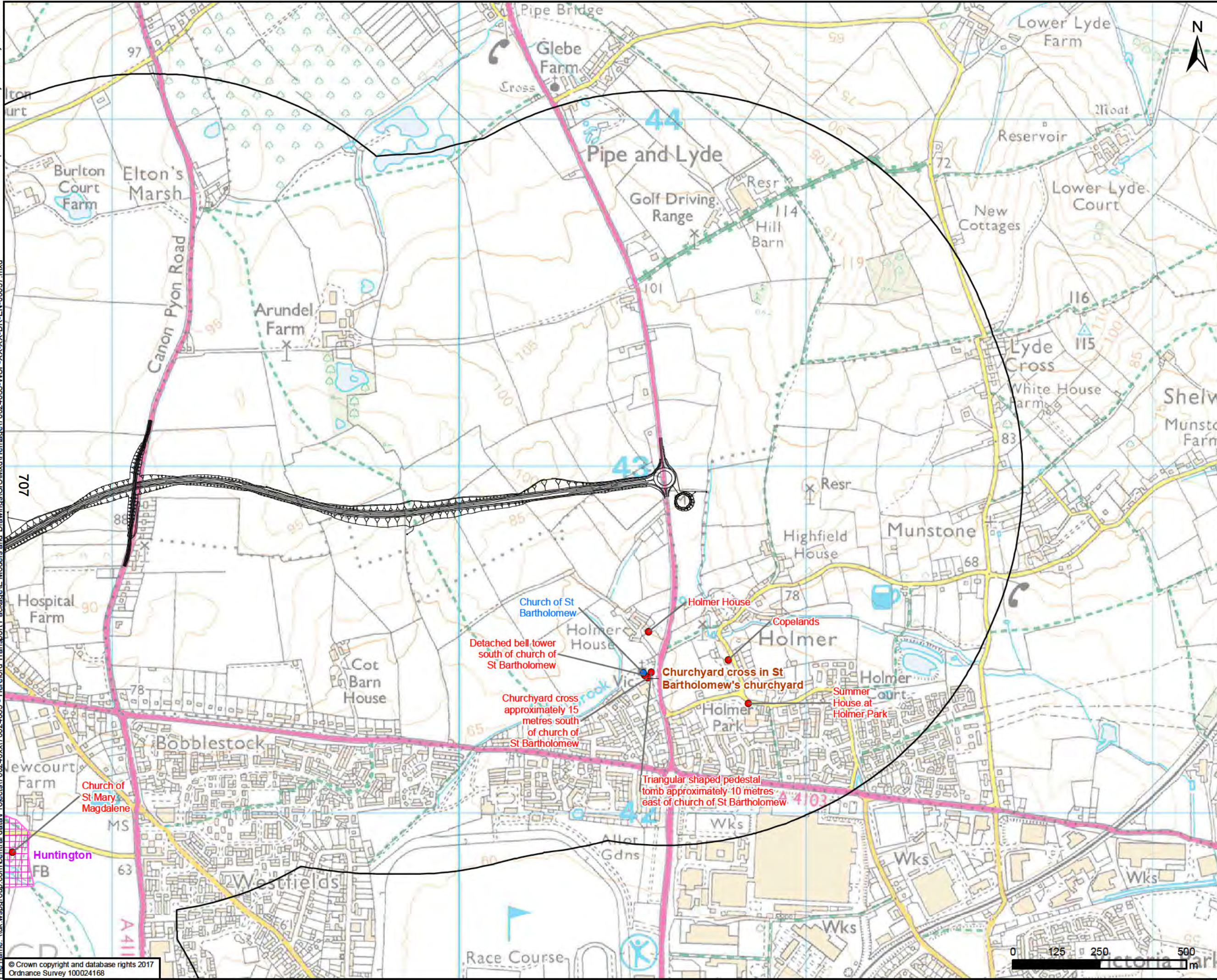
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FIGURE 8-3
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - YELLOW - PAGE 3 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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Conservation areas

Scheduled Monument

Listed Buildings

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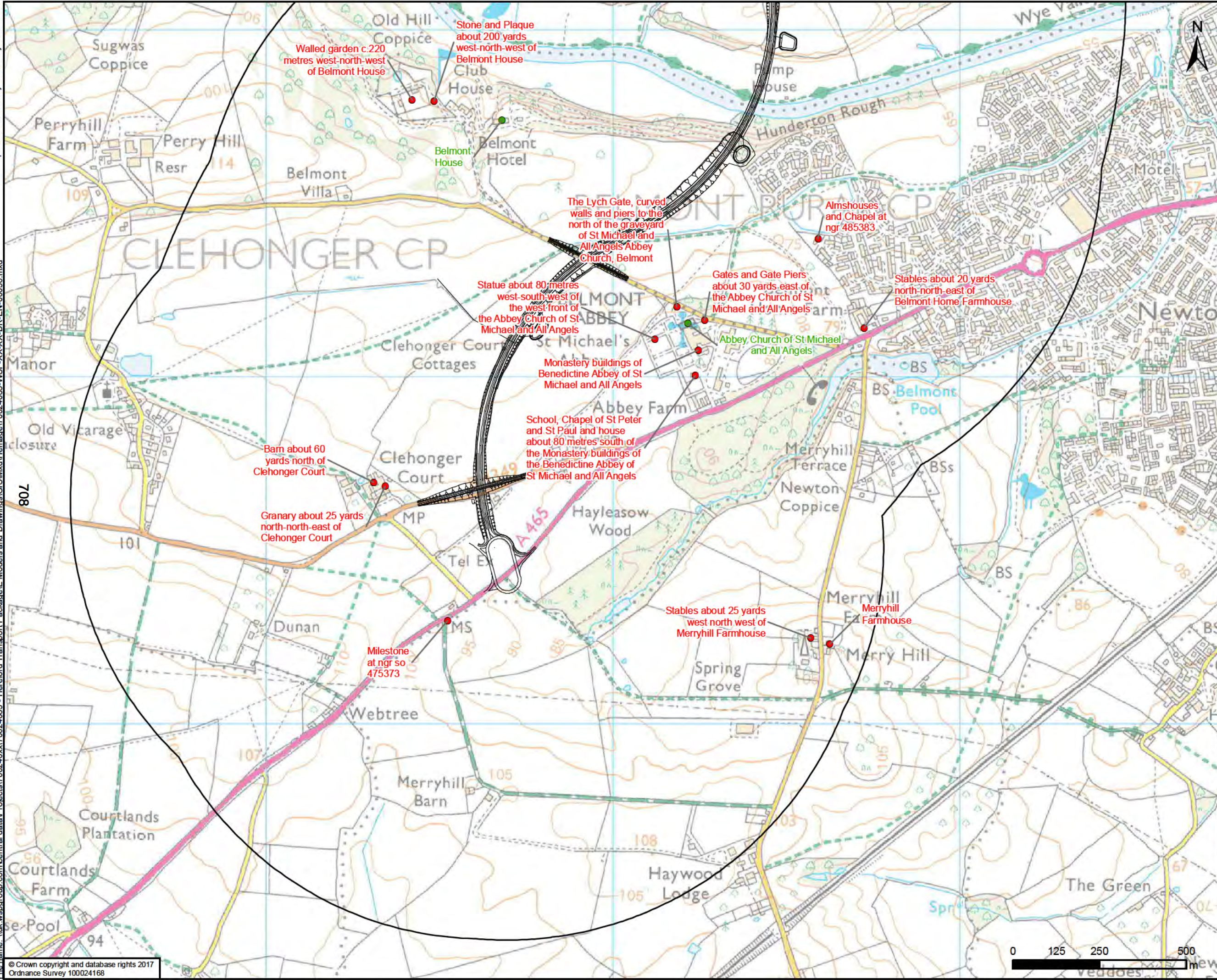
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FIGURE 8-3
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - YELLOW - PAGE 4 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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— Proposed Option - Red

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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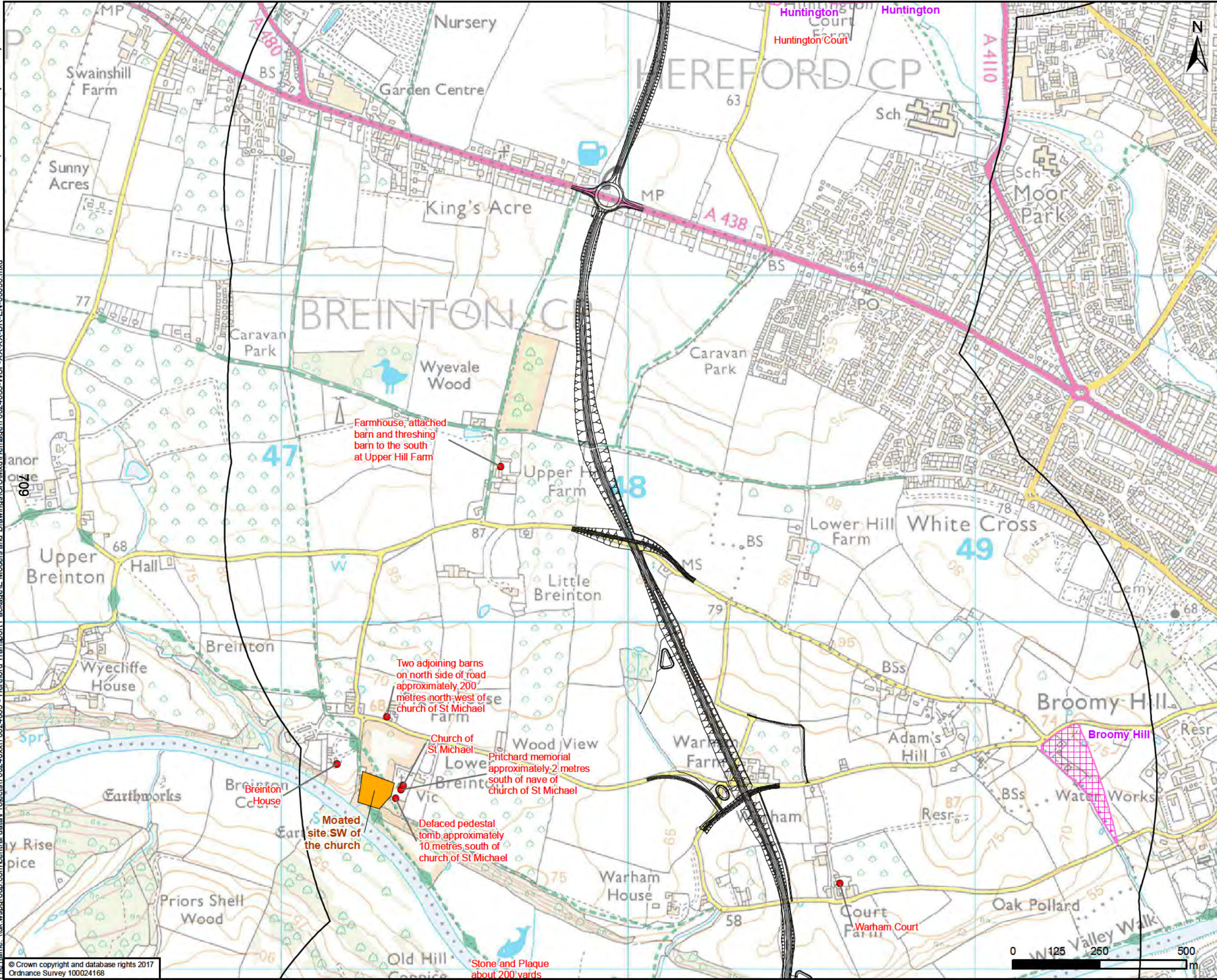
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FIGURE 8-4
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - RED - PAGE 1 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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— Proposed Option - Red

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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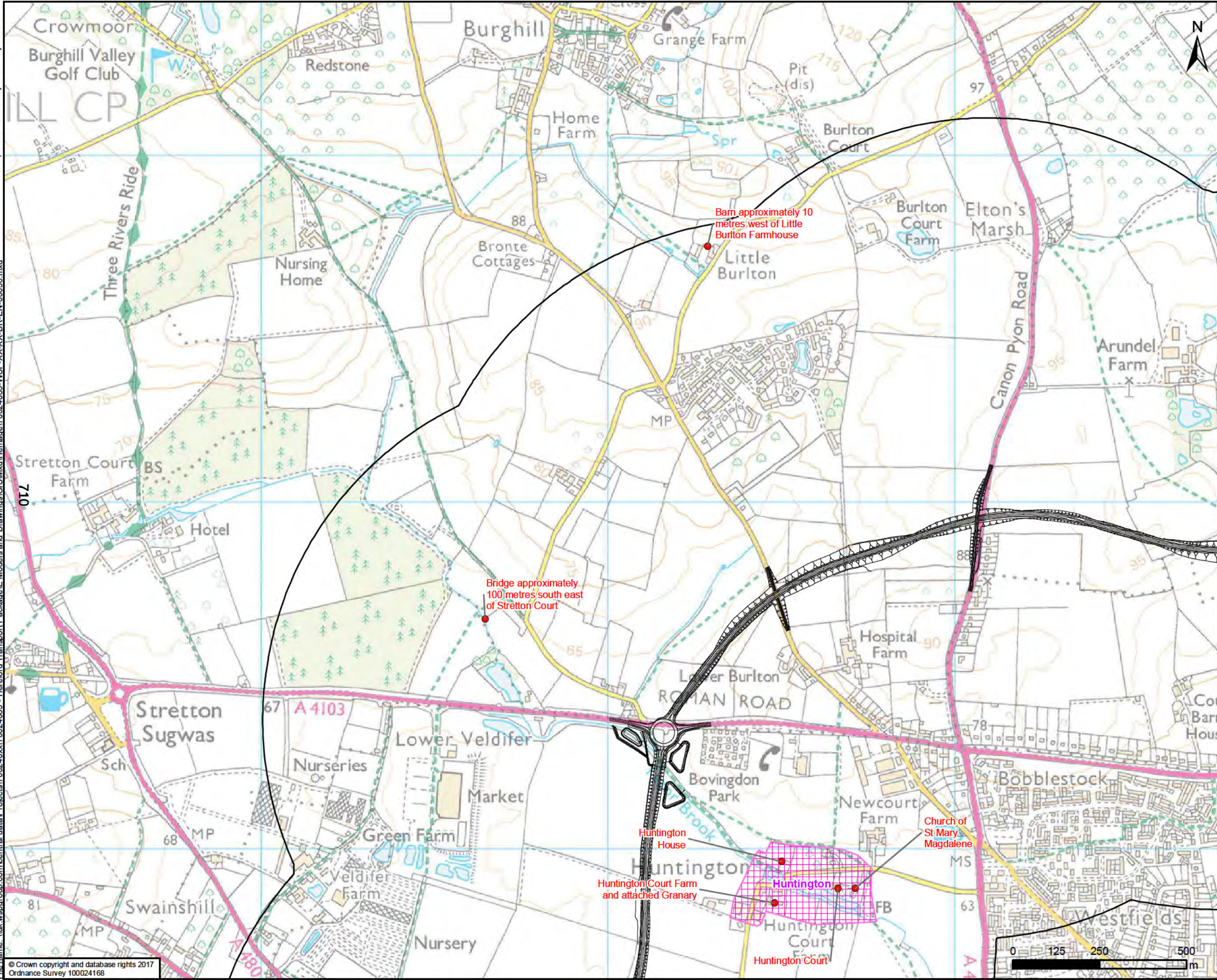
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LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - RED - PAGE 2 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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Proposed Option - Red

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

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- Grade II Listed Building

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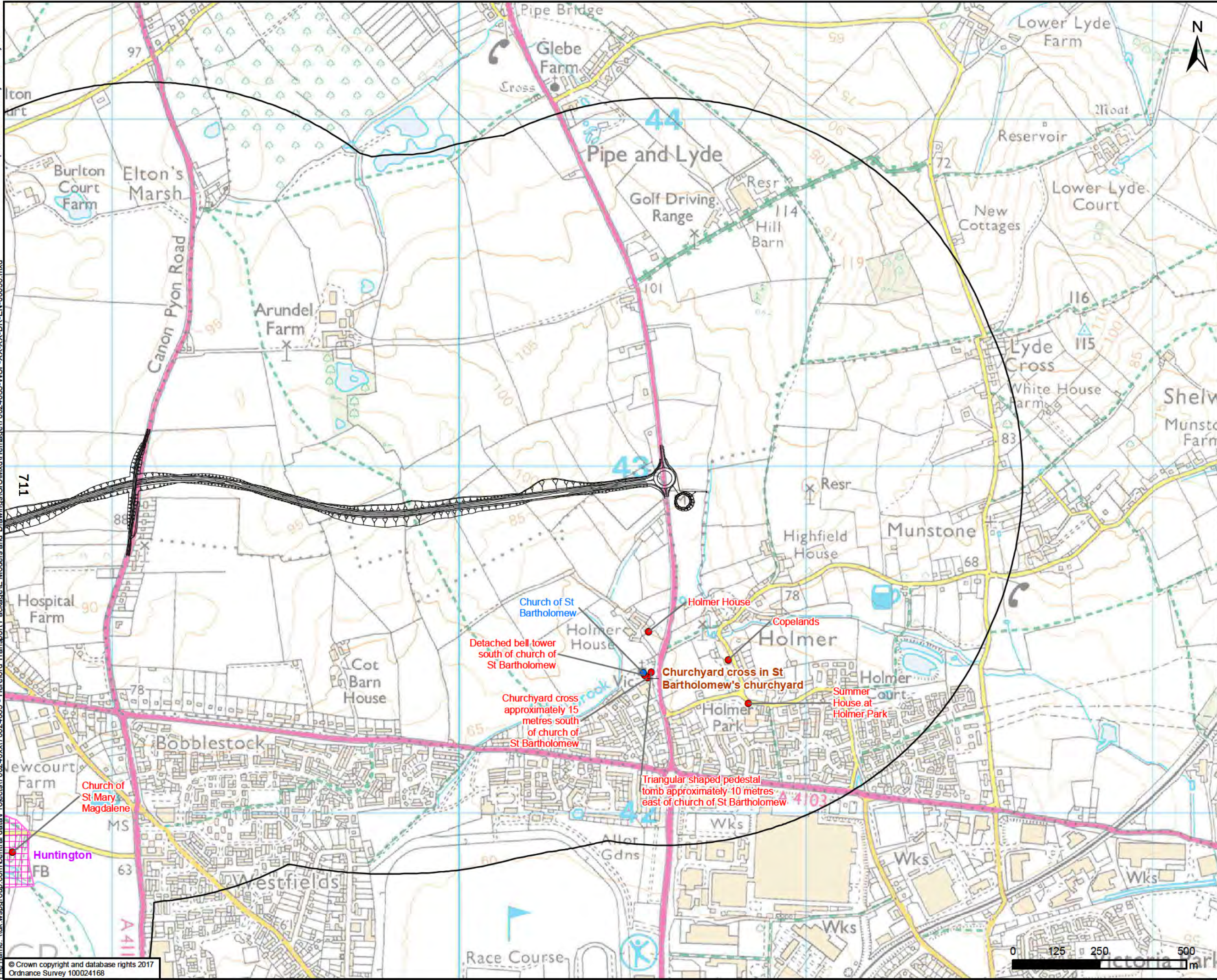
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LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - RED - PAGE 3 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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— Proposed Option - Red

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

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- Grade II* Listed Building
- Grade II Listed Building

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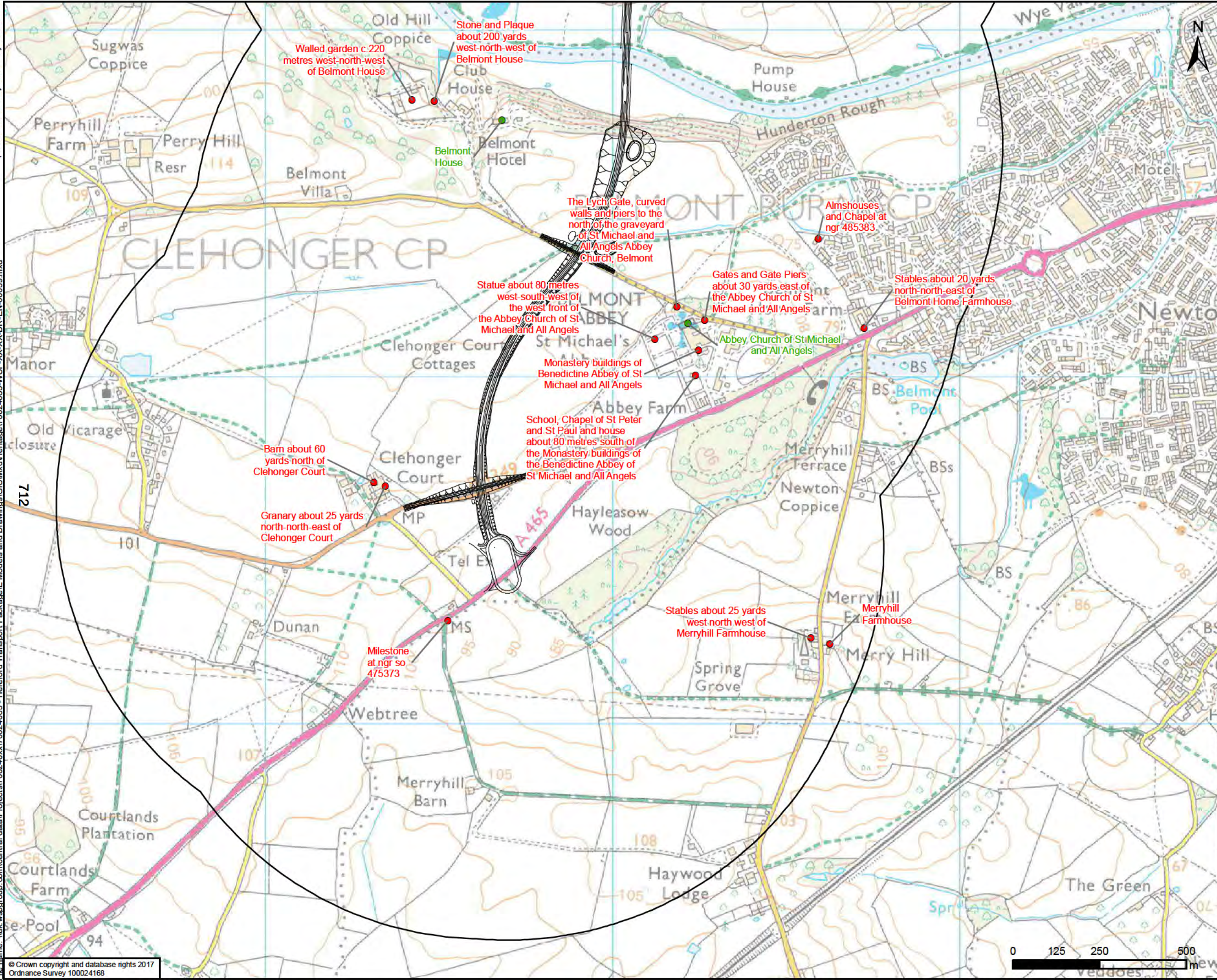
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FIGURE 8-4
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - RED - PAGE 4 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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— Proposed Option - Olive

1km Study Area

Conservation area

Scheduled Monument

Listed Buildings

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- Grade II Listed Building

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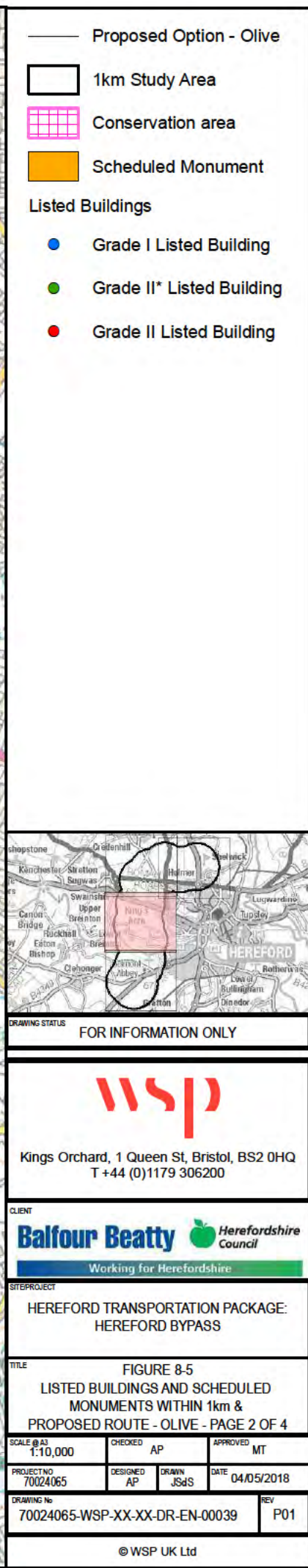
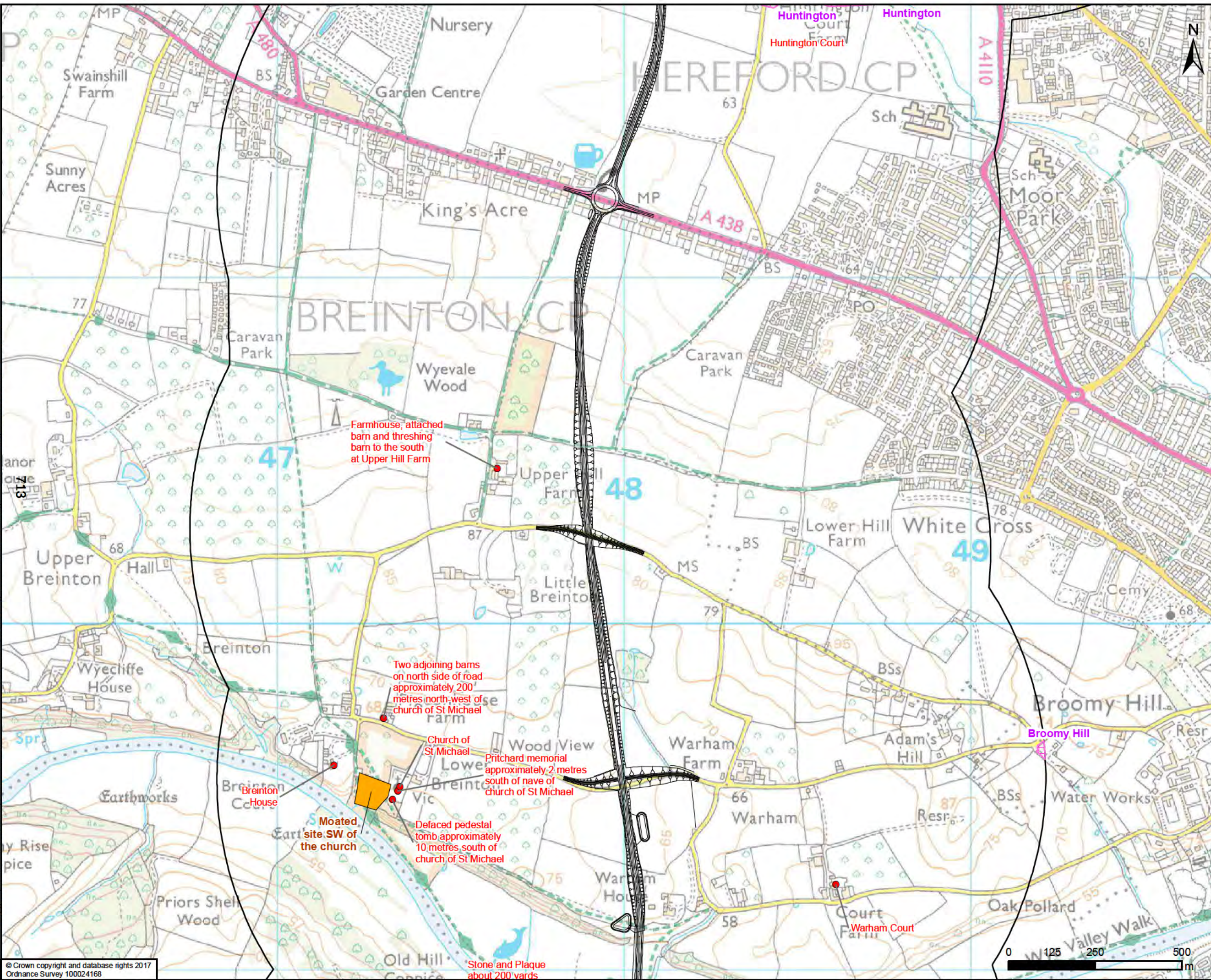
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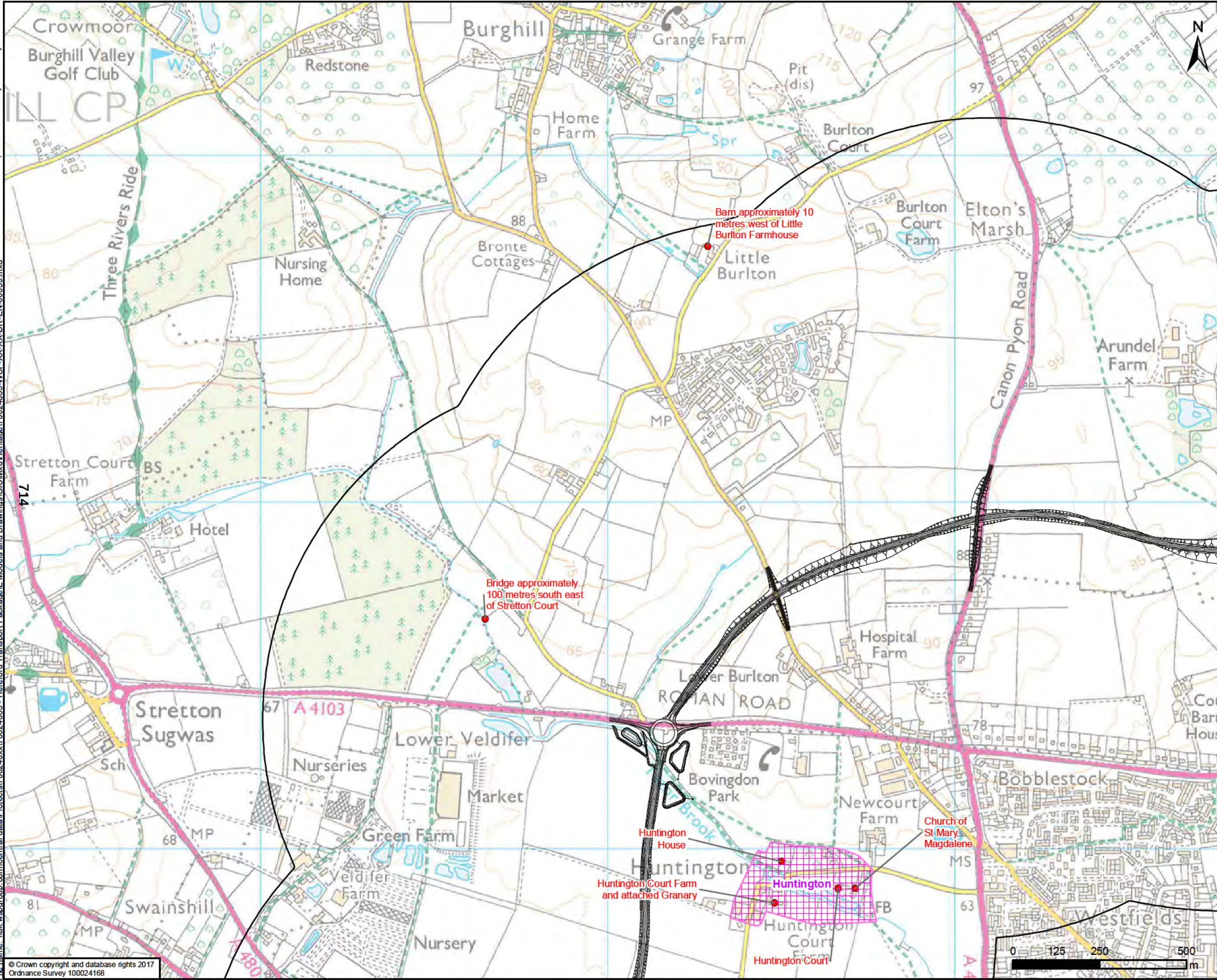
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LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - OLIVE - PAGE 1 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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— Proposed Option - Olive

1km Study Area

Conservation area

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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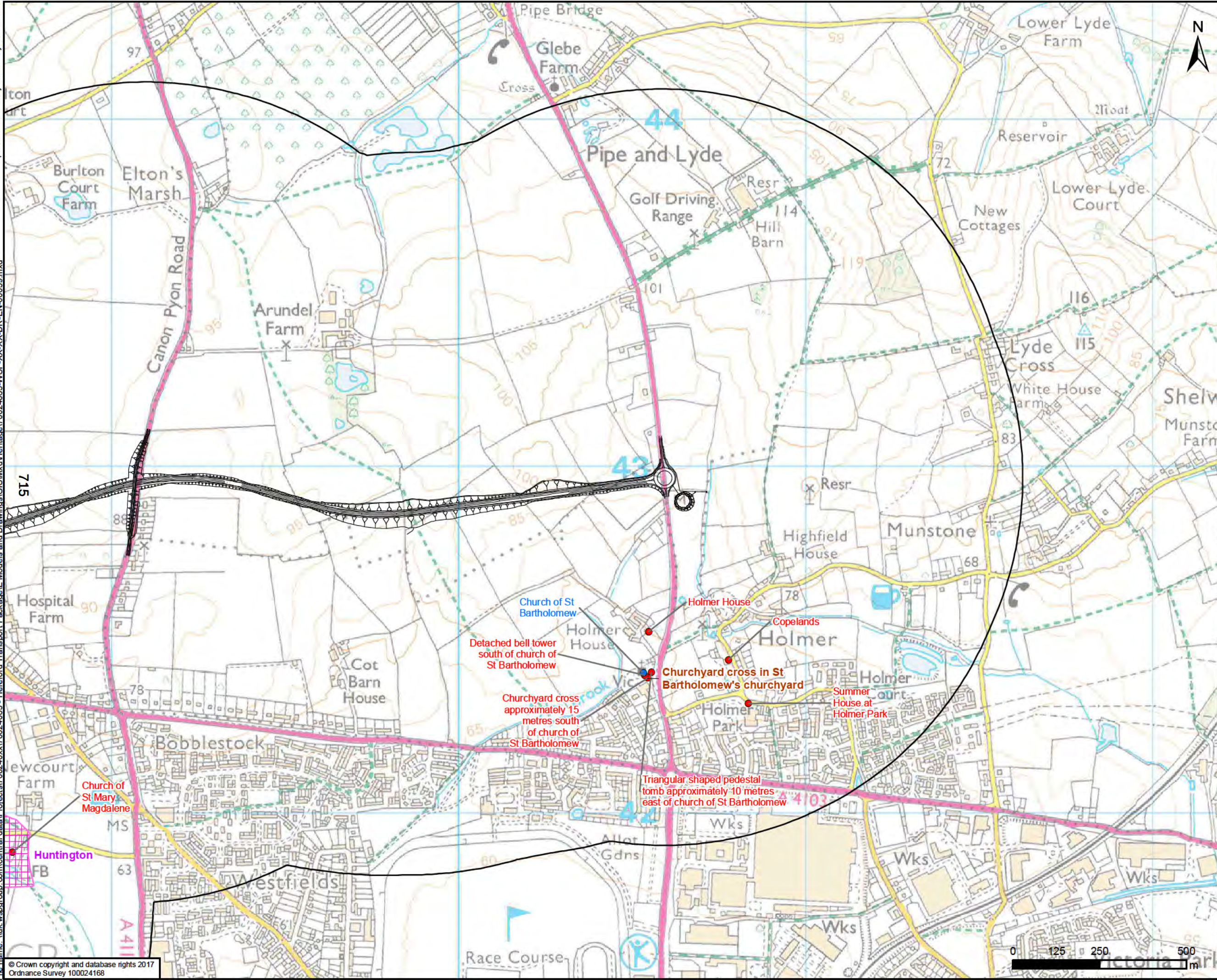
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FIGURE 8-5
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - OLIVE - PAGE 3 OF 4

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— Proposed Option - Olive

1km Study Area

Conservation area

Scheduled Monument

Listed Buildings

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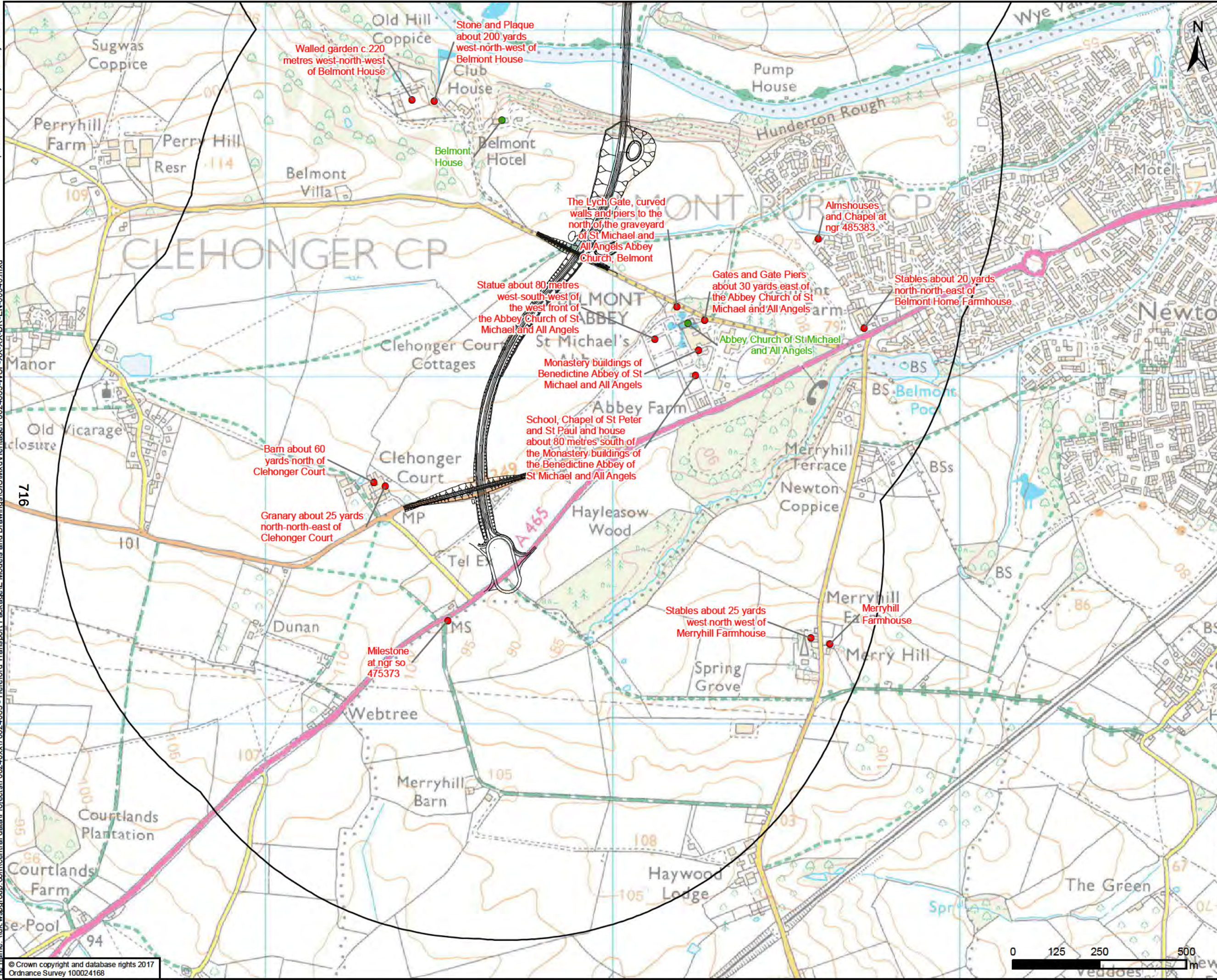
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FIGURE 8-5
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - OLIVE - PAGE 4 OF 4

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— Proposed Option - Black 1

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

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- Grade II Listed Building

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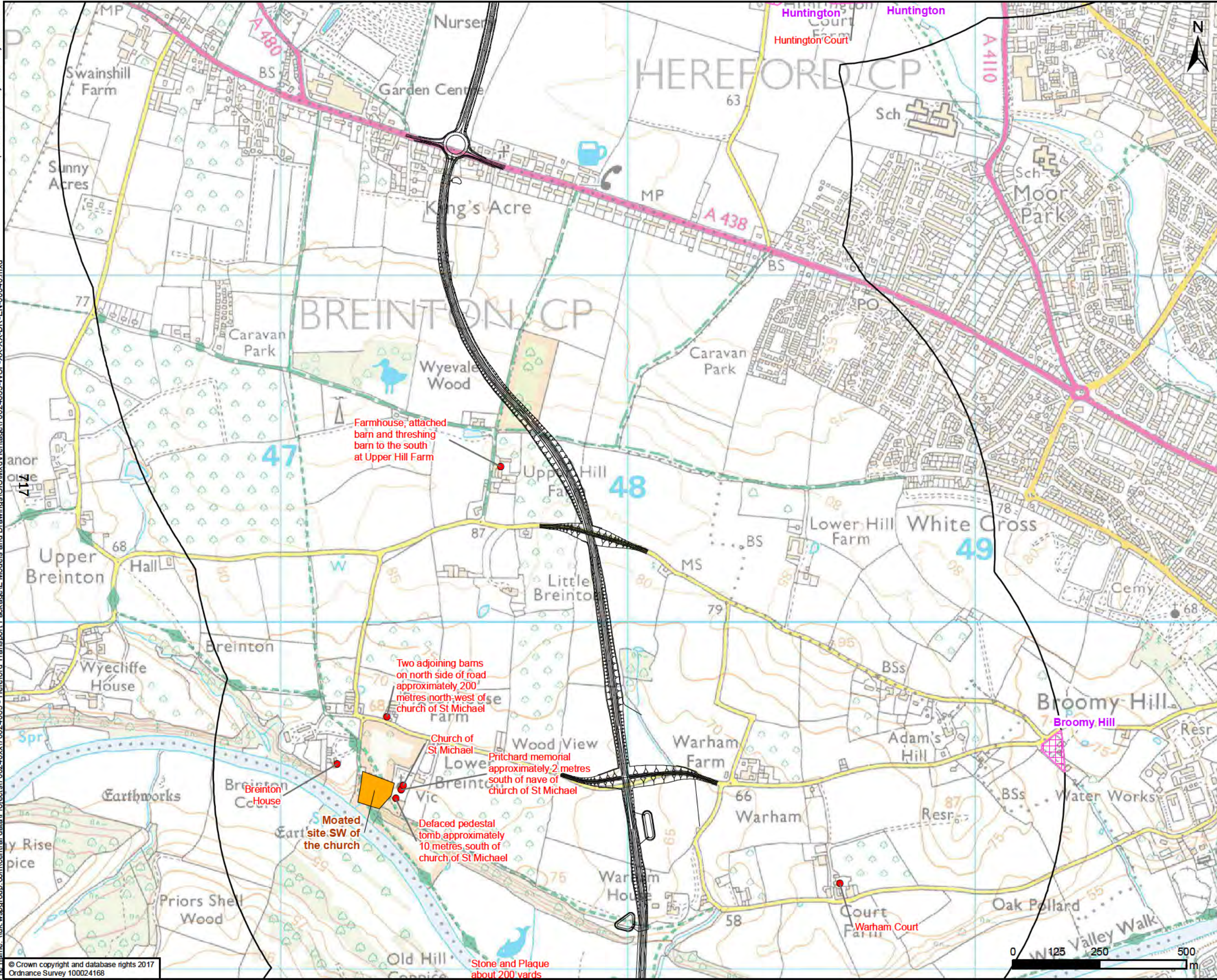
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FIGURE 8-6
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - BLACK 1 - PAGE 1 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
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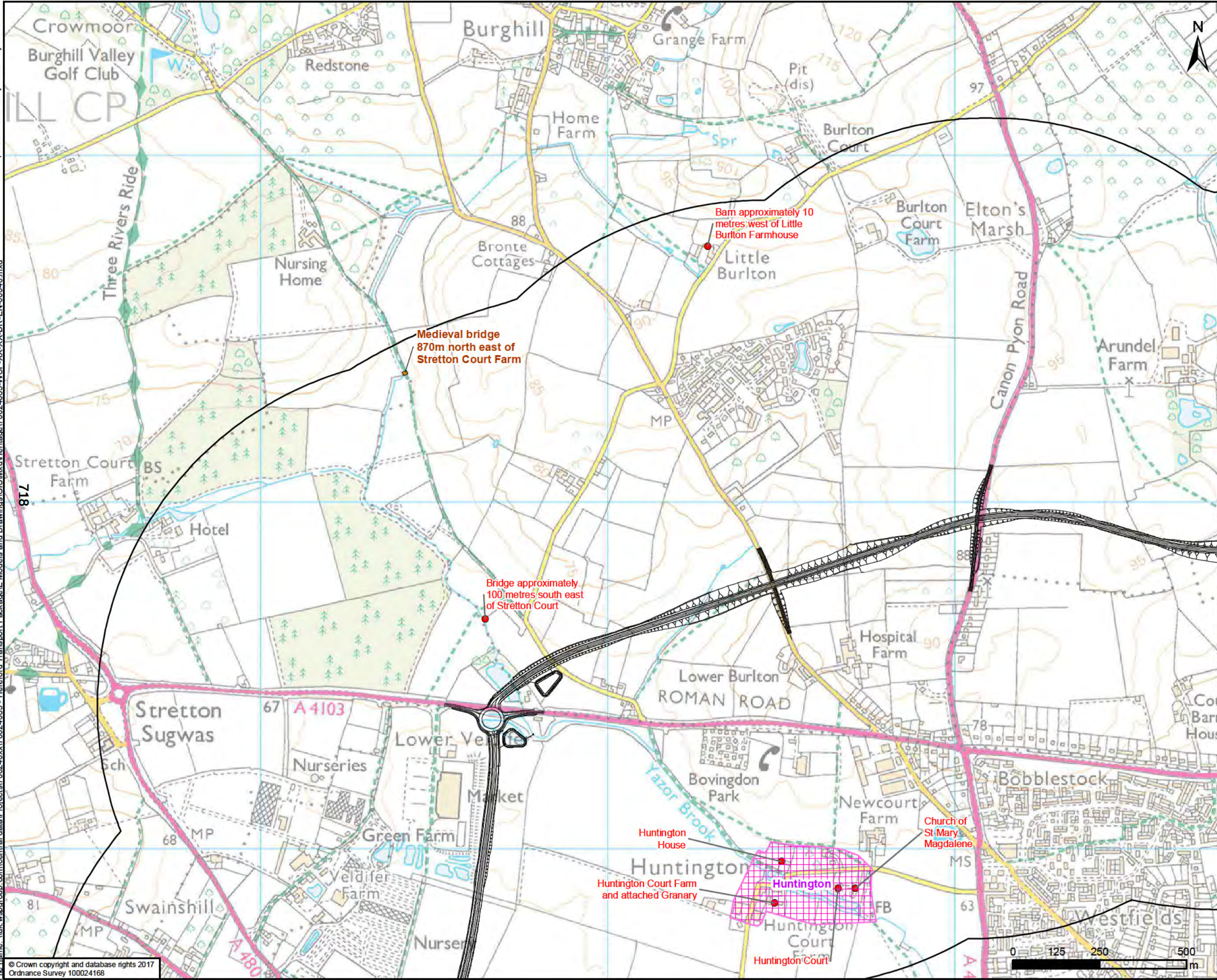
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FIGURE 8-6
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - BLACK 1 - PAGE 2 OF 4

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1km Study Area

Conservation areas

Scheduled Monument

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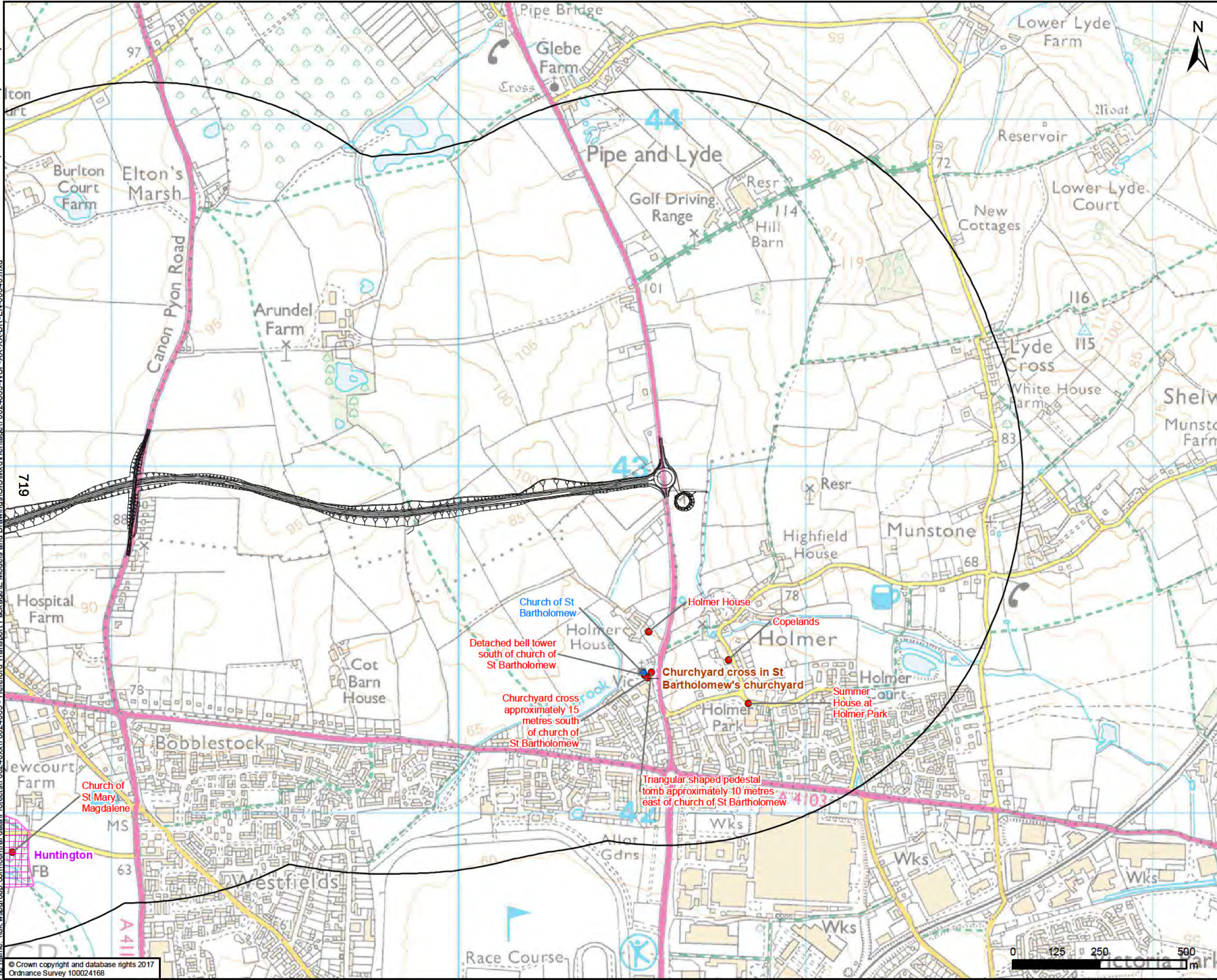
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FIGURE 8-6
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - BLACK 1 - PAGE 3 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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1km Study Area

Conservation areas

Scheduled Monument

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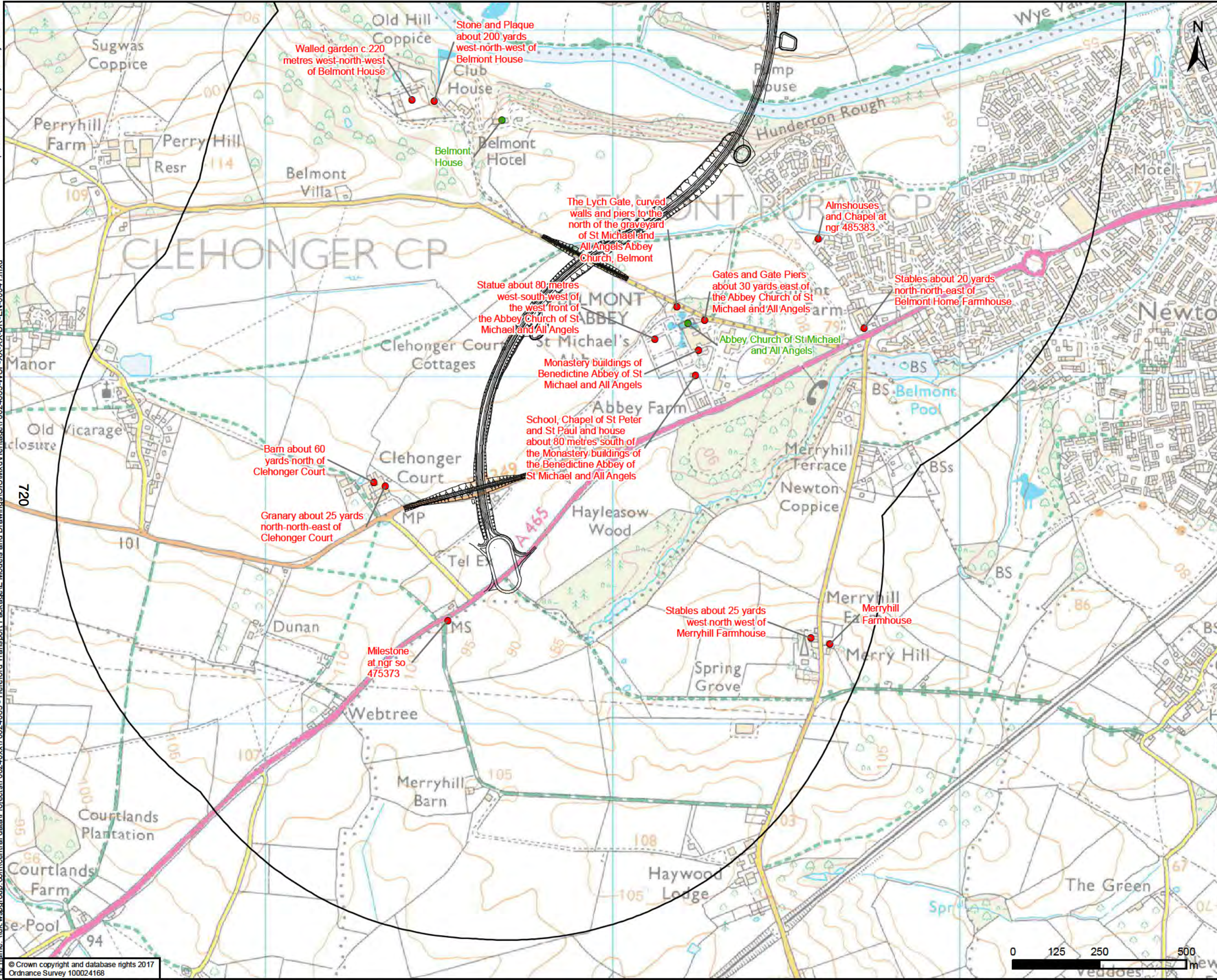
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FIGURE 8-6
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - BLACK 1 - PAGE 4 OF 4

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— Proposed Option - Black 2

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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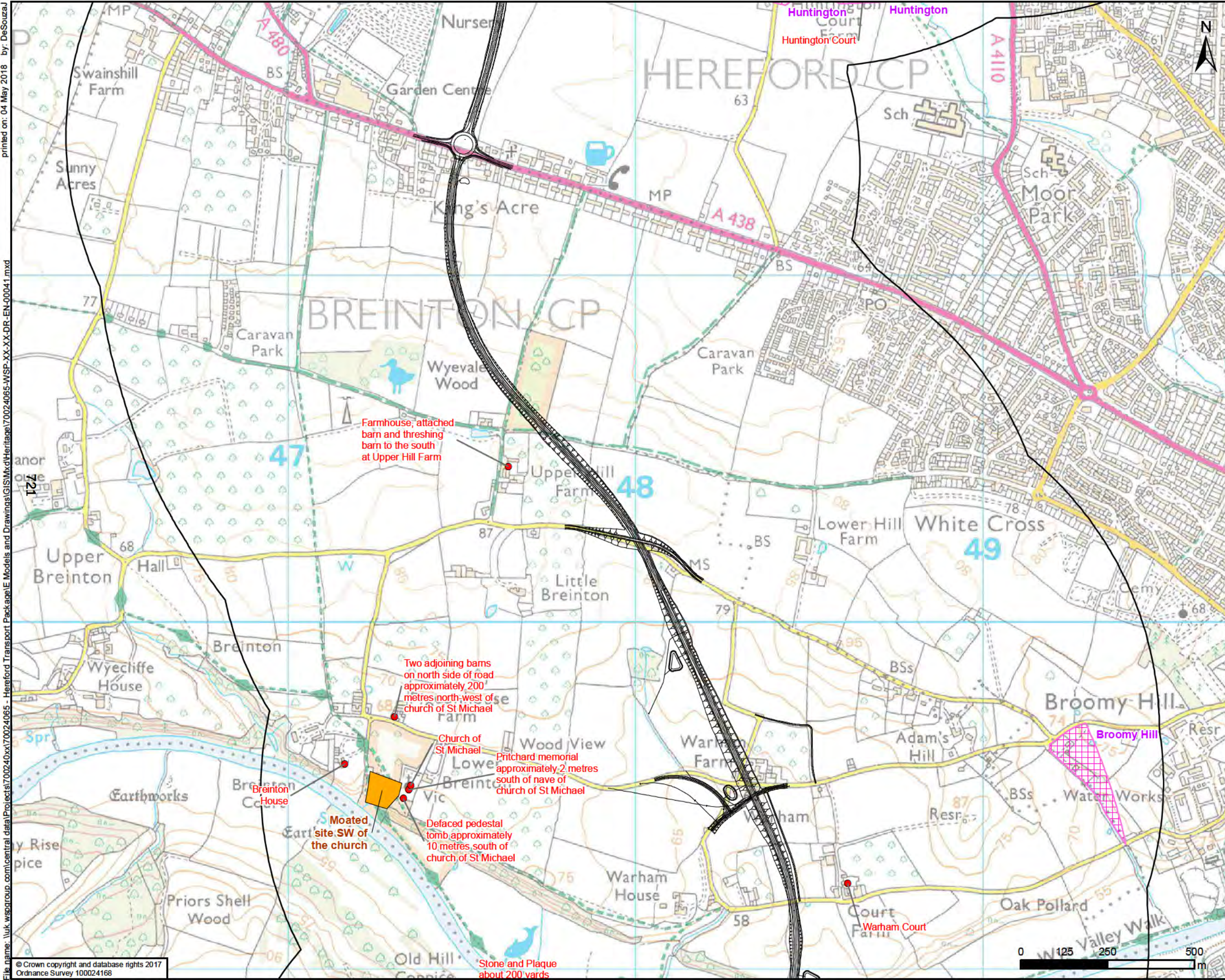
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FIGURE 8-7
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - BLACK 2 - PAGE 1 OF 4

SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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— Proposed Option - Black 2

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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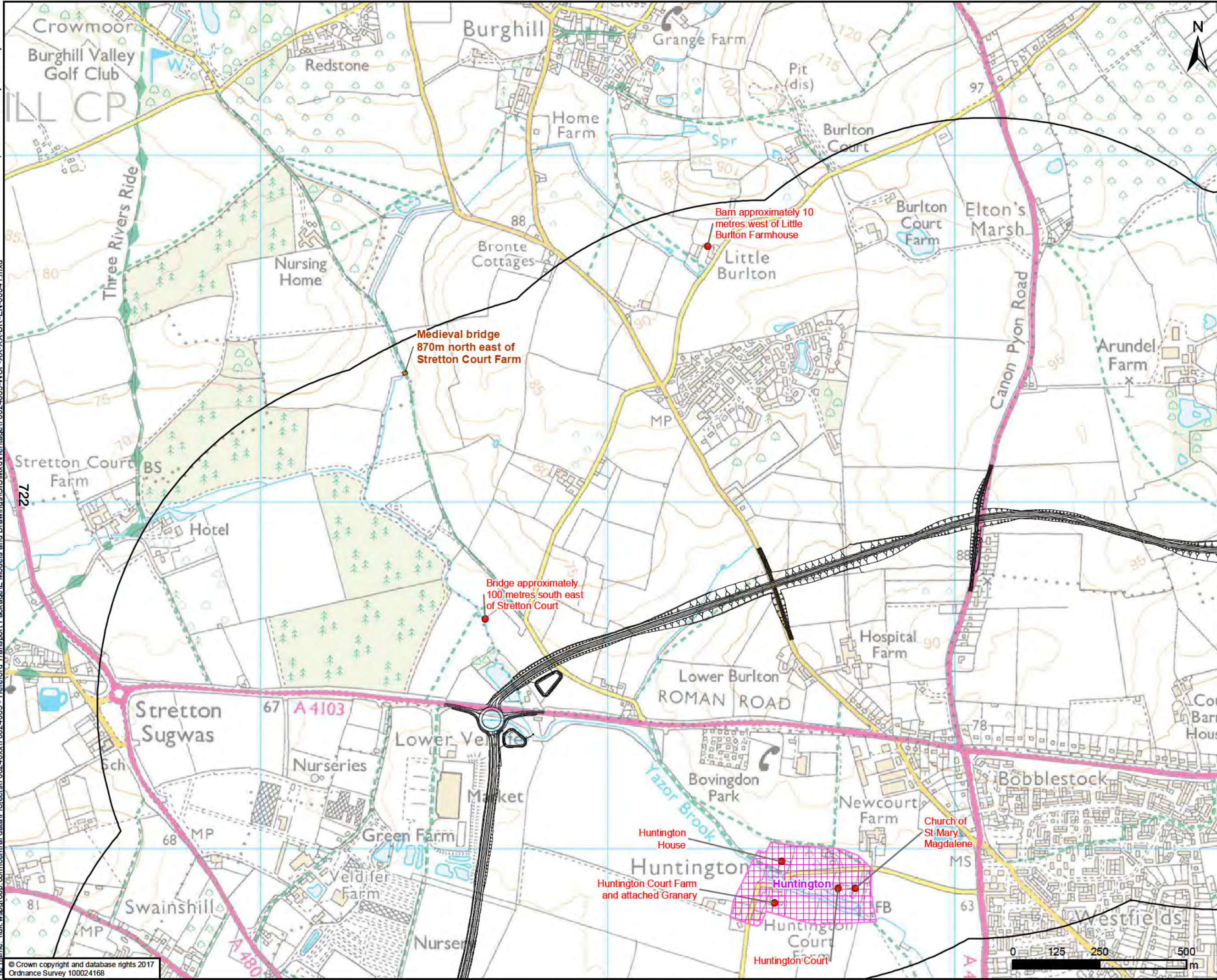
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FIGURE 8-7
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - BLACK 2 - PAGE 2 OF 4

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— Proposed Option - Black 2

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

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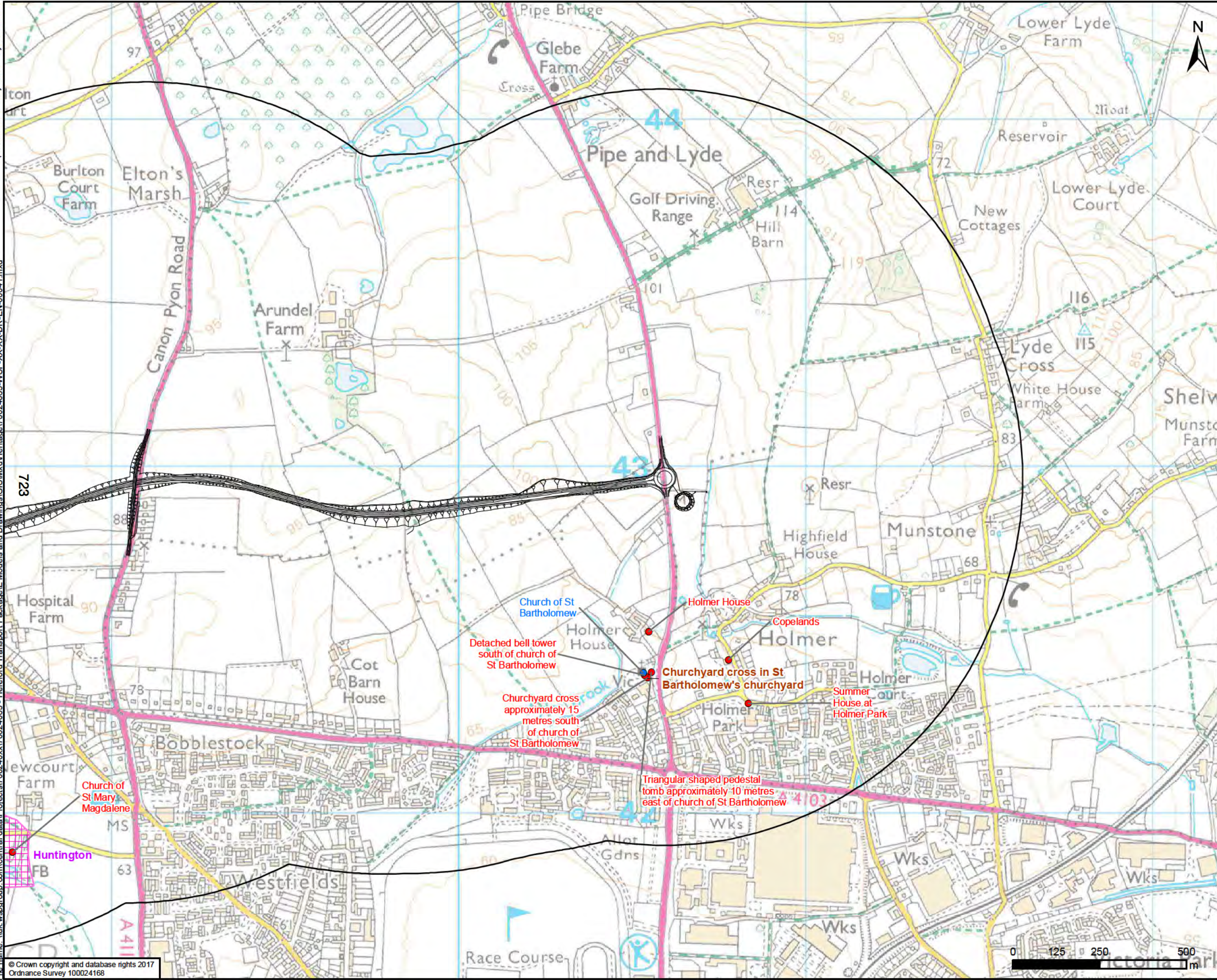
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FIGURE 8-7
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - BLACK 2 - PAGE 3 OF 4

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— Proposed Option - Black 2

1km Study Area

Conservation areas

Scheduled Monument

Listed Buildings

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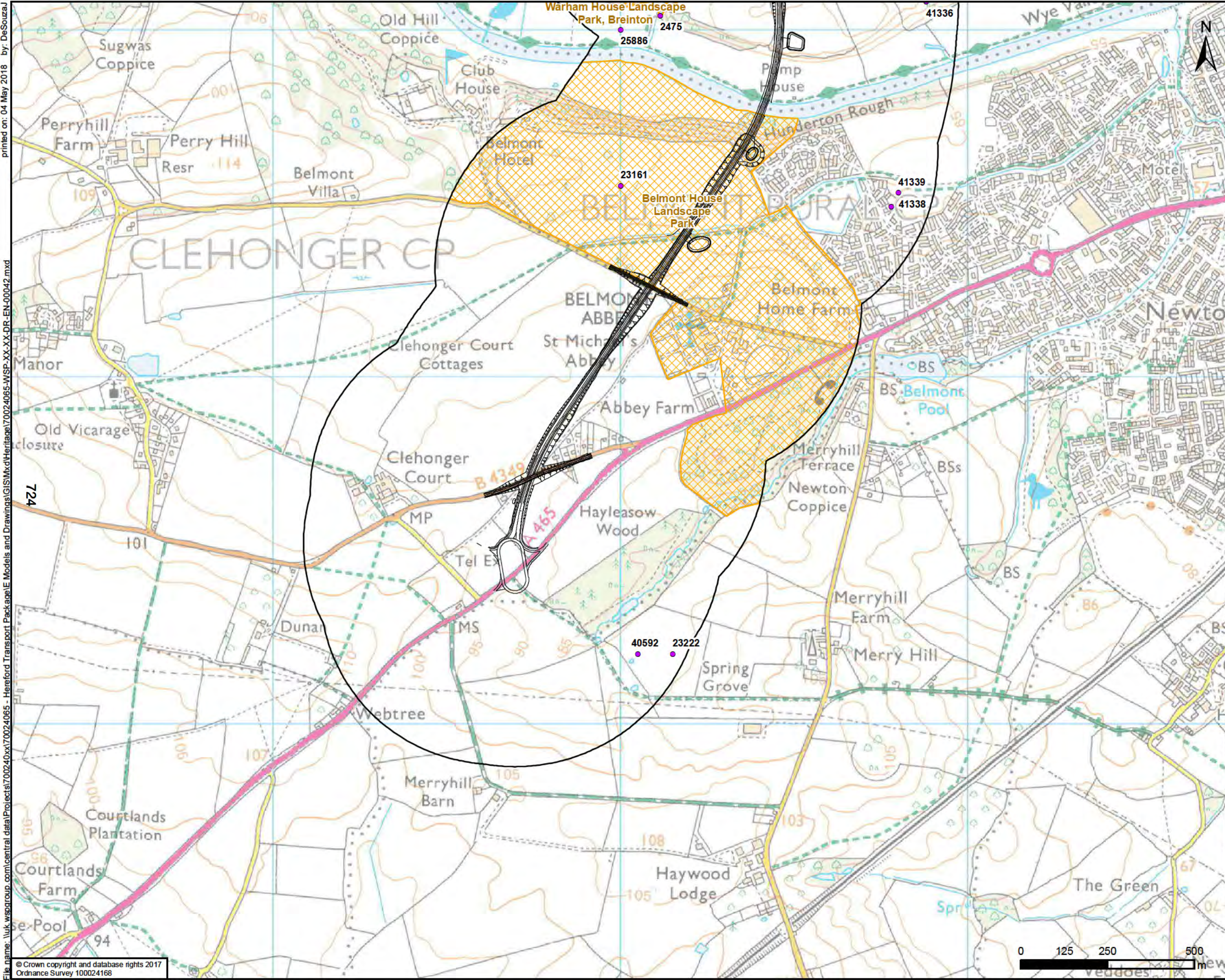
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FIGURE 8-7
LISTED BUILDINGS AND SCHEDULED
MONUMENTS WITHIN 1km &
PROPOSED ROUTE - BLACK 2 - PAGE 4 OF 4

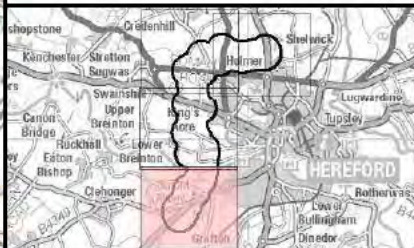
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- 500m Study Area
- Proposed Option - Orange
- HER assets
- Landscape parks



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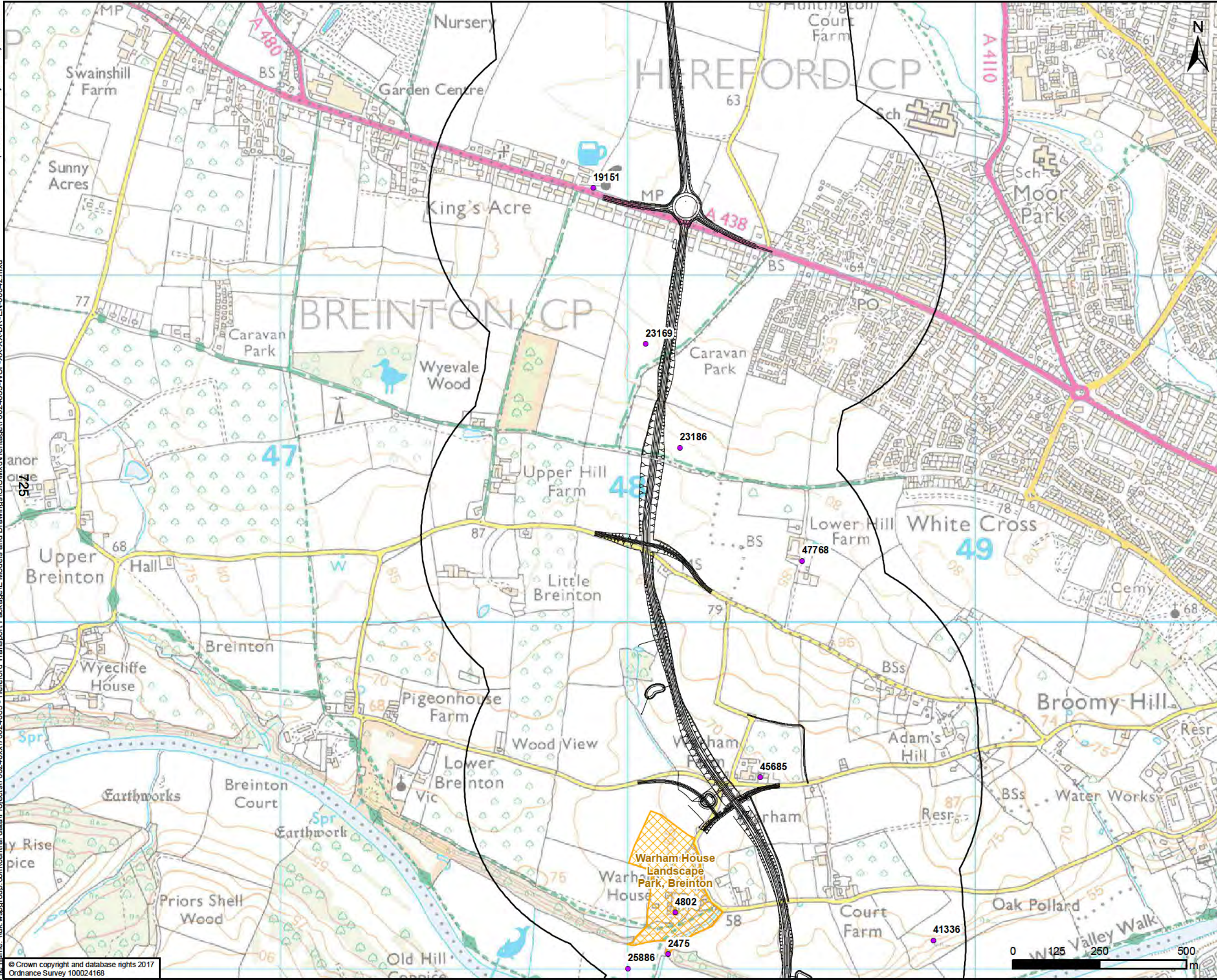
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TITLE
FIGURE 8-8
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - ORANGE
PAGE 1 OF 4

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500m Study Area

Proposed Option - Orange

HER assets

Landscape parks

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FIGURE 8-8
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - ORANGE
PAGE 2 OF 4

SCALE @ A3
1:10,000

CHECKED
AP

APPROVED
MT

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DATE
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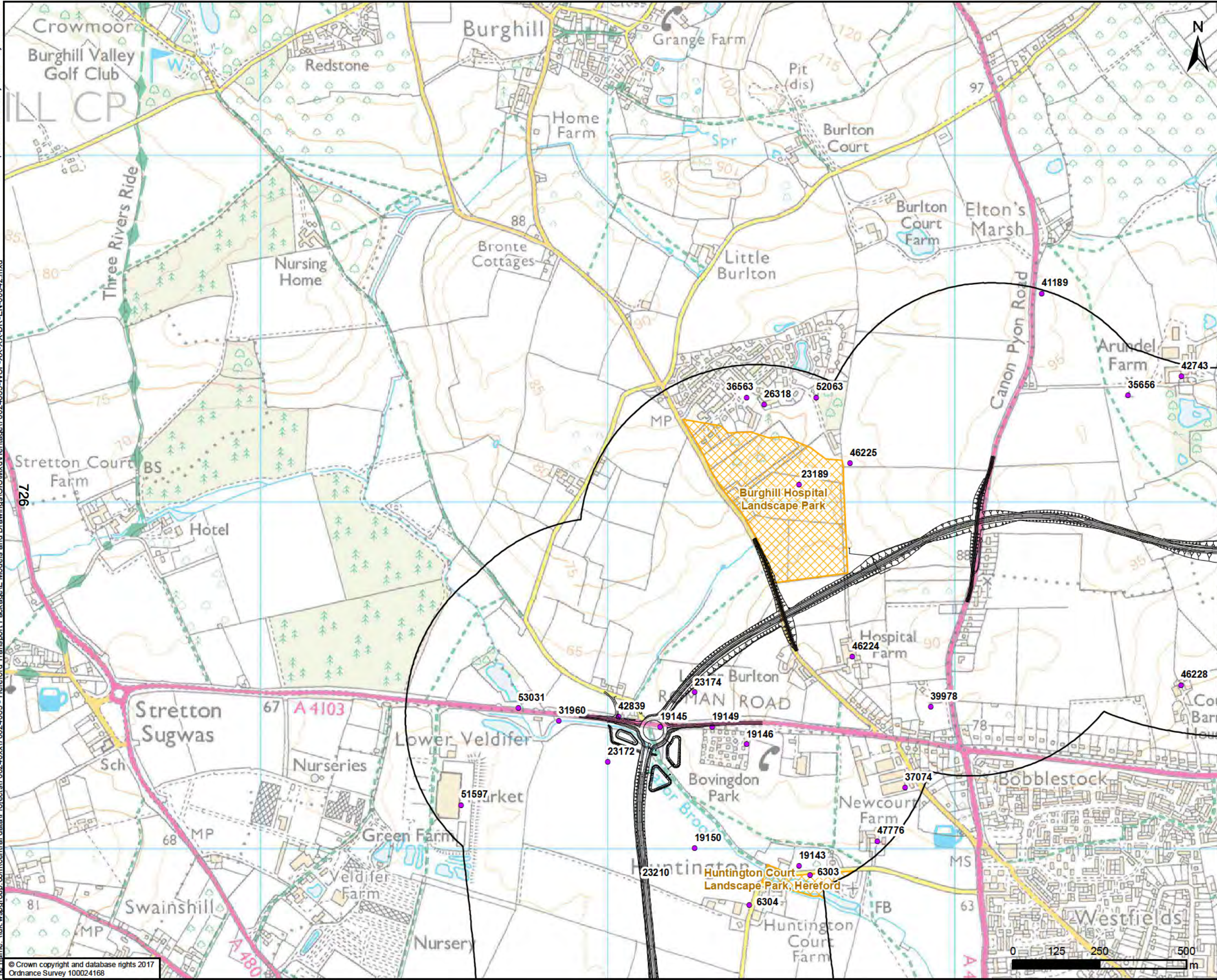
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500m Study Area

Proposed Option - Orange

HER assets

Landscape parks

North Arrow

Scale 0 125 250 500m

Map of Herefordshire

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FIGURE 8-8

NON-DESIGNATED HERITAGE ASSETS

WITHIN 500m & PROPOSED ROUTE - ORANGE

PAGE 3 OF 4

SCALE @ A3

1:10,000

CHECKED

AP

APPROVED

MT

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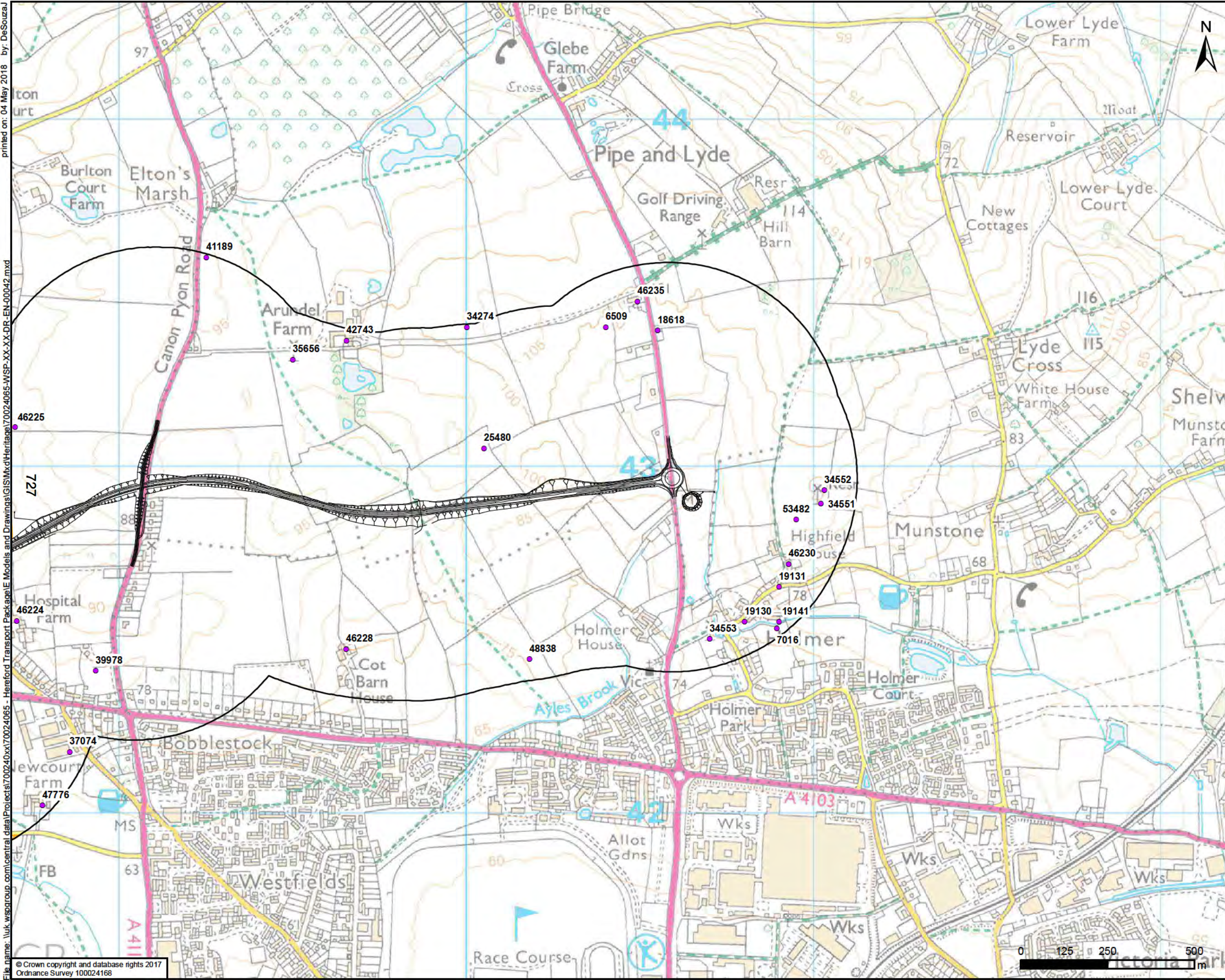
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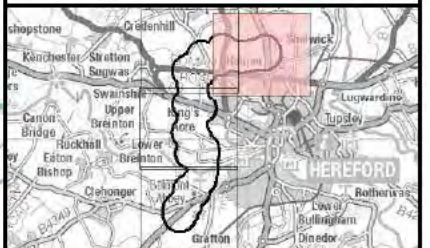
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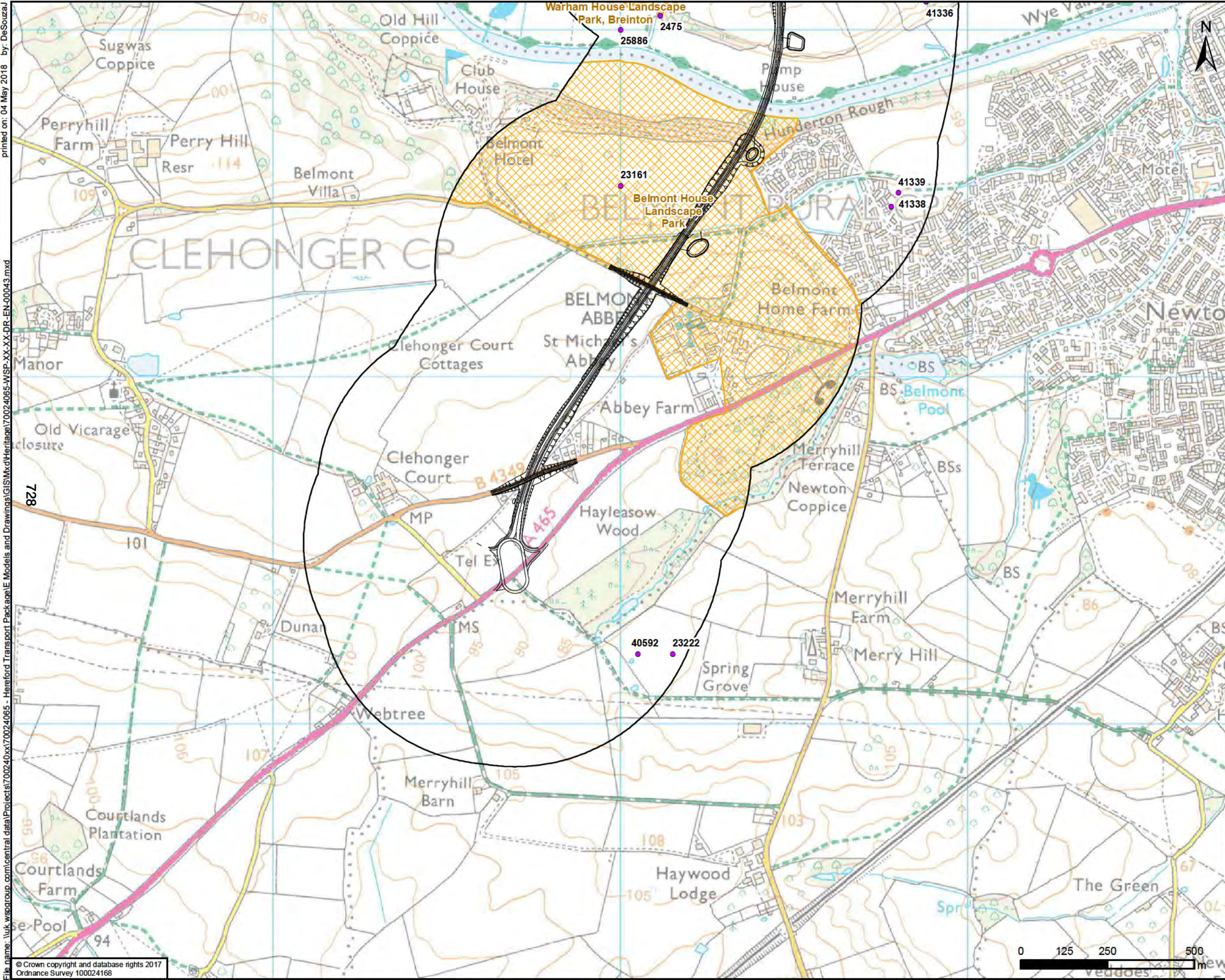
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FIGURE 8-8
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - ORANGE
PAGE 4 OF 4

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— Proposed Option - Cyan

500m Study Area

• HER assets

Landscape parks

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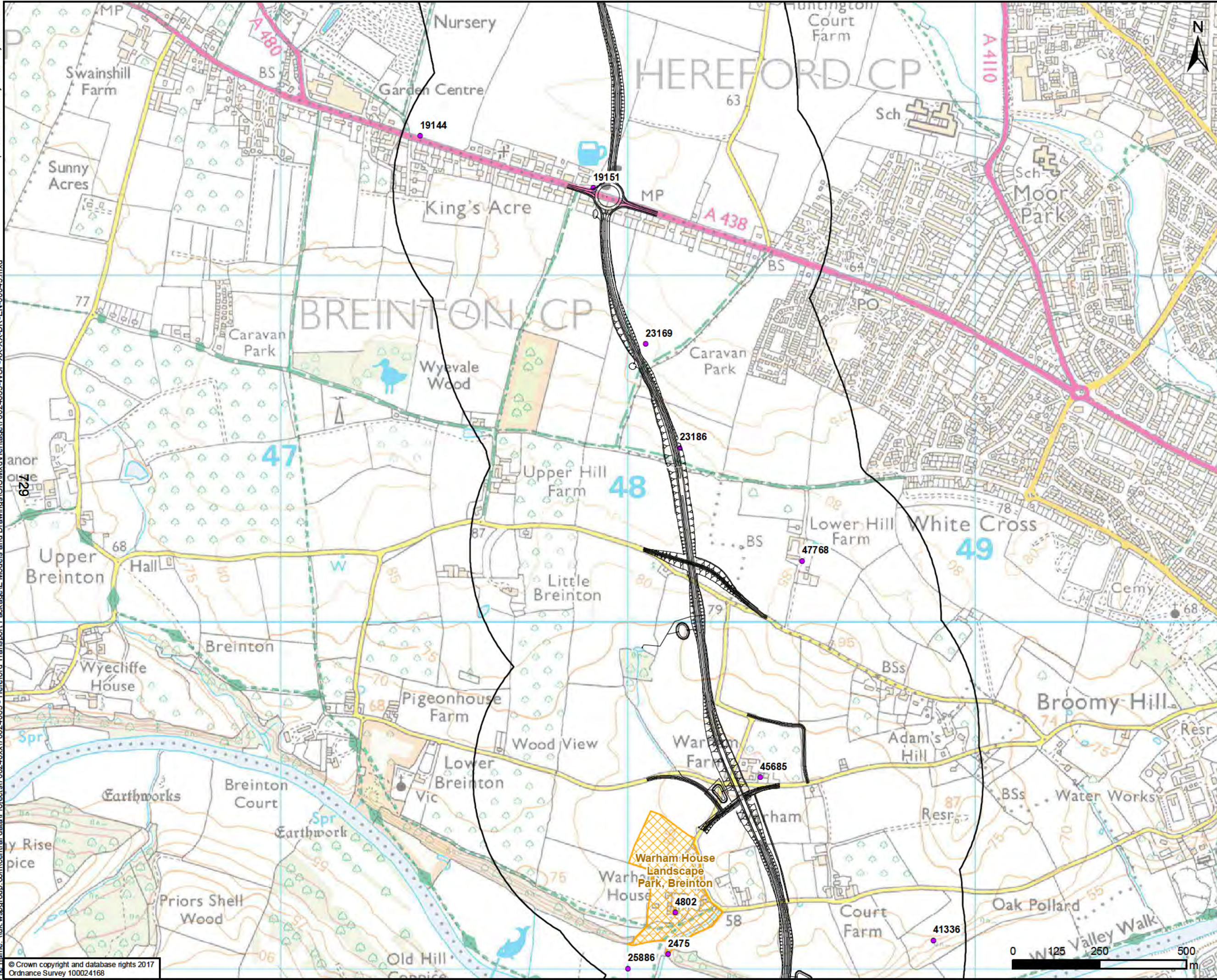
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FIGURE 8-9
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - CYAN
PAGE 1 OF 4

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— Proposed Option - Cyan

500m Study Area

● HER assets

▨ Landscape parks

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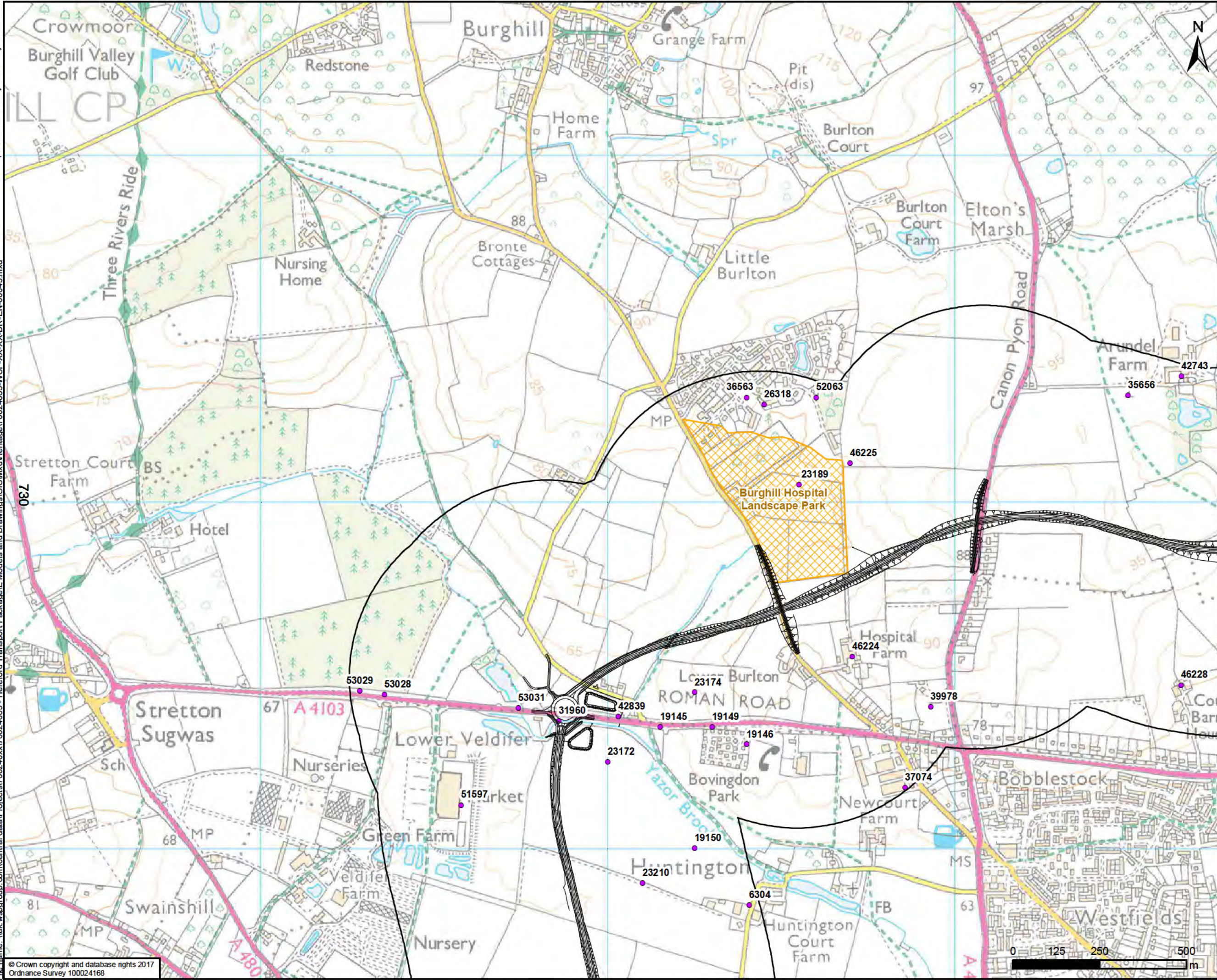
FIGURE 8-9
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - CYAN
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Proposed Option - Cyan

500m Study Area

HER assets

Landscape parks

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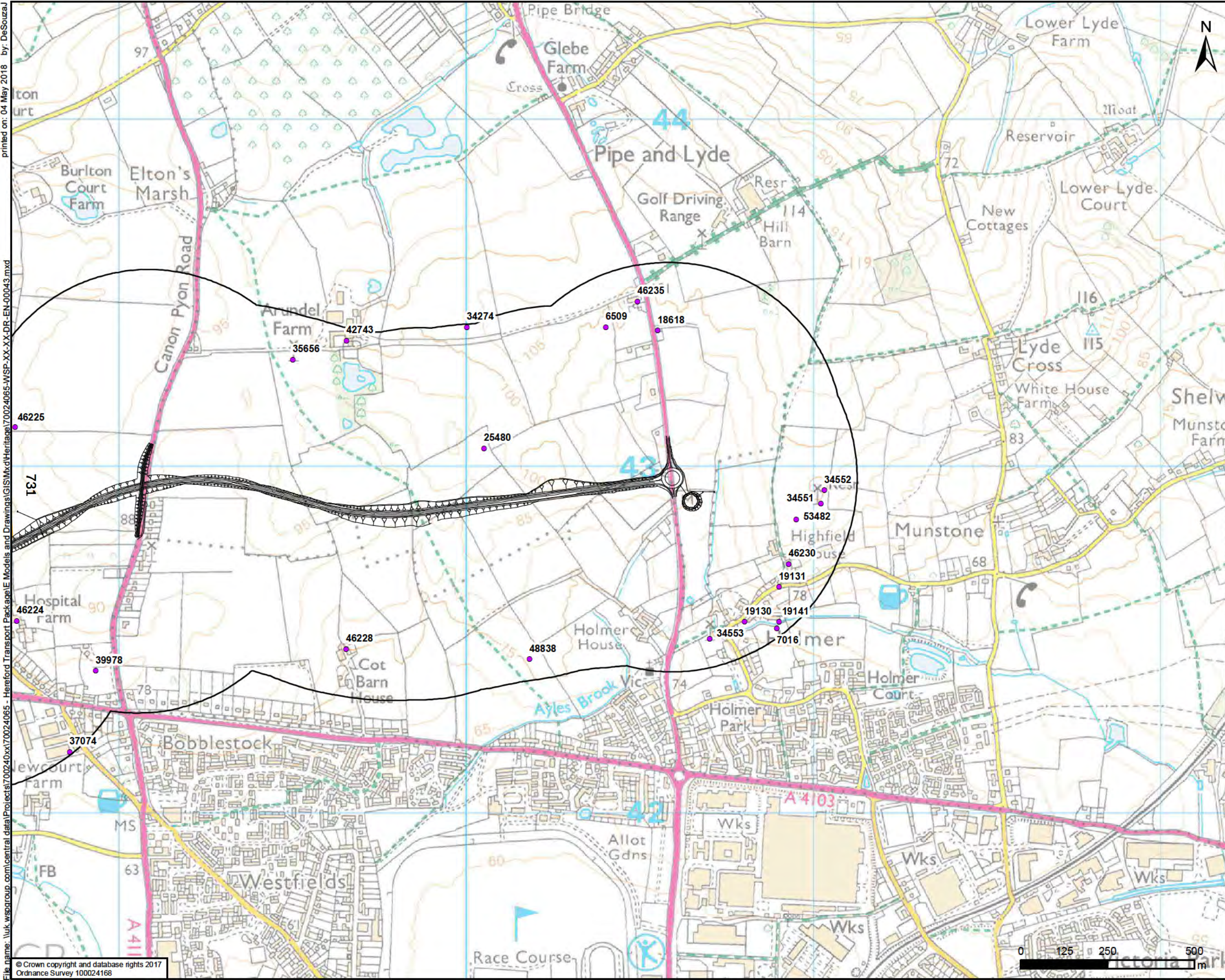
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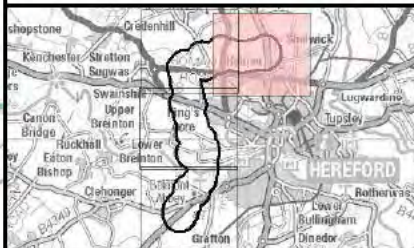
FIGURE 8-9
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - CYAN
PAGE 3 OF 4

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- 500m Study Area
- HER assets
- Landscape parks



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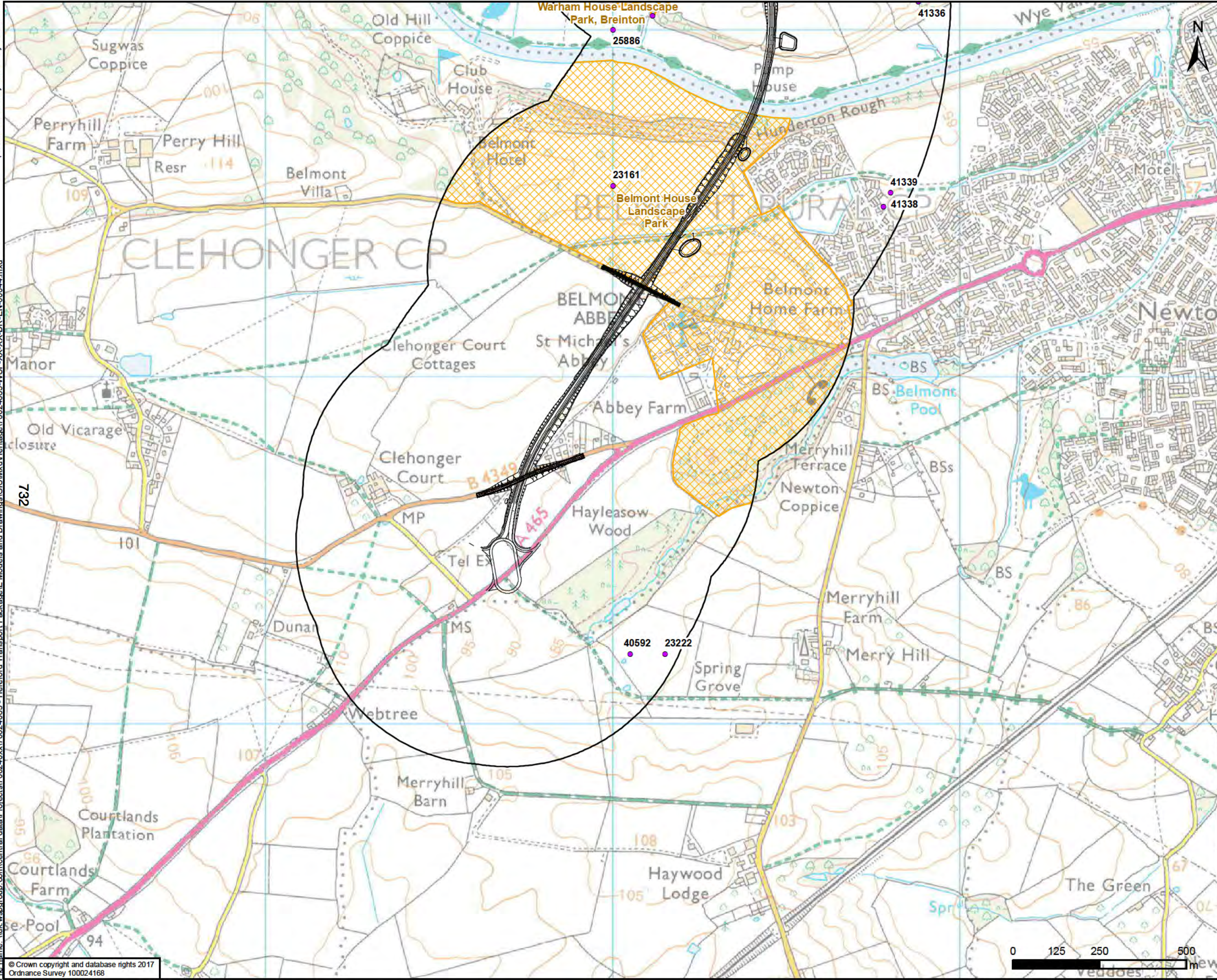
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FIGURE 8-9
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - CYAN
PAGE 4 OF 4

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— Proposed Option - Yellow

500m Study Area

HER assets

Landscape parks

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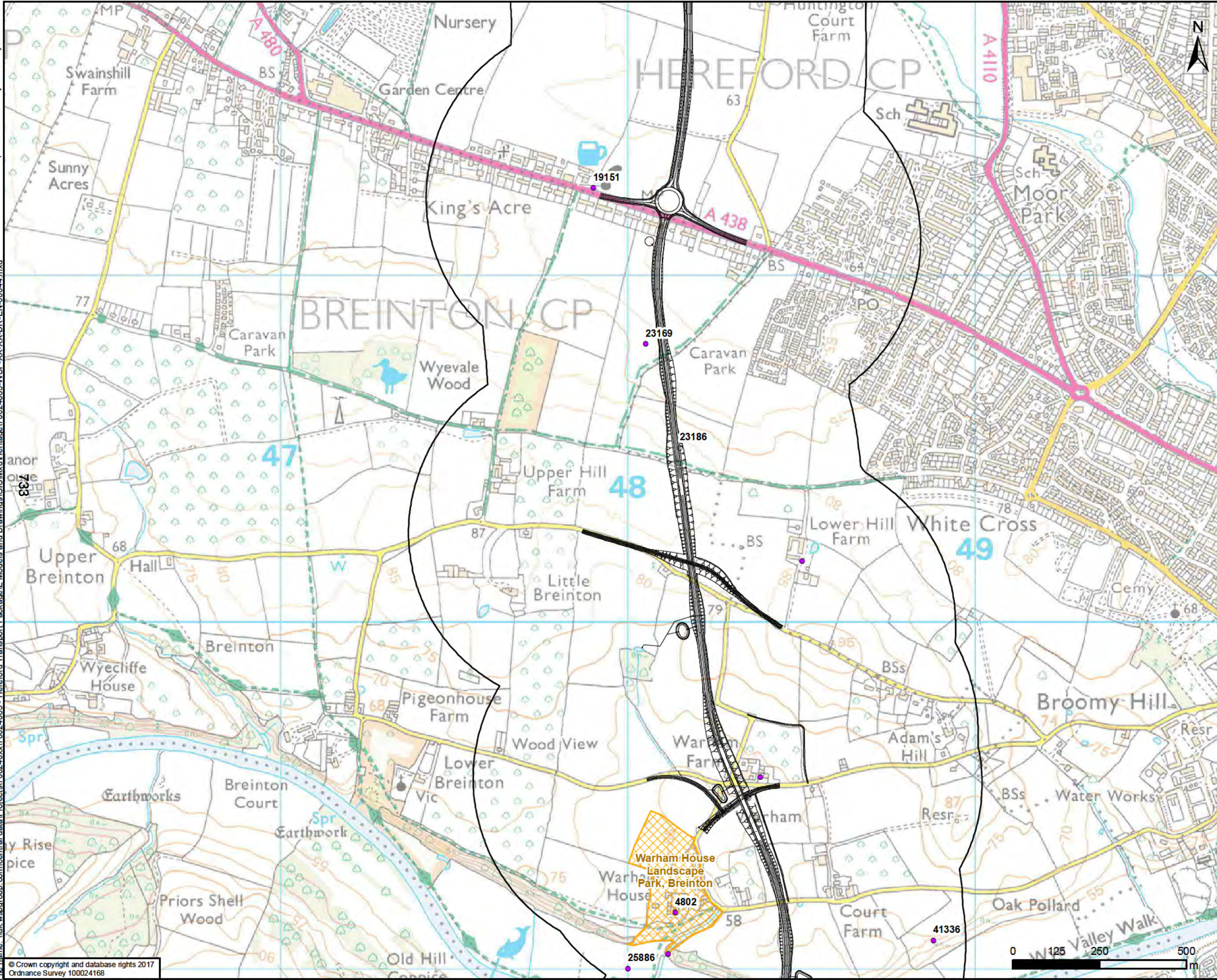
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FIGURE 8-10
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - YELLOW
PAGE 1 OF 4

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Proposed Option - Yellow

500m Study Area

HER assets

Landscape parks

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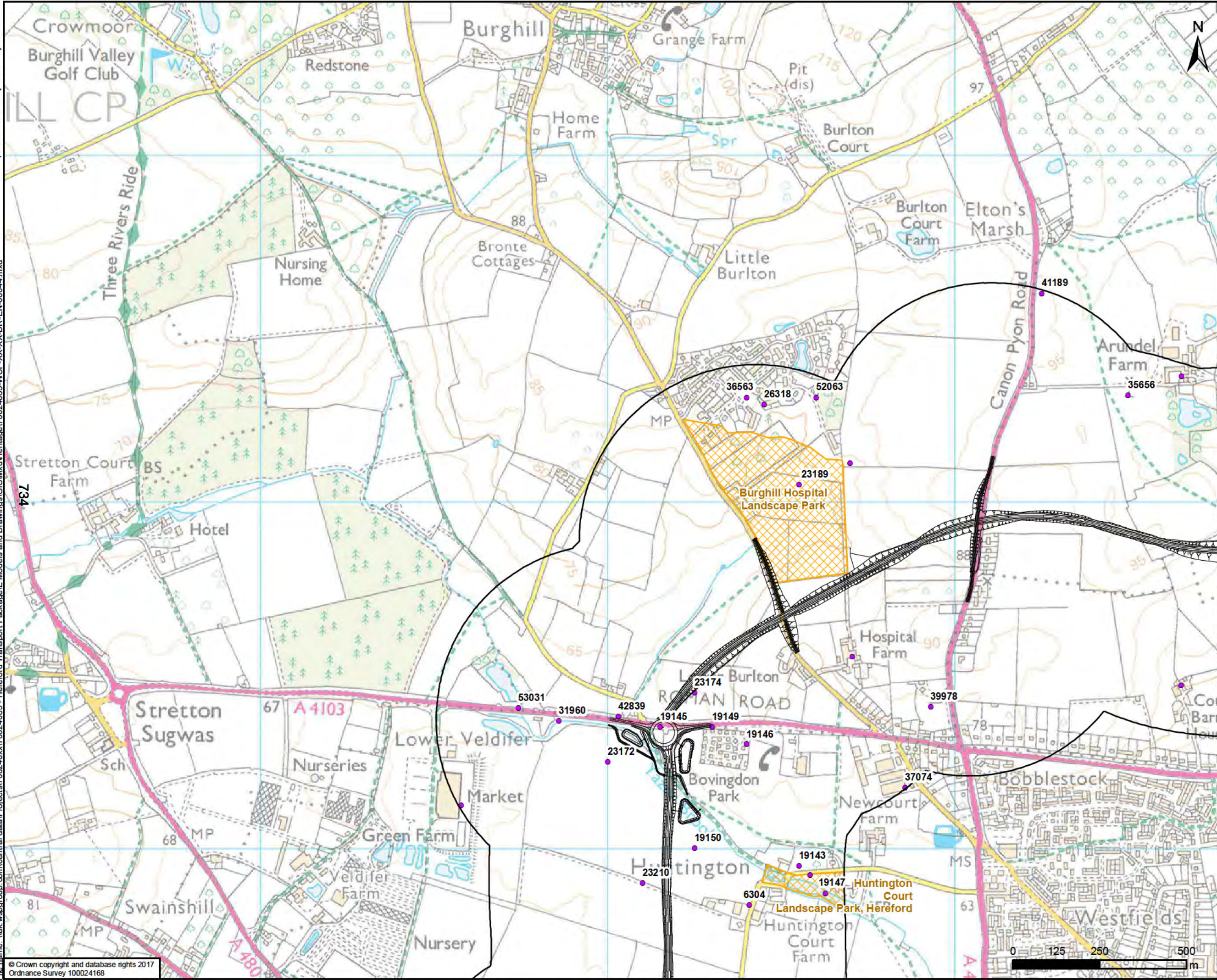
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NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - YELLOW
PAGE 2 OF 4

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— Proposed Option - Yellow

500m Study Area

• HER assets

Landscape parks

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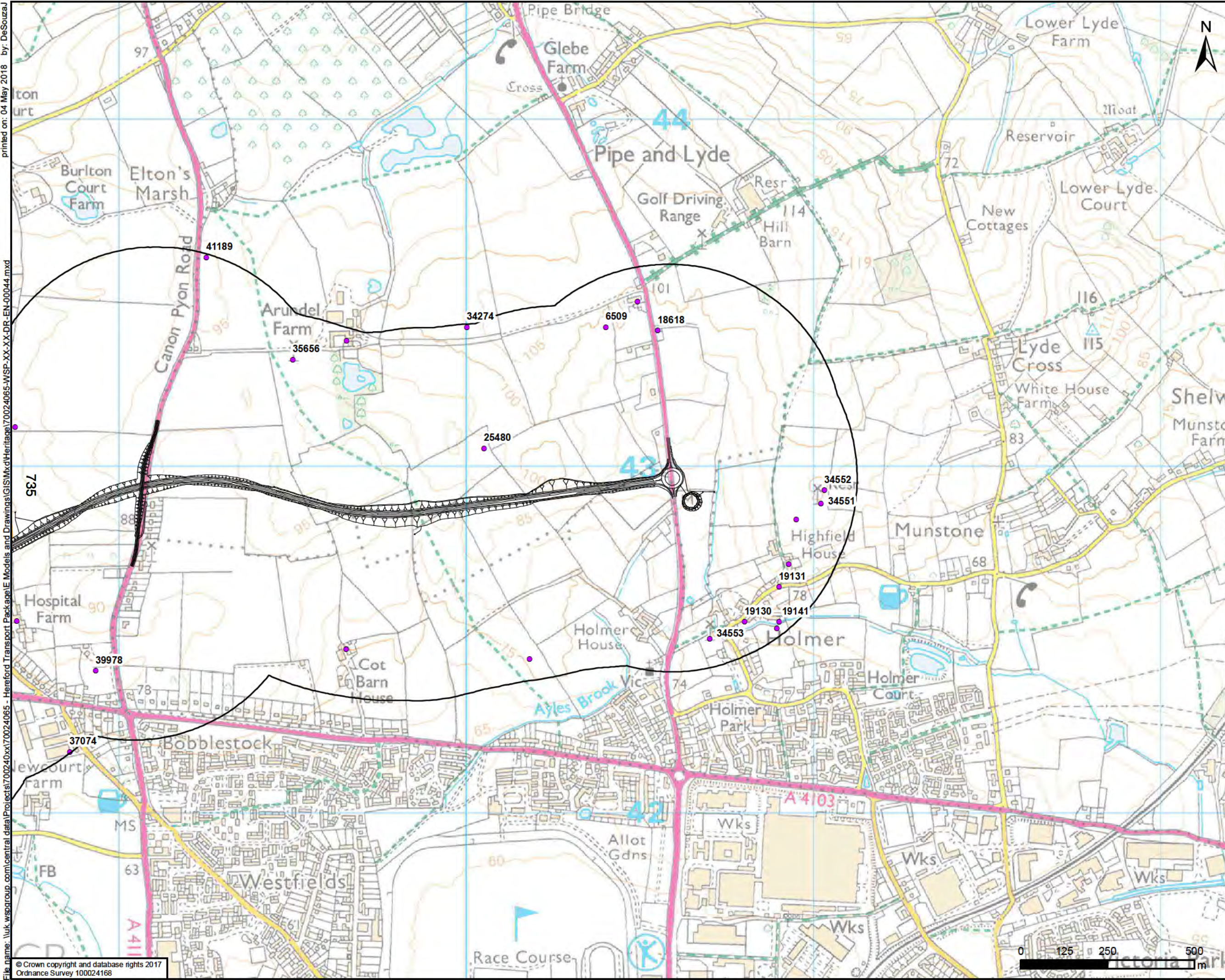
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FIGURE 8-10
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - YELLOW
PAGE 3 OF 4

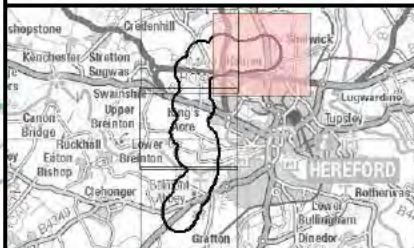
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- Proposed Option - Yellow
- 500m Study Area
- HER assets
- Landscape parks



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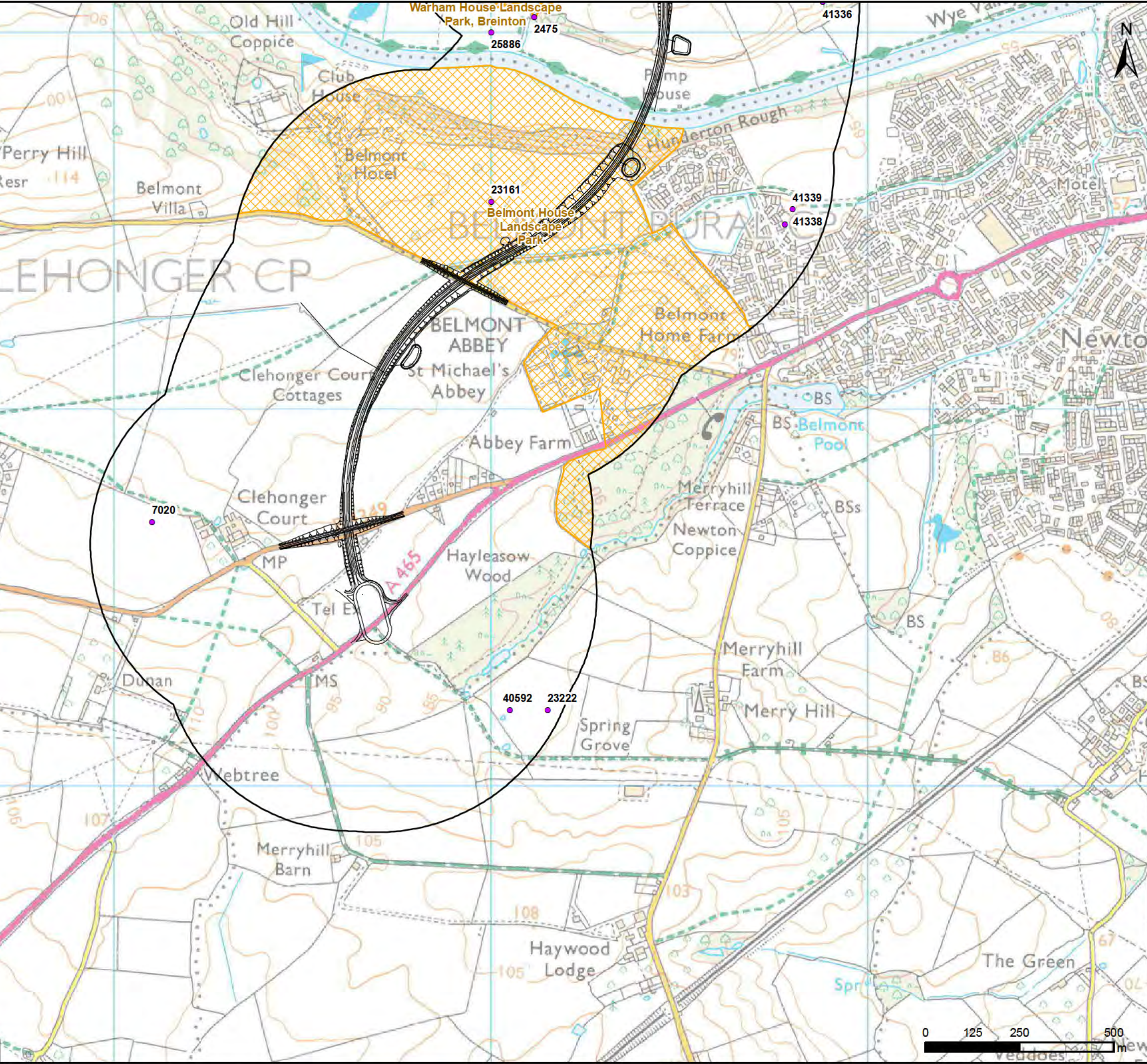
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FIGURE 8-10
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - YELLOW
PAGE 4 OF 4

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Proposed Option - Red

500m Study

HER assets

Landscape parks

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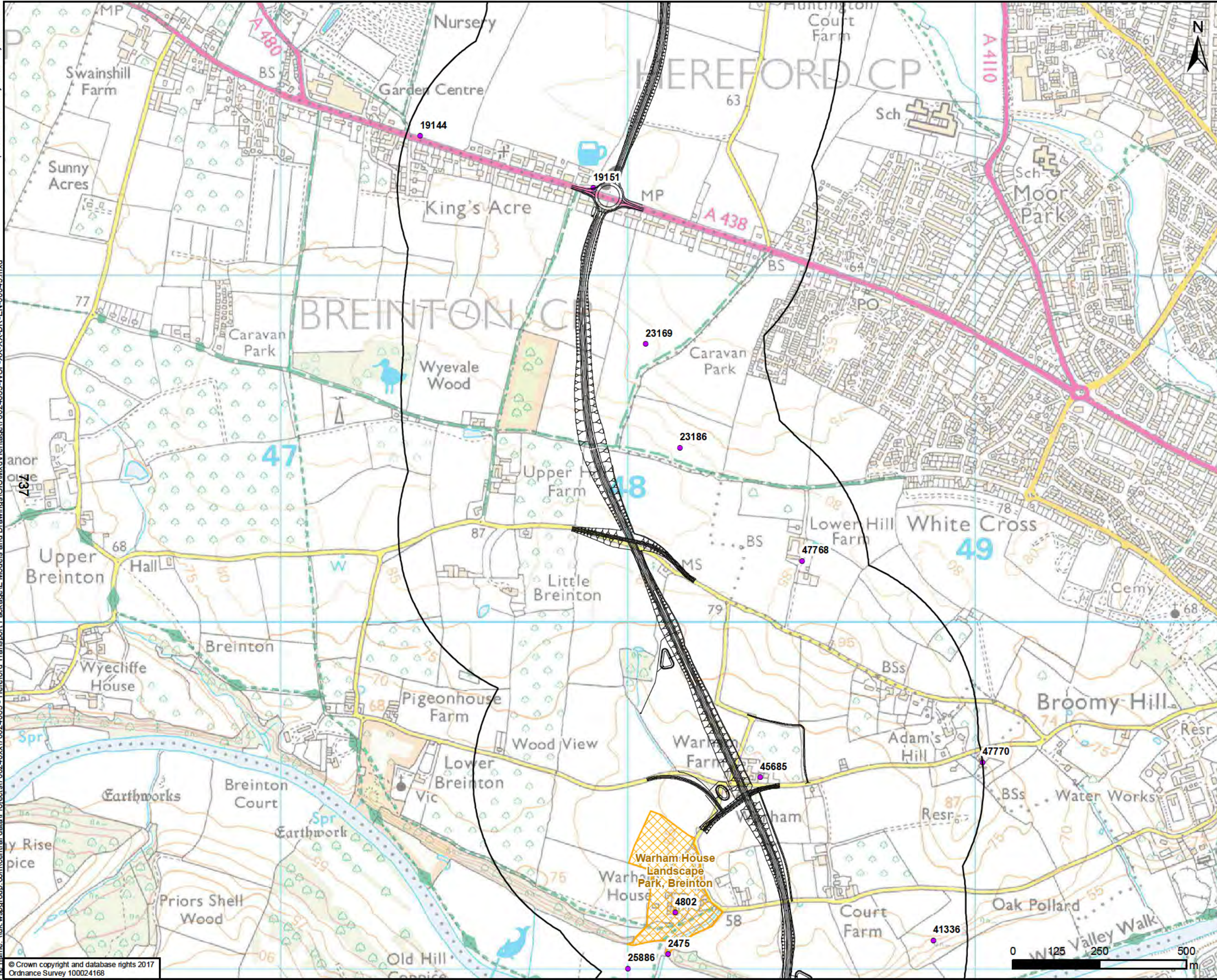
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FIGURE 8-11
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - RED
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Proposed Option - Red

500m Study

HER assets

Landscape parks

0 125 250 500m

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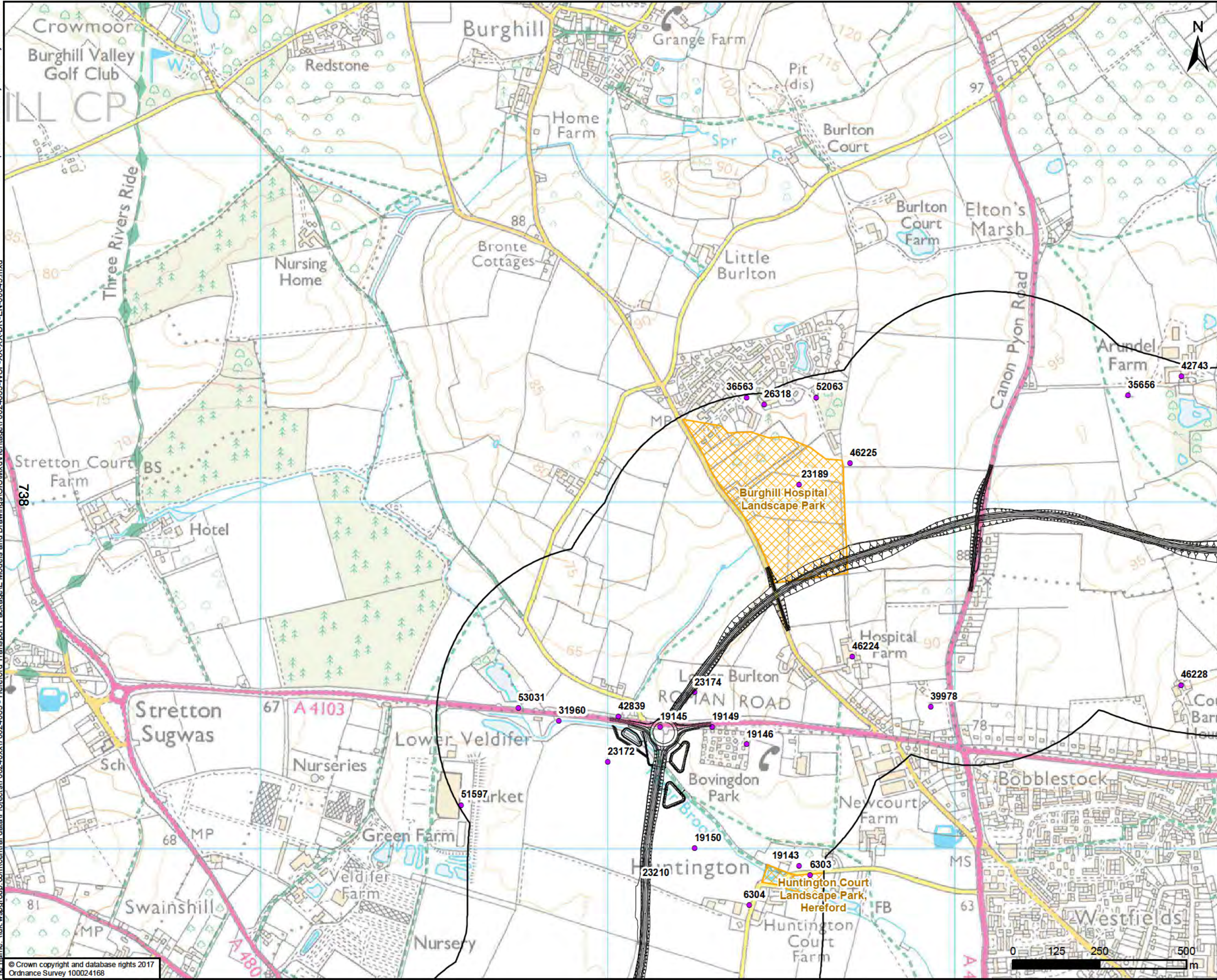
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FIGURE 8-11
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - RED
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500m Study

HER assets

Landscape parks

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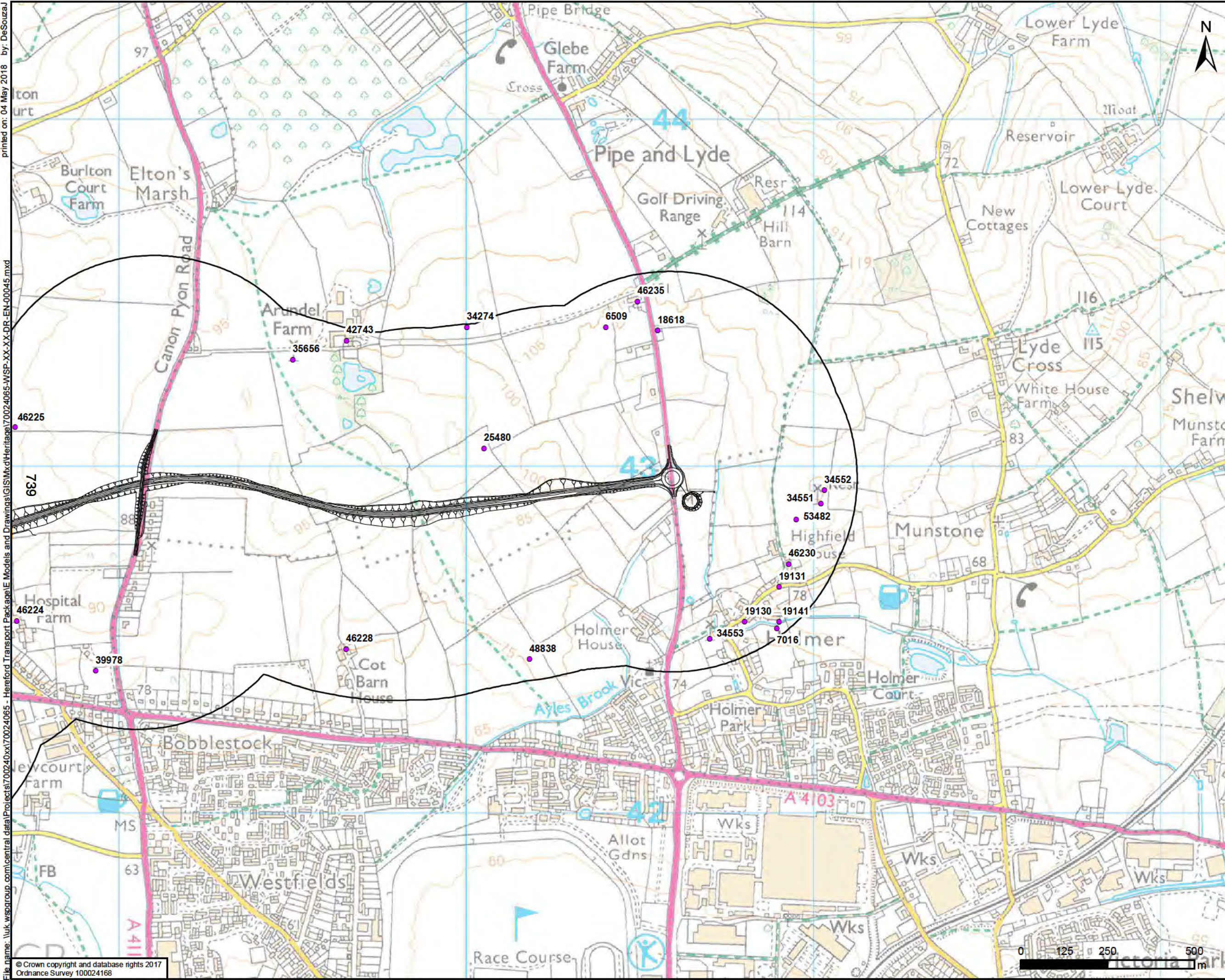
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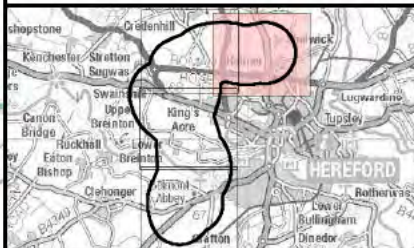
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FIGURE 8-11
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - RED
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SCALE @ A3 1:10,000	CHECKED AP	APPROVED MT
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- Proposed Option - Red
- 500m Study
- HER assets
- Landscape parks



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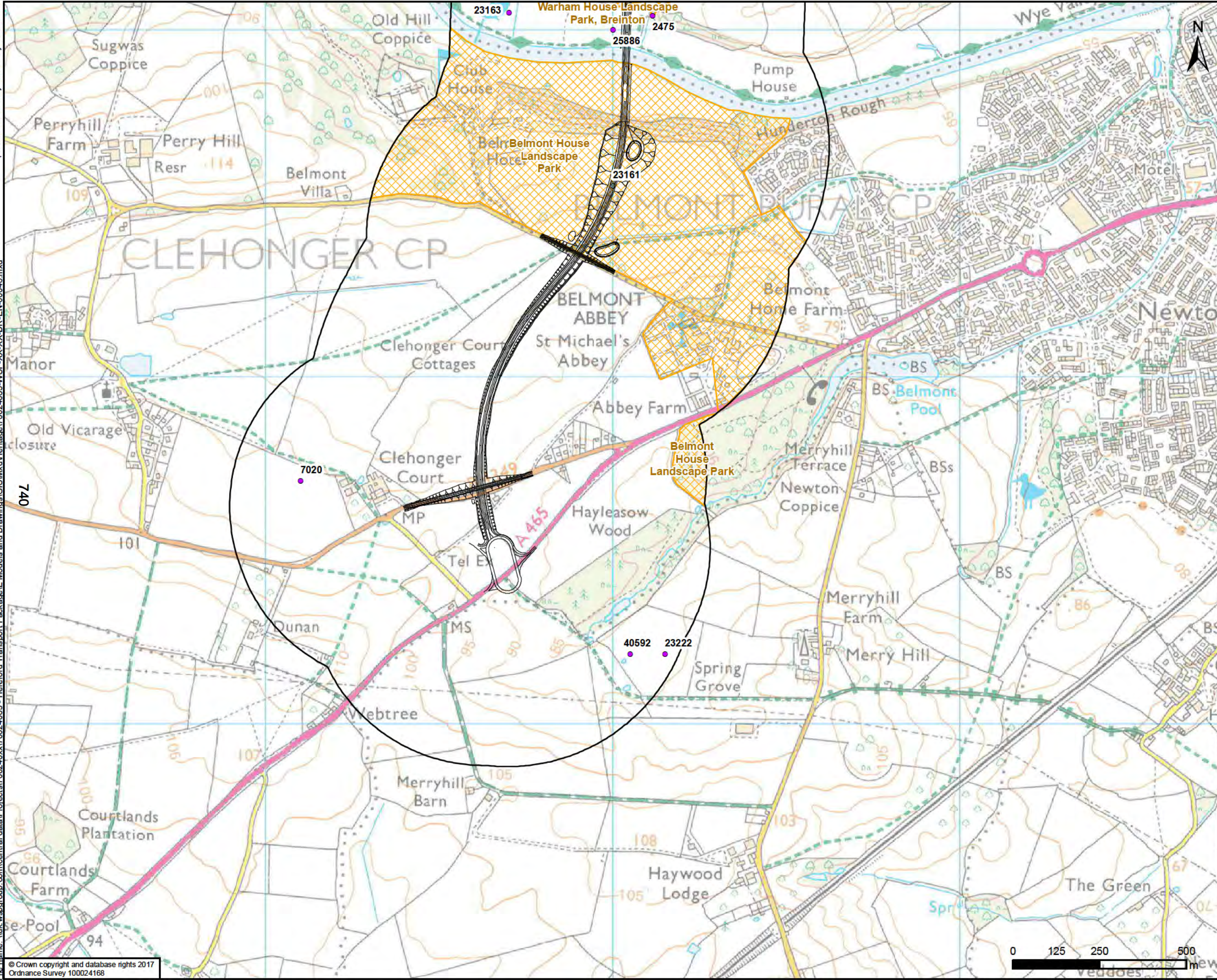
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FIGURE 8-11
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - RED
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Proposed Option - Olive

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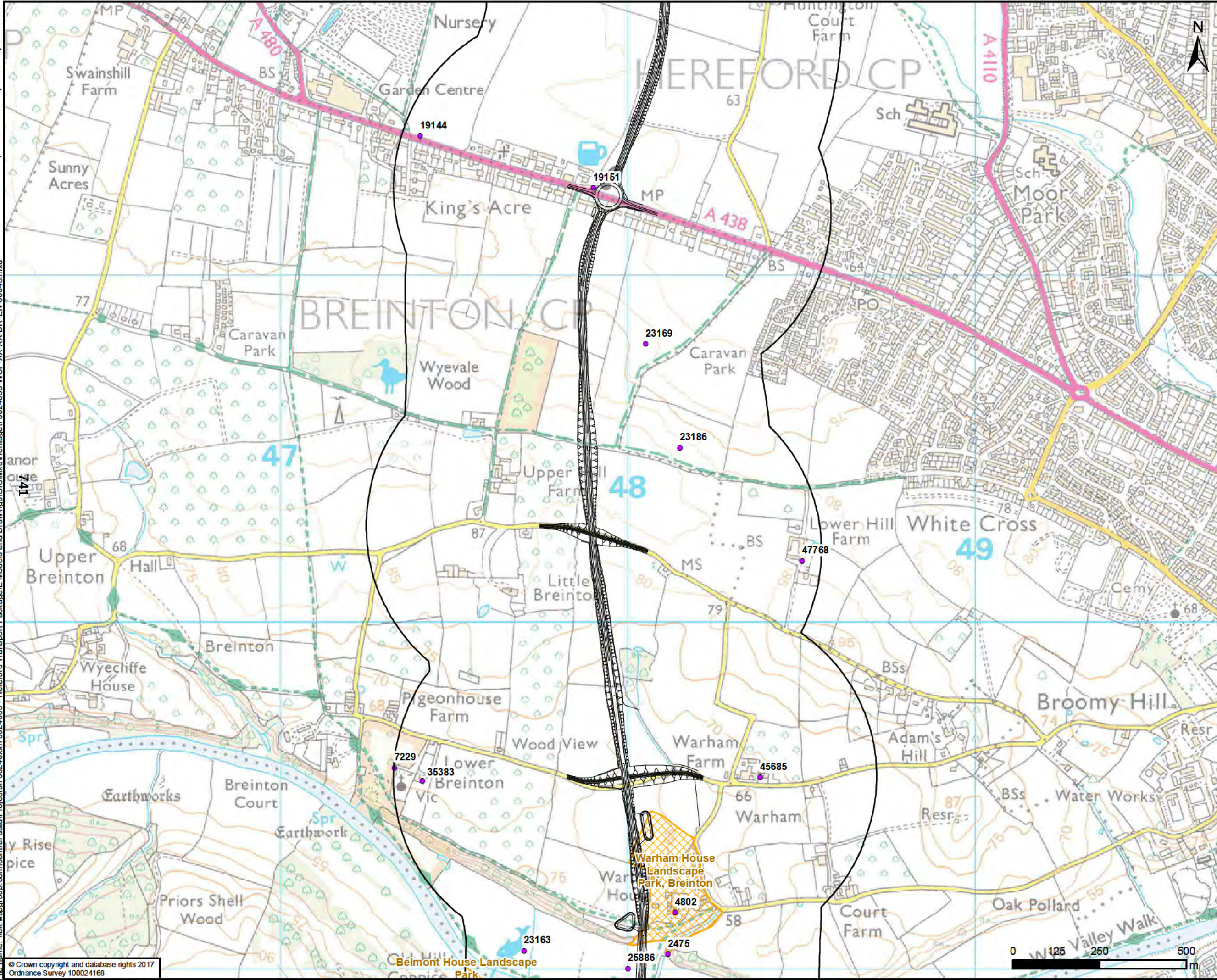
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FIGURE 8-12
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - OLIVE
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— Proposed Option - Olive

□ 500m Study Area

● HER assets

▨ Landscape parks

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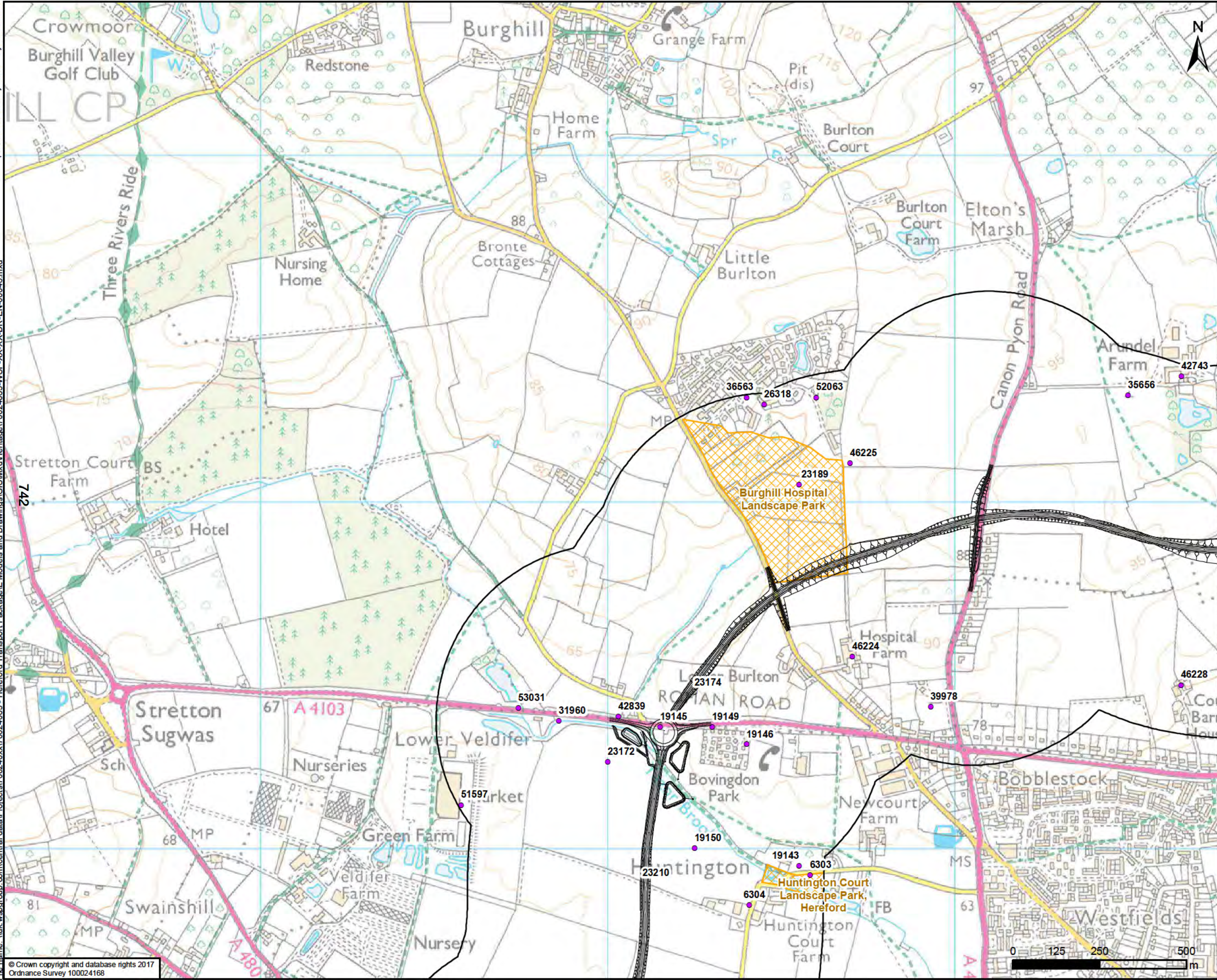
FIGURE 8-12
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - OLIVE
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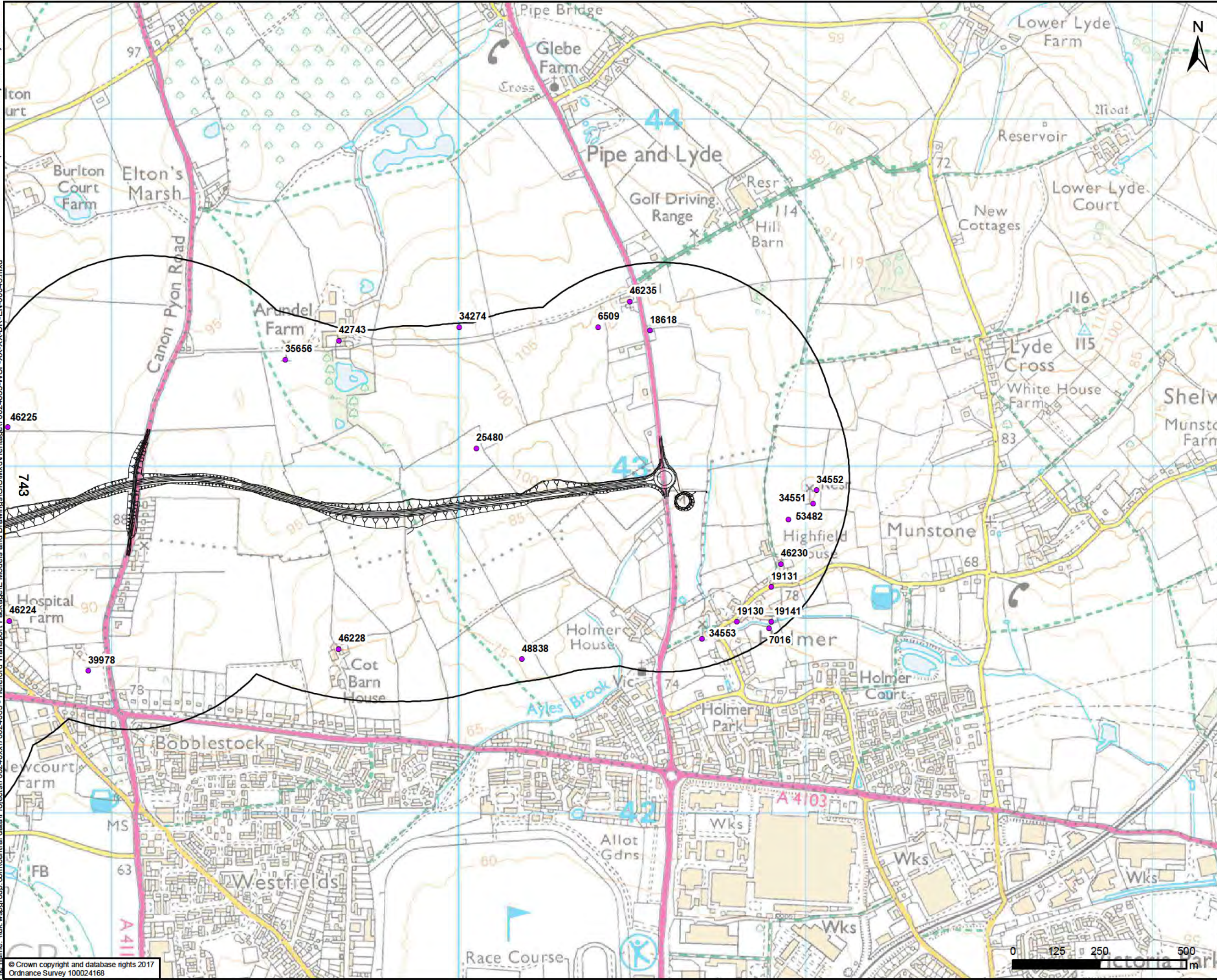
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FIGURE 8-12
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - OLIVE
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● HER assets

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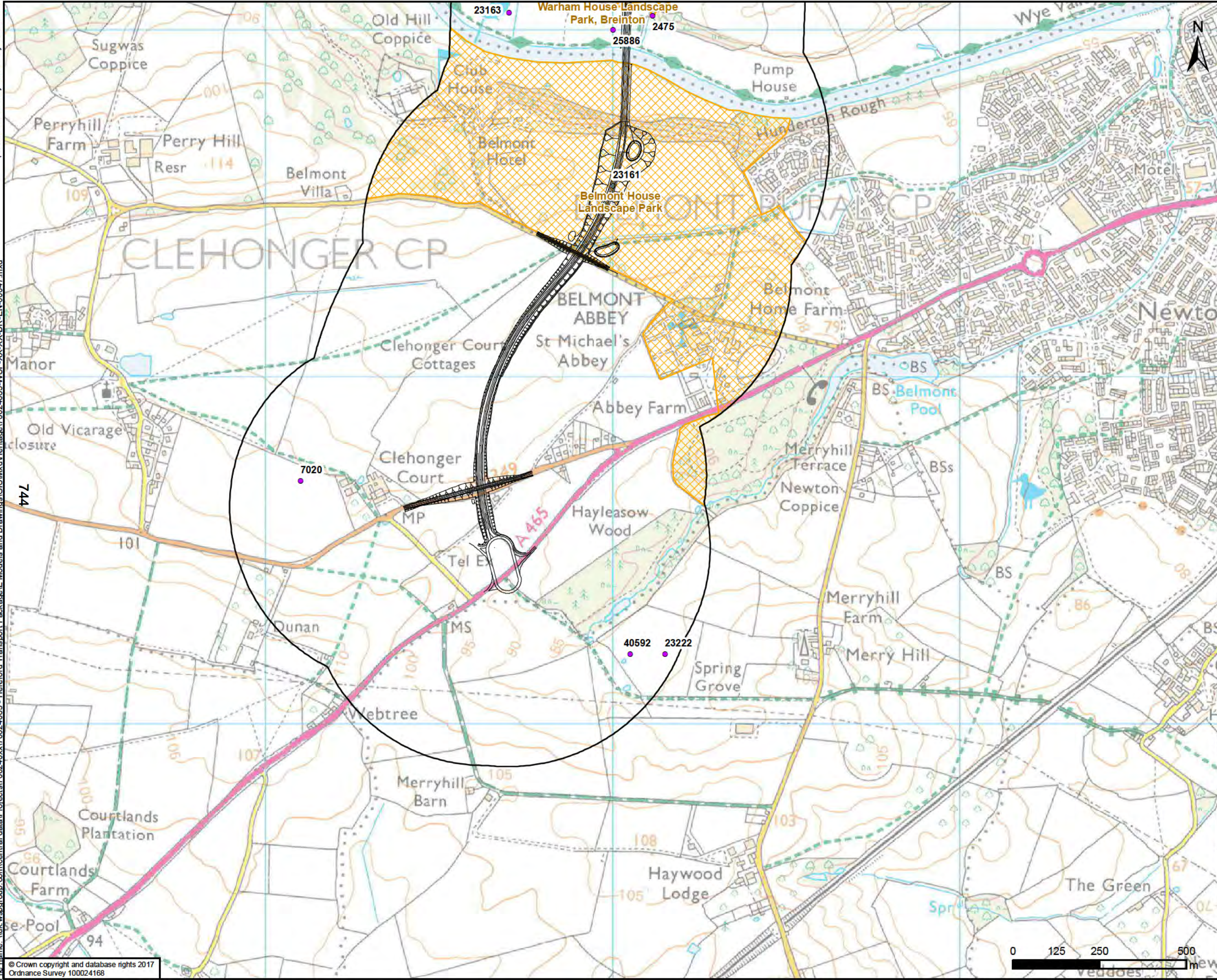
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FIGURE 8-12
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - OLIVE
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500m Study Area

HER assets

Landscape parks

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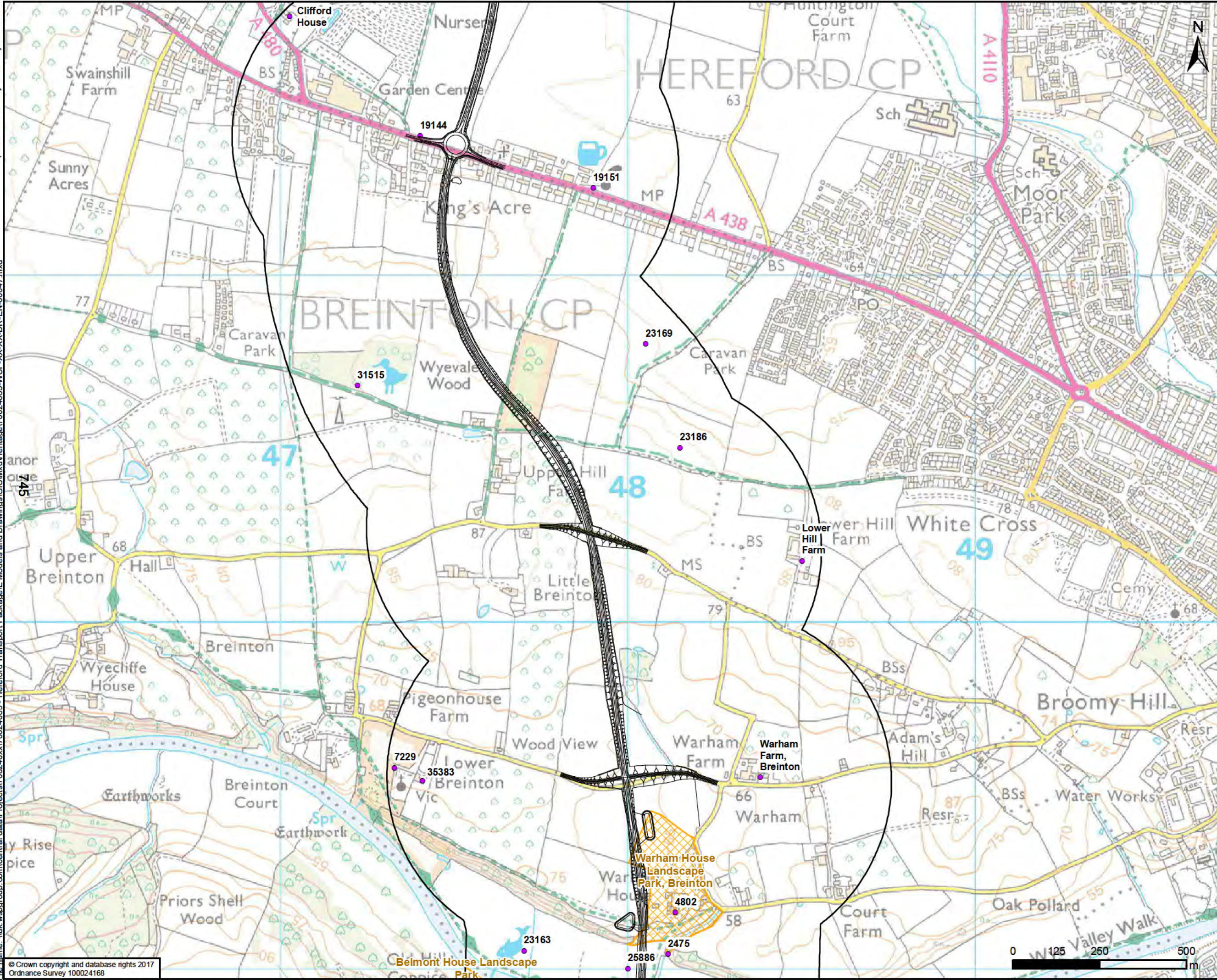
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NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - BLACK 1
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Proposed Option - Black 1

500m Study Area

HER assets

Landscape parks

0 125 250 500m

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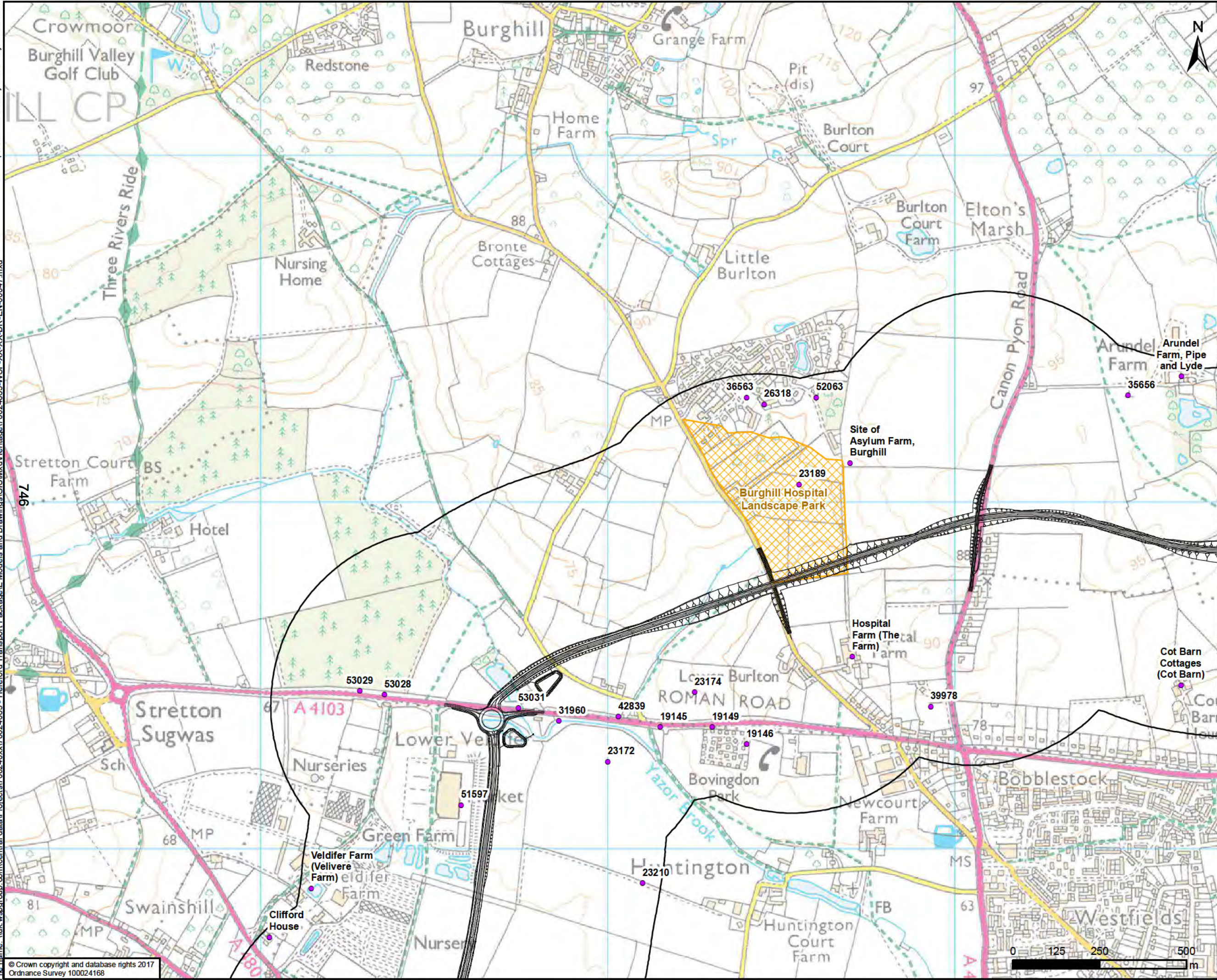
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NON-DESIGNATED HERITAGE ASSETS
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500m Study Area

HER assets

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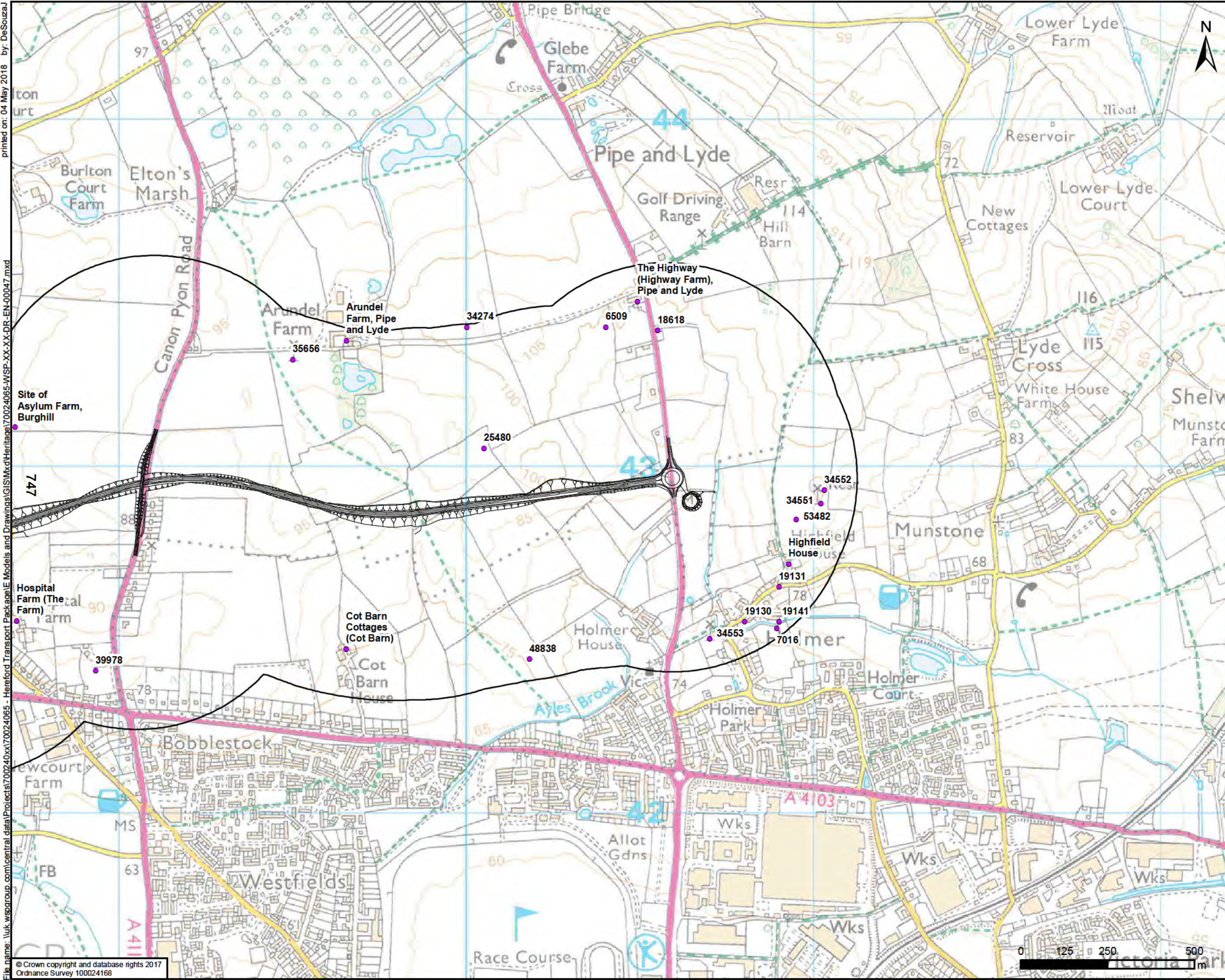
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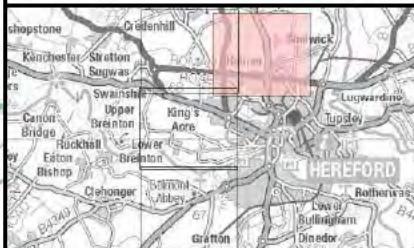
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NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - BLACK 1
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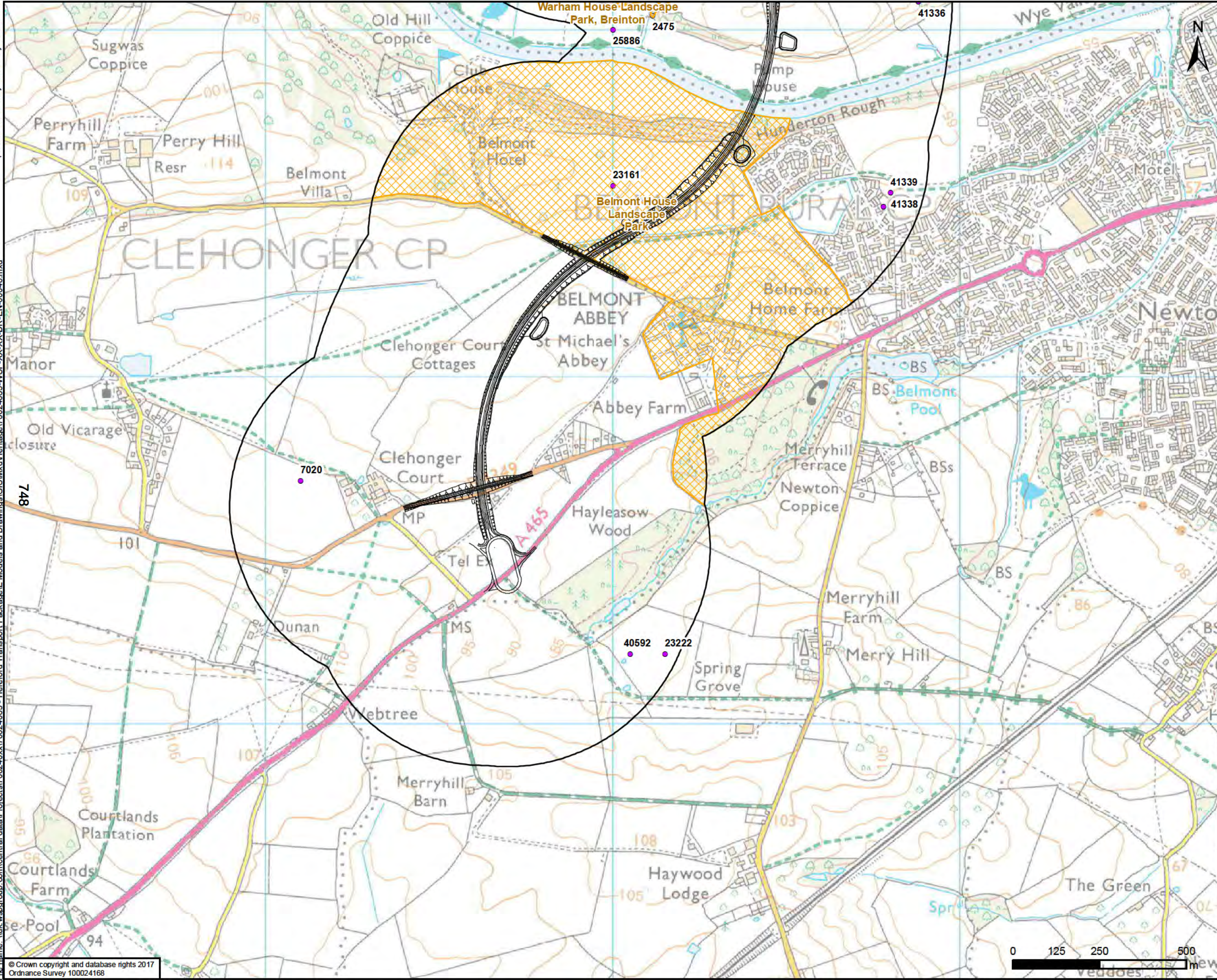
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TITLE FIGURE 8-13 NON-DESIGNATED HERITAGE ASSETS WITHIN 500m & PROPOSED ROUTE - BLACK 1 PAGE 4 OF 4			
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500m Study

HER assets

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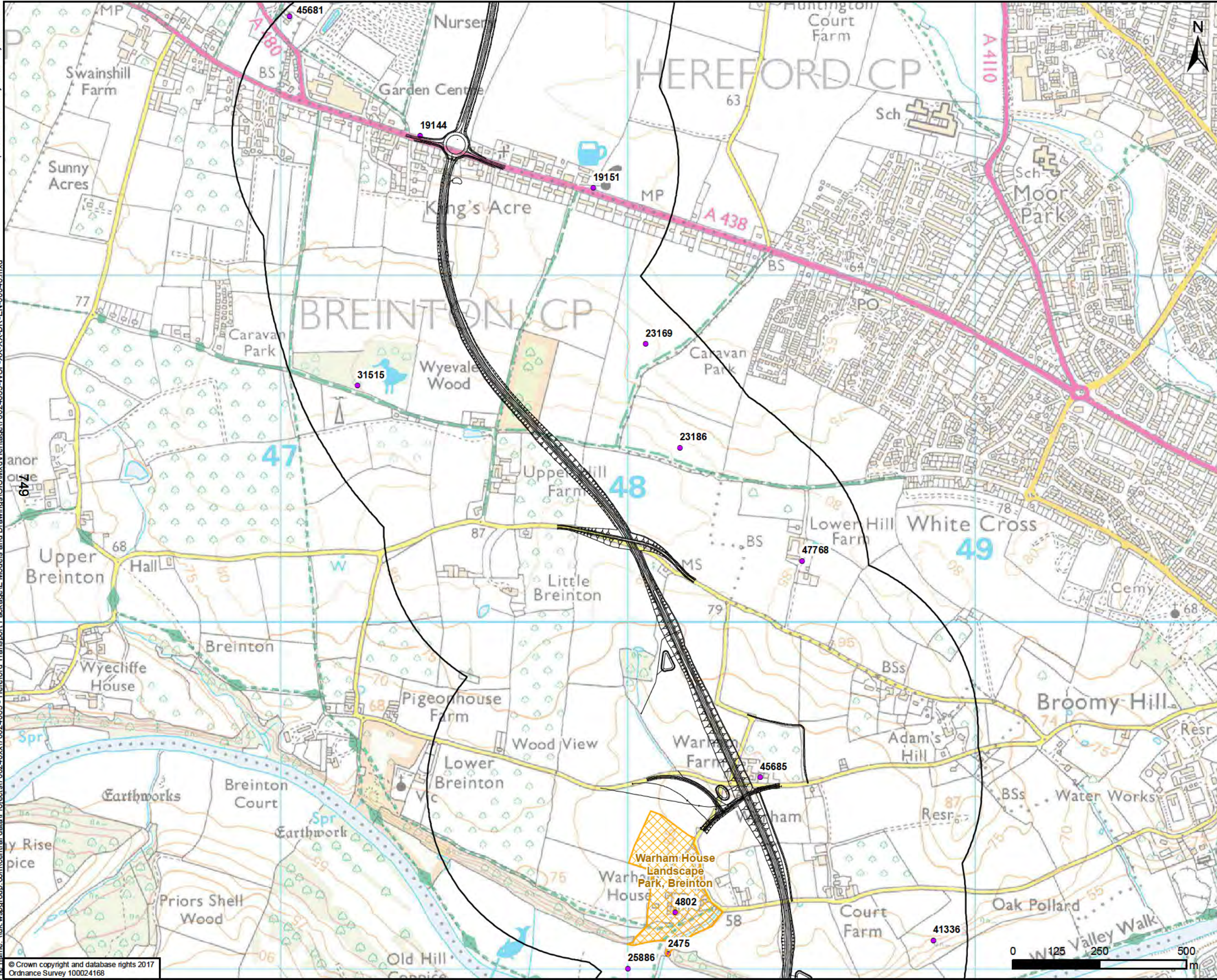
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FIGURE 8-14
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - BLACK 2
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Proposed Option - Black 2

500m Study

HER assets

Landscape parks

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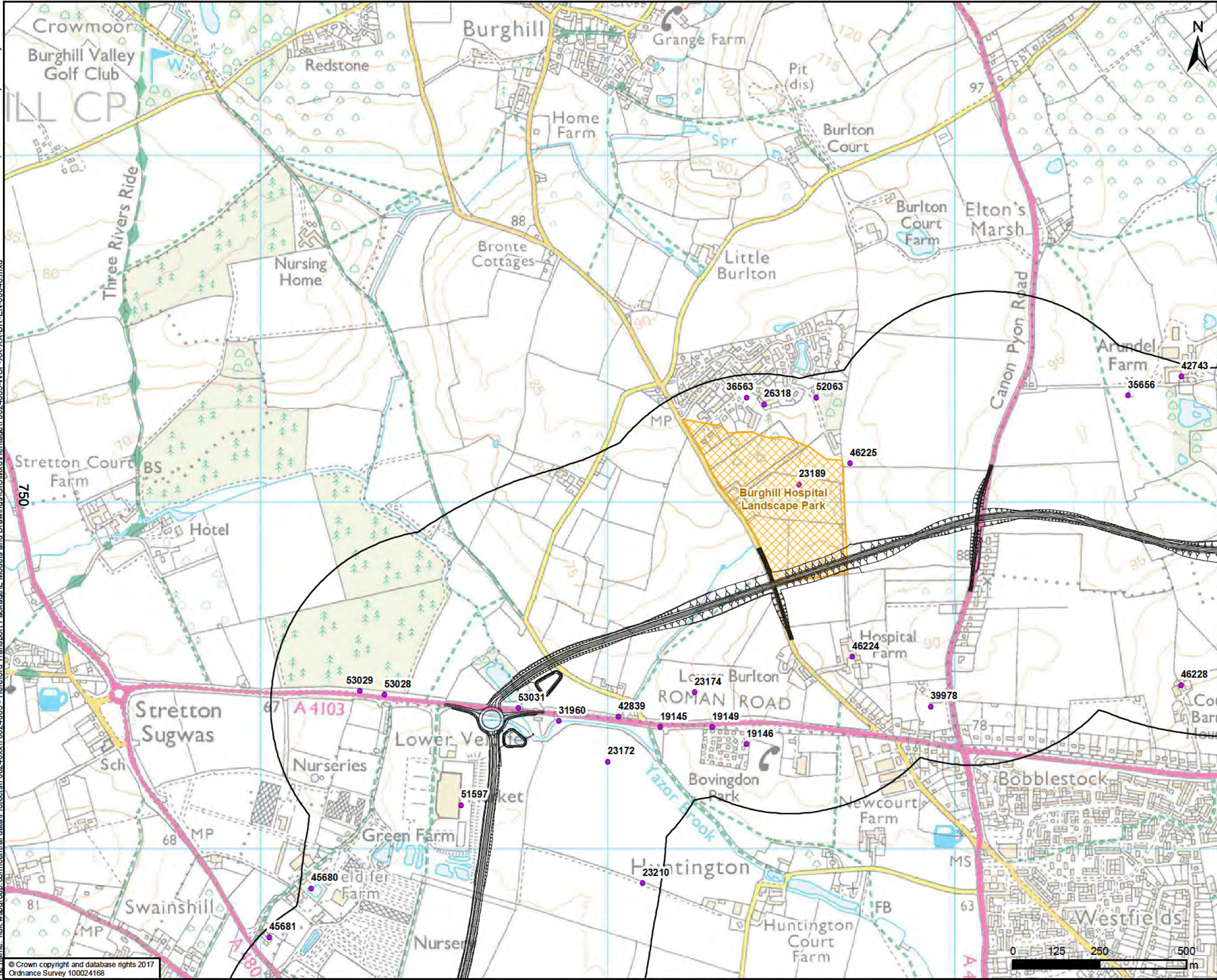
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NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - BLACK 2
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Proposed Option - Black 2

500m Study

HER assets

Landscape parks

0 125 250 500 m

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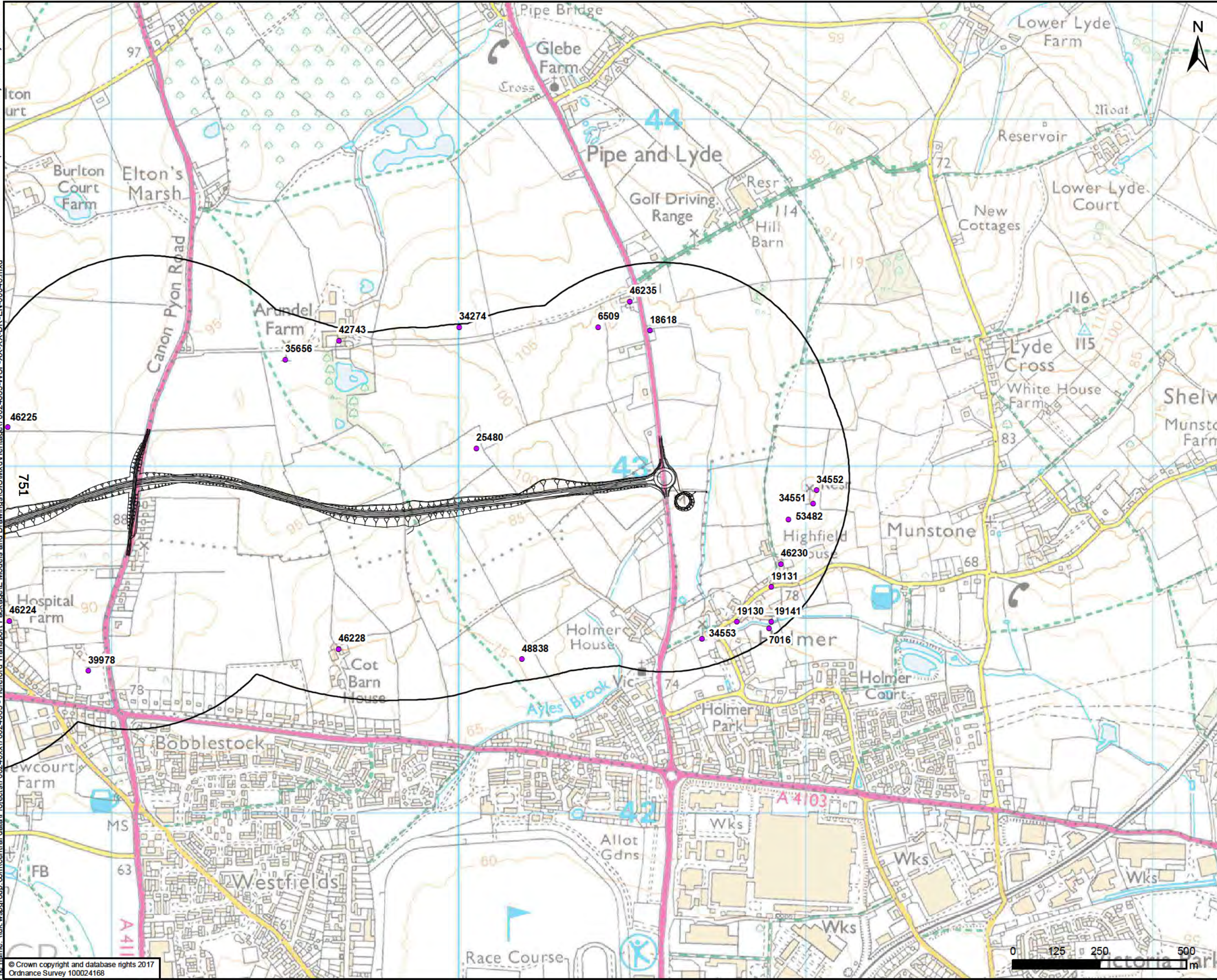
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FIGURE 8-14
NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - BLACK 2
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HER assets

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NON-DESIGNATED HERITAGE ASSETS
WITHIN 500m & PROPOSED ROUTE - BLACK 2
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Appendix 8-2

CULTURAL HERITAGE BASELINE CONDITIONS

APPENDIX 8-2

CULTURAL HERITAGE BASELINE CONDITIONS

Table 1-1: Element 1 (all options): Scheduled Monuments within the 1km Wider Study Area and Outside of the Scheme Footprint

NHLE Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
1001740	Moated site SW of the church	Unknown	Outside

Table 1-2: Element 1 (all options): Grade II* Listed Buildings within the 1km Wider Study Area and Outside of the Scheme Footprint

NHLE Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
1099699	Abbey Church of St. Michael and All Angels	Industrial Period	Outside
1167079	Belmont House	Industrial Period	Outside

Table 1-3: Element 1 (all options): Grade II Listed Buildings within the 1km Wider Study Area and Outside of the Scheme Footprint

NHLE Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
1167443	Merryhill Farmhouse	Industrial Period	Outside
1099674	Stables north-west of Merryhill Farmhouse	Industrial Period	Outside
1167452	Milestone at NGR SO 475373	Industrial Period	Outside
1301151	Granary north-east of Clehonger Court	Industrial Period	Outside
1099698	Barn north of Clehonger Court	Post-medieval	Outside
1348796	School, Chapel of St. Peter and St. Paul and house south of monastery buildings of the Benedictine Abbey of St. Michael and All Angels	Industrial Period	Outside
1167050	Monastery buildings of Benedictine Abbey of St. Michael and All Angels	Industrial Period	Outside
1099700	Statue at west front of the Abbey Church of St. Michael and All Angels	Industrial Period	Outside
1099701	Stables about north-east of Belmont Home Farmhouse	Industrial Period	Outside
1166999	Gates and gate piers about 27 metres east of the Abbey Church of St. Michael and All Angels	Industrial Period	Outside
1411804	The lych gate, curved walls and piers to the north of the graveyard of St Michael and All Angels Abbey Church, Belmont	Industrial Period	Outside

NHLE Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
1167068	Almhouses and Chapel	Industrial Period	Outside
1099702	Stone and plaque north-west of Belmont House	Industrial Period	Outside
1411713	Walled garden north-west of Belmont House	Industrial Period	Outside
1099317	Warham Court	Multi-Period	Outside
1099316	Defaced pedestal tomb south of Church of St. Michael	Industrial Period	Outside
1296681	Pritchard memorial south of nave of Church of St. Michael	Industrial Period	Outside
1296675	Church of St Michael	Late Medieval	Outside
1099315	Breinton House	Industrial Period	Outside
1349004	Two adjoining barns north-west of Church of St. Michael	Multi-Period	Outside

Table 1-4: Element 1 (all options): Conservation Areas within the 1km Study Area

Ref Number	Name	Historical Period	Inside or Outside the Scheme Area
N/A	Broomy Hill Conservation Area	Multi-period	Outside

Table 1-5: Element 1 (all options): Unregistered Parks and Gardens within the 500m Inner Study Area

HER Ref Number	Name	Inside or Outside the Scheme Footprint
31136	Belmont House Landscape Park	Inside
34057	Breinton Court and Landscape Park, Breinton	Outside
34070	Warham House Landscape Park, Breinton	Inside
23044	Breinton House and Landscape Park, Breinton	Outside
25453	Merry Hill, Landscape Park	Outside

Table 1-6: Element 1 (all options): Non-Designated Assets within the 500m Inner Study Area

HER Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
4802	Warham House, Warham, Breinton	Post-medieval	Outside
7020	Cropmarks of linear features, west of Clehonger Court, Clehonger	Date Unknown	Outside
23161	Field surveyed for Hereford Bypass, Clehonger	Date Unknown	Inside
23222	Quarry, Field surveyed for Hereford Bypass, Haywood	Date Unknown	Outside
25886	Warham medieval settlement, Breinton	Late Medieval	Outside

41336	Former Gravel Pit, Southeast of Warham Court Farm, Breinton	Post-medieval	Outside
41338	Gravel Pit on first edition OS map	Post-medieval	Outside
41339	Gravel Pit on first edition OS map	Post-medieval	Outside
40592	Quarry	Post-medieval	Outside
2475	Site of ponds, south of Warham House, Breinton	Date Unknown	Outside
45685	Warham Farm, Breinton	Post-medieval	Outside
47770	Arncroft (Adam's Hill)	Post-medieval	Outside
23163	Brick Kiln Meadow, Breinton	Date Unknown	Outside
7229	Possible Deserted Medieval Village, north-west of St Michaels Church, Breinton	Late Medieval	Outside
35383	Breinton Grange (Former Vicarage), Breinton	Post-medieval	Outside

Table 1-7: Element 2 (all options): Grade II Listed Buildings within the 1km Wider Study Area and Outside of the Scheme Footprint

NHLE Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
1349018	Bridge south-east of Stretton Court	Late Medieval	Outside
1099278	Barn approximately 10m west of Little Burlton Farmhouse	Post-medieval	Outside
1296573	Triangular-shaped pedestal tomb approximately 10m east of Church of St. Bartholomew	Industrial Period	Outside
1393549	Farmhouse, attached barn and threshing barn to the south at Upper Hill Farm	Post-medieval	Outside
1297409	Huntington Court Farm and attached granary	Multi-period	Outside
1196847	Church of St. Mary Magdalene	Post-medieval	Outside
1024992	Huntington court	Post-medieval	Outside
1298843	Huntington Court Farm and attached granary	Multi-period	Outside

Table 1-8: Element 2 (all options): Conservation Areas within the 1km Study Area

Ref Number	Name	Historical Period	Inside or Outside the Scheme Area
N/A	Huntington Conservation Area	Multi-period	Outside

Table 1-9: Element 2 (all options): Non-Designated Landscape Parks and Gardens within the 500m Inner Study Area

NHLE HER Ref Number	Name	Inside or Outside the Scheme Footprint
31698	Burghill Hospital Landscape Park	Inside
31173	Huntington Court Landscape Park, Hereford	Outside

Table 1-10: Element 2 (all options): Non-Designated Assets within the 500m Inner Study Area

HER Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
6304	Possible Mill Site, West of Huntington Court Farm, Huntington	Late-medieval	Outside
19143	Buildings (site), NW of Huntington Court, Hereford	Post-medieval	Outside
19144	House (site), Kings Acre, Hereford	Post-medieval	Outside
19145	Cottage (site), NW of Bovingdon, Hereford	Post-medieval	Inside
19146	Cottage (site), north of Bovingdon, Hereford	Post-medieval	Outside
19149	Cottage (site), NW of Bovingdon, Hereford	Post-medieval	Inside
19150	House (site), NW of Huntington, Hereford	Post-medieval	Outside
19151	House (site), Kings Acre, Hereford	Post-medieval	Inside
23169	Cropmark of possible track or field boundary, Breinton	Date Unknown	Inside
23172	Possible Cropmark Site, Breinton	Date Unknown	Outside
23174	Possible Lynchet, Burghill	Date Unknown	Inside
23186	Site of Boundary Stones, Northwest of Lower Hill Farm, Hereford	Date Unknown	Outside Inside
23189	Possible Site of Mill, North of Hospital Farm, Burghill	Date Unknown	Outside
23210	Ridge and Furrow, Breinton	Date Unknown	Inside
26318	St Marys Hospital, Burghill	Industrial Period	Outside
39978	Quarry, Southeast of Hospital Farm, Burghill	Post-medieval	Outside
31960	Sluice Gates, The Bolts, Huntington	Industrial Period	Inside

HER Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
36563	Chapel of the County and City Lunatic Asylum	Post-medieval	Outside
42839	Linear feature, Huntington Meadow	Prehistoric	Inside
52063	Site of WWII Aircraft Crash (B-24, 42-95238), Former St Mary's Hospital Site, Burghill	Modern Period	Outside
53031	Trackway, West of the Yazor Brook, Roman Road, Hereford	Date Unknown	Outside
6303	Huntington Medieval Village, Huntington, Hereford	Early Medieval	Outside
51597	Linear Features, Field Immediately East of Lower Veldifer, Roman Road, Hereford	Prehistoric	Outside
46224	Hospital Farm (The Farm)	Post-medieval	Outside
46225	Site of Asylum Farm, Burghill	Post-medieval	Outside
47768	Lower Hill Farm	Post-medieval	Outside
31515	Boundary Stone, Green Lane Wood Nature Reserve	Post-medieval	Outside
45681	Clifford House	Post-medieval	Outside
45680	Veldifer Farm (Velivere Farm)	Post-medieval	Outside
53029	Drainage Features, North of Roman Road, Lower Veldifer, Stretton Sugwas	Romano-British	Outside
53028	Possible Quarry, North of Roman Road, Lower Veldifer, Stretton Sugwas	Romano-British	Outside
19147	Pond, South of Huntington Court, Hereford	Post-medieval	Outside
37074	Site of Preserve Factory, North of Newcourt Farm, Huntington	Post-medieval	Outside
47776	Newcourt Farm, Hereford	Post-medieval	Outside

Table 1-11: Element 3 (all options): Scheduled Monuments within the 1km Wider Study Area and Outside of the Scheme Footprint

NHLE Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
1016345	Churchyard cross in St Bartholomew's churchyard	Late Medieval	Outside

Table 1-12: Element 3 (all options): Grade I Listed Buildings within the 1km Wider Study Area and Outside of the Scheme Footprint

NHLE Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
1099290	Church of St Bartholomew	Late Medieval/Industrial Period	Outside

Table 1-13: Element 3 (all options): Grade II Listed Buildings within the 1km Wider Study Area and Outside of the Scheme Footprint

NHLE Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
1385469	Summer House at Holmer Park	Post-medieval/Industrial Period	Outside
1099291	Churchyard Cross south of Church of St Bartholomew	Late Medieval/Industrial Period	Outside
1168081	Detached bell tower south of Church of St Bartholomew	Late Medieval	Outside
1296573	Triangular-shaped pedestal tomb east of Church of St. Bartholomew	Industrial Period	Outside
1099292	Copelands House	Late Medieval/Industrial Period	Outside
1296577	Holmer House	Multi-period	Outside

Table 1-14: Element 3 (all options): Non-Designated Landscape Parks and Gardens within the Inner 500m Study Area

HER Ref Number	Name	Inside or Outside the Scheme Footprint
31171	Holmer Park Landscape Park	Outside

Table 1-15: Element 3 (all options): Non-Designated Assets within the Inner 500m Study Area

HER Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
6509	Cross Base, Highway Farm, Pipe & Lyde	Late Medieval	Outside
18618	House (site), south of The Highway, Pipe & Lyde	Post-medieval	Outside
19130	Butts House (site), SW of Highfield House, Holmer	Post-medieval	Outside
19131	Houses (site), S of Highfield House, Holmer	Post-medieval	Outside

HER Ref Number	Name	Archaeological / Historical Period	Inside or Outside the Scheme Footprint
19141	Cottage (site), SW of Highfield House, Holmer	Post-medieval	Outside
25480	Possible Site of Coal Pit, Pipe and Lyde	Post-medieval	Outside
34274	Oval Enclosure, East of Arundel Farm, Pipe and Lyde	Date Unknown	Outside
34551	Highfield House, Wind pump	Modern	Outside
34552	Highfield House, covered reservoir	Modern	Outside
34553	Wind Pump, Holmer	Modern	Outside
35656	Wind Pump, Pipe and Lyde	Post-medieval	Outside
7016	DMV, East of the A49, Holmer	Late Medieval	Outside
48838	Occupation Site, south-west of Holmer House, Holmer	Date Unknown	Outside
53482	Cropmark double ditched enclosure Highfield House, Holmer and Shelwick	Prehistoric/Romano-British	Outside
42743	Arundel Farm, Pipe and Lyde	Post-medieval	Outside
46228	Cot Barn Cottages (Cot Barn)	Post-medieval	Outside
46230	Highfield House	Post-medieval	Outside
46235	The Highway (Highway Farm), Pipe and Lyde	Post-medieval	Outside
41189	Gravel Pit, Pipe and Lyde	Post-medieval	Outside

Appendix 10-1

FLOOD RISK ANALYSIS TECHNICAL NOTE



Herefordshire Council

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Flood Risk Analysis Technical Note





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Flood Risk Analysis Technical Note

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

**PROJECT NO. 70024065
OUR REF. NO. 70024065**

DATE: MAY 2018

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Checked by	Joanna Goodwin			
Signature				
Authorised by	Clare Postlethwaite			
Signature				
Project number	70024065			
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FLOOD RISK ANALYSIS TECHNICAL NOTE

INTRODUCTION

This technical note provides a high-level summary of the likely implications of the proposed Scheme options on flood risk associated with the proposed crossing of the Yazor Brook, and the likely mitigation measures that will be needed to be considered within the Scheme design to address these risks.

It should be noted that this is not a detailed assessment and is not appropriate for informing scheme design. The purpose of this analysis is to better understand the risks to inform the selection of the preferred route corridor. Detailed assessment will be required to inform the Flood Risk Assessment and design of mitigation measures to support the subsequent design and planning submission of the proposed Scheme.

The Technical Note supports the Water Environment Chapter of the Stage 2 Environmental Assessment Report (EAR).

ASSESSMENT METHODOLOGY

The assessment of potential effects of the Scheme options has used the existing Flood Modeller Pro - Tuflow 1D-2D hydraulic model of the Yazor Brook held by Herefordshire Council.

The Scheme options would cross the Yazor Brook in three distinct locations:

- Options 1 (Orange), 3 (Yellow), 4 (Red) and 5 (Olive): All cross the Yazor Brook to the east of the study area and to the south of Roman Road, approximately 400m downstream of where the Yazor Brook flows beneath Roman Road.
- Option 2 (Cyan): Located immediately to the east of The Bolts and crosses the Yazor Brook approximately 90m downstream of where the Yazor Brook flows beneath Roman Road.
- Options 6 (Black 1) and 7 (Black 2): Located to the west of the study area and both cross the Yazor Brook to the north of Roman Road, approximately 70m upstream of where the Yazor Brook flows beneath Roman Road.

Due to the comparable locations of several of the Options within these three groups it was decided to undertake hydraulic analysis of only three of the proposed Options to inform the Stage 2 assessment – namely Options 2 (Cyan), 5 (Olive) and 6 (Black 1) as illustrated in Figure 1. This was considered sufficient to undertake a high-level of analysis of potential effects to flood risk and the nature of mitigation that would be required to manage these identified effects, thus informing the Stage 2 assessment of the short listed Scheme options.



Figure 1 – Scheme options considered in the analysis of flood risk

The three Scheme options were modelled for the 1 in 100 annual probability event with a 35% allowance in peak river flow to accommodate for climate change. The soffit level of proposed channel structures along the Yazor Brook has been set by the design road levels with an allowance made for the thickness of the road deck, taken as 600mm above culvert soffits and 900mm above bridge soffits, depending the structure assessed. These soffit levels are summarised in Table 1.

Table 1 - Structure soffit levels

	Bypass Option 2 (Cyan) Culvert	Bypass Option 5 (Olive) Culvert	Bypass Option 5 (Olive) Bridge	Bypass Option 6 (Black 1) Bridge
Road design level (mAOD)	64.6	63.0	65.4	65.7
Structure soffit level (mAOD)	64.0	62.4	64.5	64.8

The choice of modelling a culvert or a bridge is dependent on the design as currently proposed by the highway design team, the likely suitability of each structure at the location of the Yazor Brook crossing, and the likely ability to realign the Yazor Brook to enable a bridge to be provided. In summary the following structures were assessed for the three Scheme options considered:

- Options 5 (Olive): Culvert and bridge options assessed.
- Option 2 (Cyan): Only culvert option assessed as bridge structure would not be viable without significant realignment of Yazor Brook.
- Options 6 (Black 1): Only bridge option assessed as this is already part of highway design to also span existing pond.

Proposed bridge spans have been set at 15m. Initial culvert sizes have been based on the estimated height to the culvert soffit and the approximate width of the Yazor Brook at the location of the crossing.

The following assumptions have been made to inform the hydraulic assessments:

Table 2 - Assessment assumptions

ASSUMPTION	JUSTIFICATION / IMPLICATIONS
Only the 1 in 100 + 35% climate change (CC) annual probability event has been considered.	Consideration will be given to the 1 in 100 + 70%CC annual probability event and the 1 in 1000 annual probability event during the detailed design of the Scheme as residual risk scenarios. However, for the purpose of informing the selection of the preferred route and the likely mitigation requirements it was decided to consider the normal 'design' scenario.
The Yazor Brook Flood Alleviation Scheme (FAS) would be in full operation for the duration of the tested storm.	Although consideration must be given to the failure of the FAS as a residual risk, for the purpose of informing the selection of the preferred route and the likely mitigation requirements it was decided to consider the normal 'design' scenario, as not including the FAS may provide an overestimation of the flood extents and potential flood mitigations.
There would be no overtopping of the proposed Scheme. As such all flow passing through the model would have to flow either overland or via the modelled drainage structures incorporated into the proposed Scheme alignment.	It is assumed that overtopping of the Scheme is unlikely to be acceptable up to the 1 in 100 year + 35%CC annual probability event and, therefore, within the model it was assumed that flood waters would not be able to flow over the inserted road alignment.
In the assessment of potential effects a certain amount of regrading of the Yazor Brook and associated features would be possible to enable the proposed design.	The design of the proposed schemes requires some realignment of the Yazor Brook because of the location of the proposed junctions and road layout. It is assumed that the impact of this realignment is negligible compared with the wider impact of the schemes on flood risk.

BASELINE SCENARIO

Upstream of Roman Road, the Yazor Brook flows south alongside a manmade pond at Pinston House and continues south to flow beneath Roman Road via a 3.6m x 1.2m box culvert. From here the watercourse flows around The Bolts and towards the east adjacent to Roman Road for approximately 200m, before turning to the south-east and flowing towards Huntington. The alignment of Yazor Brook is illustrated in Figure 2.

Flood management works were completed at the crossing of the Yazor Brook with Roman Road in 2004 to manage flows that exceed the capacity of the watercourse. In summary the scheme comprised:

- A flood relief channel from the Yazor Brook immediately upstream of the Pinston House pond. Flood waters are diverted into the channel via a weir that conveys water south and beneath Roman Road through a 900mm diameter pipe culvert. The channel reconnects to the Yazor Brook immediately downstream of The Bolts.
- A flood relief culvert beneath Roman Road approximately 90m to the west of Yazor Brook. The culvert comprises a 2.4m by 0.9m box culvert that conveys overland flood flows from the Yazor Brook into a short ditch to the south side of Roman Road. The ditch subsequently conveys this water back into the Yazor Brook as it emerges from beneath Roman Road.

Figure 2 illustrates the existing flood extents associated with Yazor Brook during the 1 in 100 + 35% CC annual probability event.

The modelling indicates that the Yazor Brook culvert and flood relief culverts are insufficient to convey flood waters to the south of Roman Road during the 1 in 100 + 35% CC annual probability event without overtopping the road. During this event, flood flows initially exceed the capacity of Yazor Brook west of Pinston House and flow overland to the east where they are intercepted by the flood relief channel. In turn, this channel overflows towards the east with flood waters flowing overland towards the junction of Towtree Lane and Roman Road where overtopping of Roman Road occurs. The flow continues south to re-join the Yazor Brook downstream of Roman Road.

Once the existing flood relief channel has been overloaded, flood waters also overtop to the Yazor Brook approximately 170m upstream of its crossing with Roman Road. These flows pass overland to the south-west where they are contained by Roman Road before passing through the 2.4m by 0.9m flood relief culvert, although also eventually overtopping the road.

On the downstream side of Roman Road flood flows exceed the banks of the Yazor Brook approximately 250m downstream of the Yazor Brook culvert, flowing overland parallel to the Yazor Brook as it flows south-east towards Hereford.

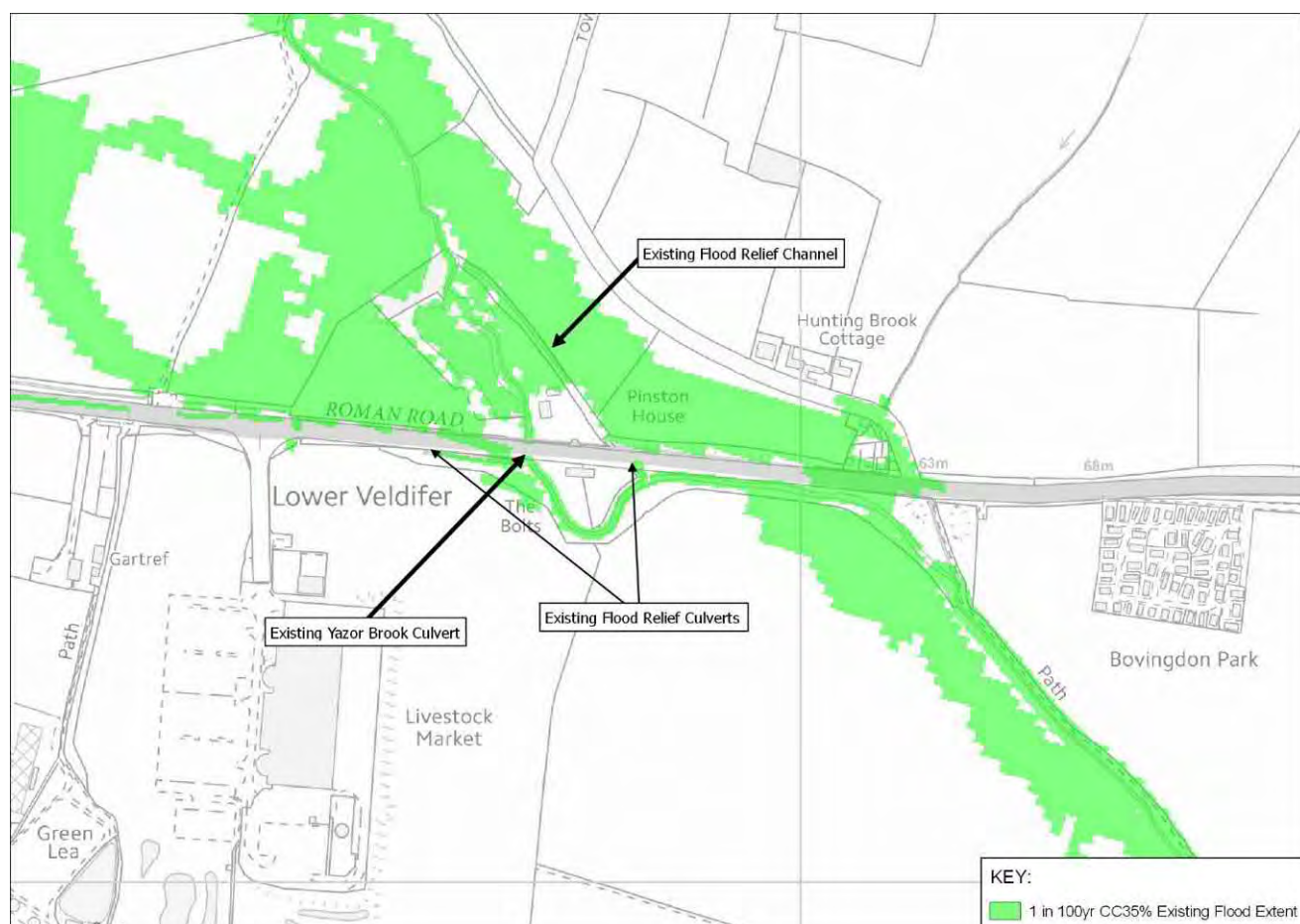


Figure 2 - Existing 1 in 100 annual probability with 35% climate change allowance flood extent

OPTION 5 (OLIVE) SCENARIO

Option 5 (Olive) was selected to represent the potential effects and mitigation required for Options 1 (Orange), 3 (Yellow), 4 (Red) and 5 (Olive). The alignment of Option 5 (Olive) is illustrated in Figure 3 and Figure 4.

Option 5 (Olive) would cross the Yazor Brook to the east of the study. The assessment considered both a culvert and bridge solution for the Yazor Brook crossing, illustrated in Figure 3 (culvert) and Figure 4 (bridge) respectively.

The assessment of the culvert option assumed that the alignment of the Yazor Brook can remain broadly in its current alignment. It should be noted however that for all Options:

- This may not be possible due to the required freeboard between the culvert soffit and 1 in 100 + 35%CC annual probability event flood level that may require the crossing to be moved slightly further south.
- Some realignment of the watercourse is likely to be required to accommodate 'clashes' between the proposed junction and the current alignment of the Yazor Brook and to create an appropriate channel alignment through the culvert crossing.

These differences are, however, unlikely to notably change the results of this initial flood risk analysis.

The assessment of the bridge option assumes that the Yazor Brook can be diverted approximately 100m south of its existing location in order to accommodate a 2m clearance from the existing ground level to the bridge soffit. A lesser clearance (i.e. 1.5m) would require a shorter diversion although, again, this is unlikely to notably change the results of this initial flood risk analysis.

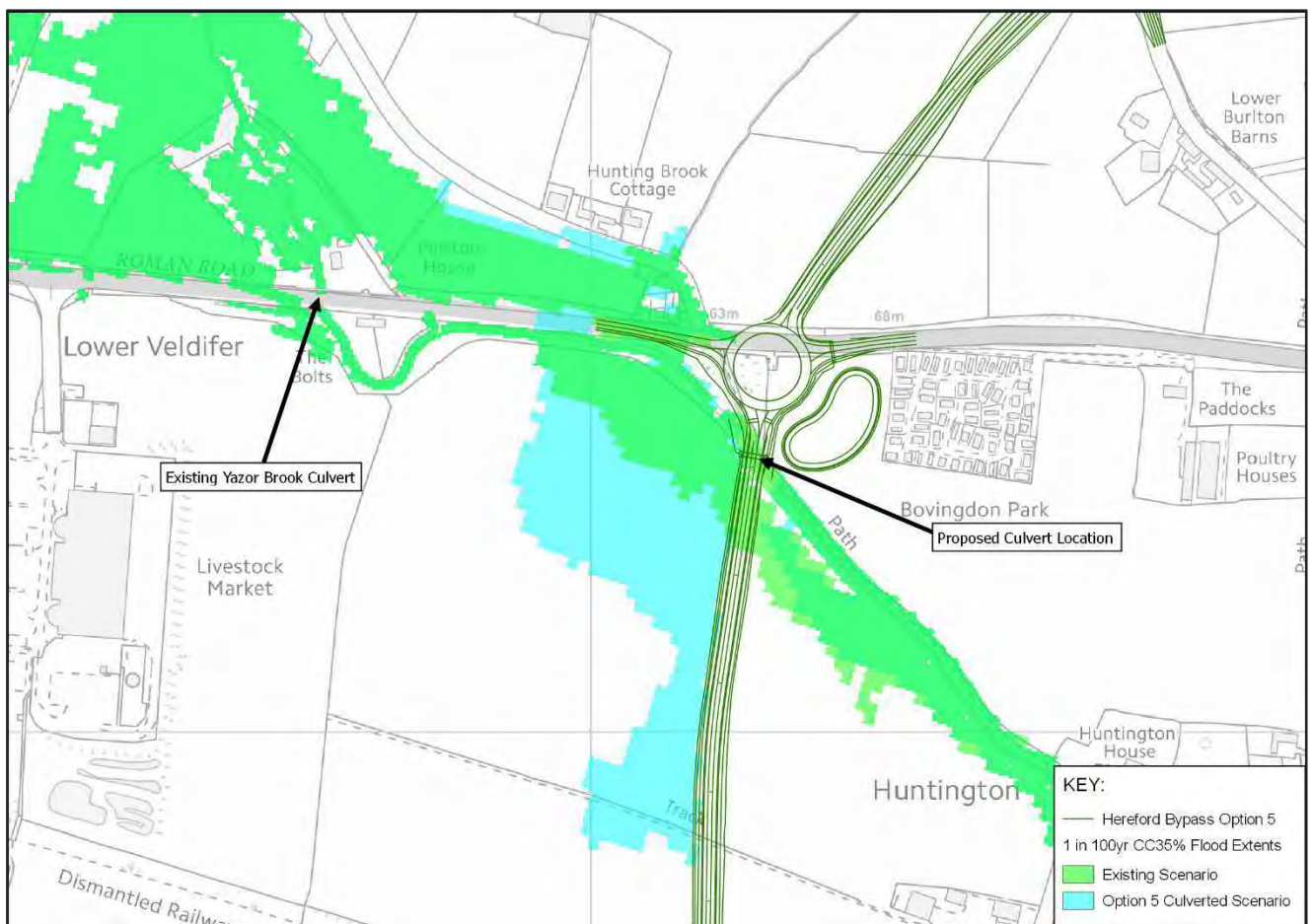


Figure 3 - Option 5 (Olive) culvert option flood extent for the 1 in 100 + 35%CC annual probability event

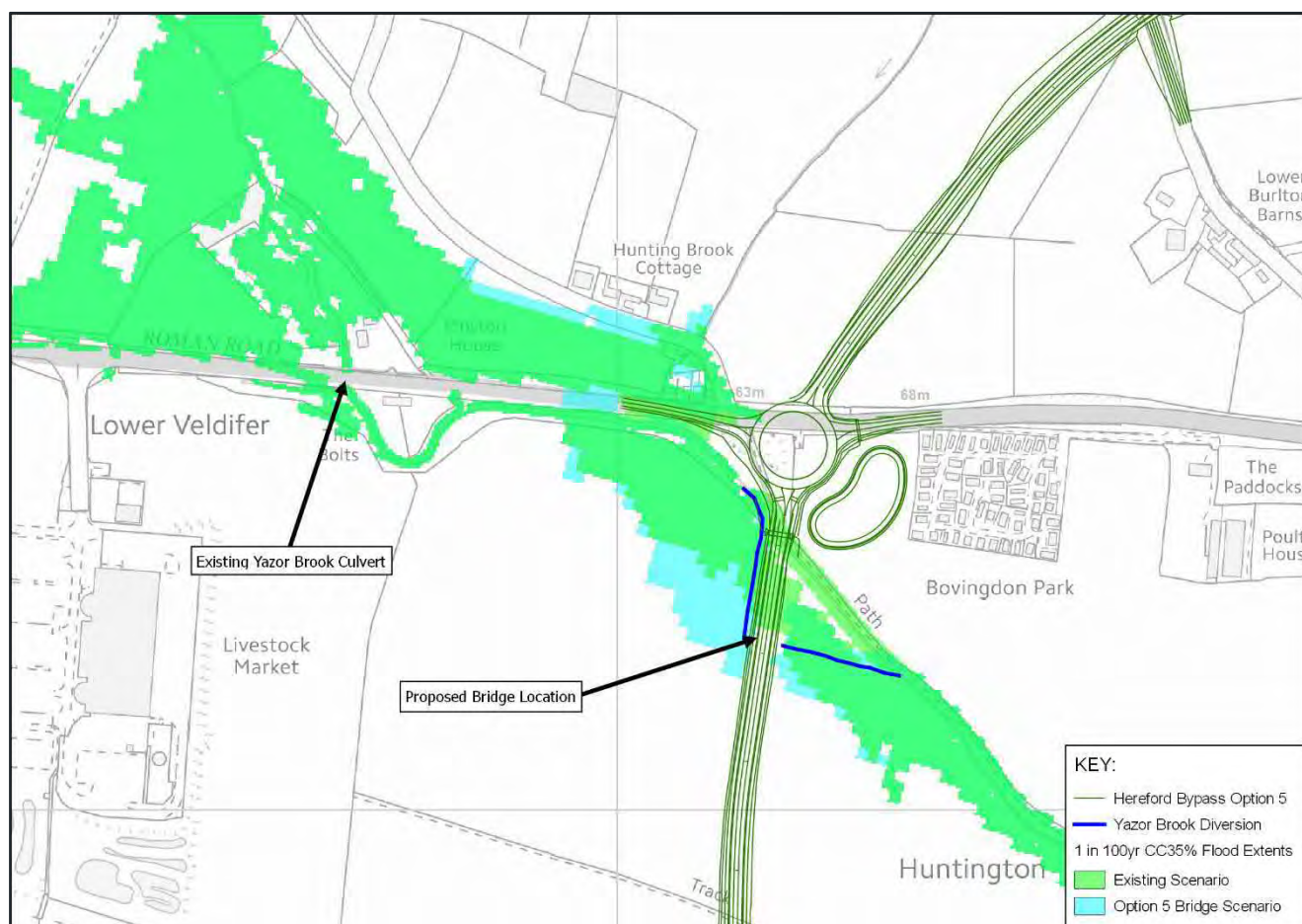


Figure 4 – Option 5 (Olive) bridge option flood extent for the 1 in 100 +35%CC annual probability event

Figure 3 and Figure 4 show that both the culvert and bridge options would cause an increase in flood extent to the west of the proposed Scheme and to the north of Roman Road.

The flooding to the west of the proposed Scheme is caused by the constriction of the Yazor Brook through the proposed structures, combined with the blockage of the overland flow route that flows parallel to the Yazor Brook. This leads to an increase in the flood extent as water builds up behind the Scheme before passing through the new structure. The extent of increased flood risk for the culvert option is significantly greater than that presented for the bridge option. Whilst there is some immediate downstream benefit associated with the severance of the overland flow route provided by the culvert option, there was no notable benefit further downstream of the Scheme alignment.

The Environment Agency and Herefordshire Council as LLFA have advised that structures to be constructed along the Yazor Brook should retain a 600mm freeboard between the peak flood water level and the structure soffit. In Option 5 (Olive), the design used in the analysis of the culvert option comprises a 3.3m x 1m box culvert. During the design event this culvert becomes completely submerged, meaning it does not currently comply with EA and LLFA requirements in its current state. In addition, while the hydraulic model has been built so that overtopping of the bypass corridors cannot occur, the peak water level upstream of the culvert reaches approximately 63.4mAOD, a level 0.4m above the design level of the road at this location. This is not an issue for the bridge option as the peak water level at the upstream face of the Option 5 bridge option is 62.8mAOD, maintaining a clearance of 1.7m to the bridge soffit.

The small increase in flood extent to the north of the proposed Scheme is caused by the construction of the western arm of the junction that creates a barrier to the current overland flow route that overtops Roman

Road. The new road alignment causes flood waters to pond to the north of Roman Road until they are able to overtop the road at a location slightly further west. It is expected that the modelled increase in flood extent to the north of Roman Road is conservative as the western arm of the bypass junction would not cause complete blockage of the overtopping flows.

Option 5 (Olive) mitigation options

The primary cause of increased flood risk associated with Option 5 (Olive) is the constriction of the overland flow route at the crossing of the Yazor Brook and the blockage of overland flows that currently overtop Roman Road to the north.

The following methods can be used to mitigate the increased flood risk for both the culvert and bridge options as illustrated in Figure 5:

- Provision of flood compensation storage upstream of the proposed crossing location in order to effectively 'contain' the attenuated flood waters and reduce the impact of proposed flood extents.
- Provision of a flood relief culvert beneath Roman Road to the west of the proposed junction in order to allow for earlier release of flood waters north of Roman Road and reduce the amount of flow overtopping Roman Road at this location.

The provision of the proposed flood relief culvert beneath Roman Road to the west of the proposed junction may also provide benefit to the existing properties at Towtree Lane, as well as reduce existing risk of overtopping of Roman Road.

As discussed above, the current culvert size used in this analysis is not sufficiently large to comply with Environment Agency and LLFA requirements. A larger culvert would therefore be required that may change the modelled flood extents as presented in the figures above. This may also require regrading and widening of the Yazor Brook upstream and downstream of the proposed culvert location to allow for a larger structure to be provided, and/or moving the watercourse further south to allow for a taller culvert to be provided.

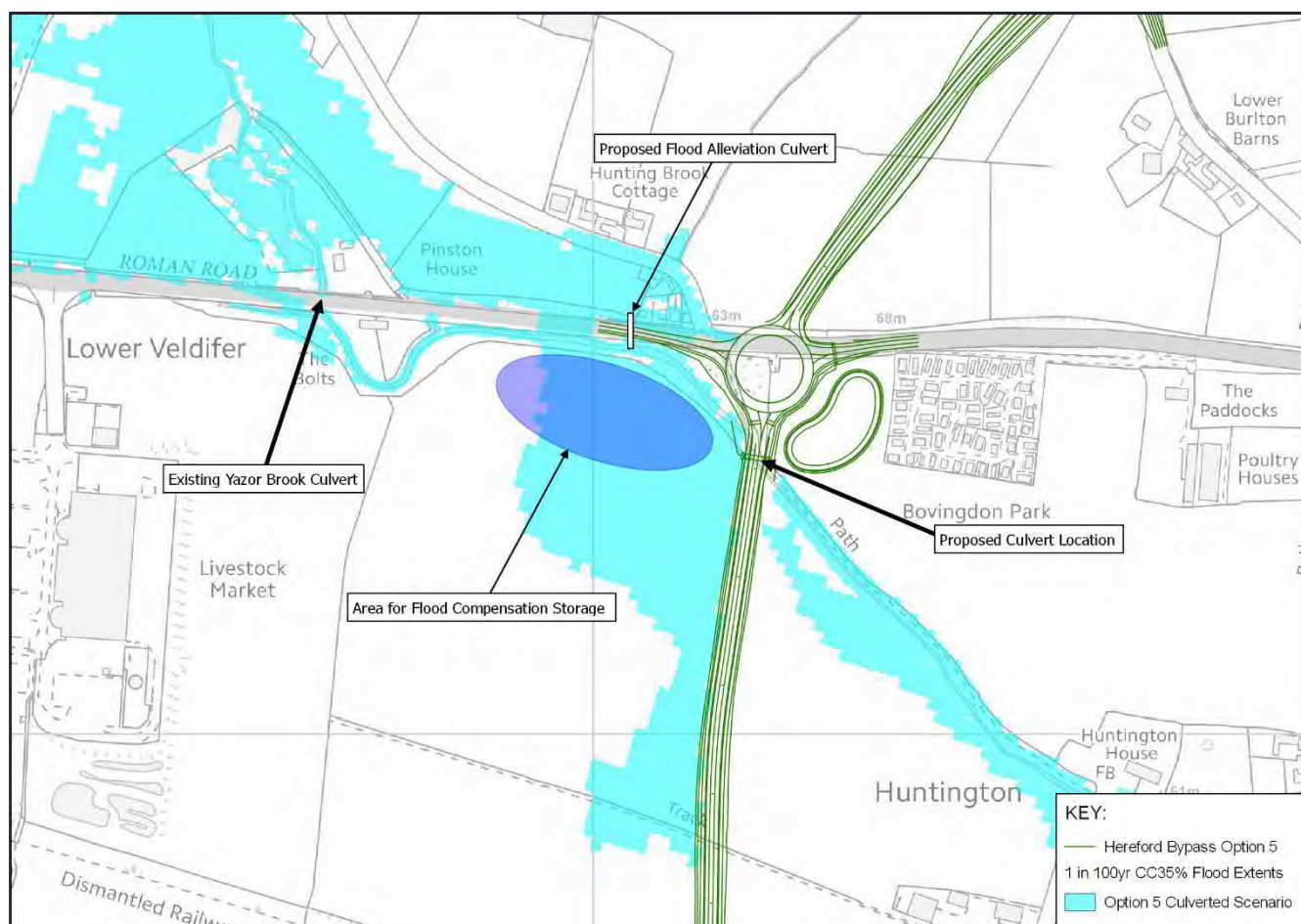


Figure 5 – Option 5 (Olive)flood mitigation measures (culvert option scenario depicted but mitigations are applicable to both culvert and bridge options)

OPTION 2 (CYAN) SCENARIO

Option 2 (Cyan) crosses the Yazor Brook 90m east of the existing Yazor Brook culvert beneath Roman Road as illustrated in Figure 6.

The assessment only considered a culvert option for the crossing of the Yazor Brook. Some realignment of the watercourse will be required to move the watercourse to the south of the proposed junction, although the watercourse broadly follows a similar alignment to the baseline scenario.

The potential for a bridge option was investigated but was found to be untenable due to the requirements for clearance to the bridge soffit and a need to maintain stopping sight distances to the new junction on Roman Road. It may be possible to provide a bridge if the Yazor Brook was realigned to cross the proposed Scheme c.200m further south combined with significant ground reprofiling, but this has not been considered further at this time.

The proposed junction clashes with the existing flood relief channel located to the east of Yazor Brook. For the purpose of this assessment it has been assumed that the alignment of this channel can be maintained.

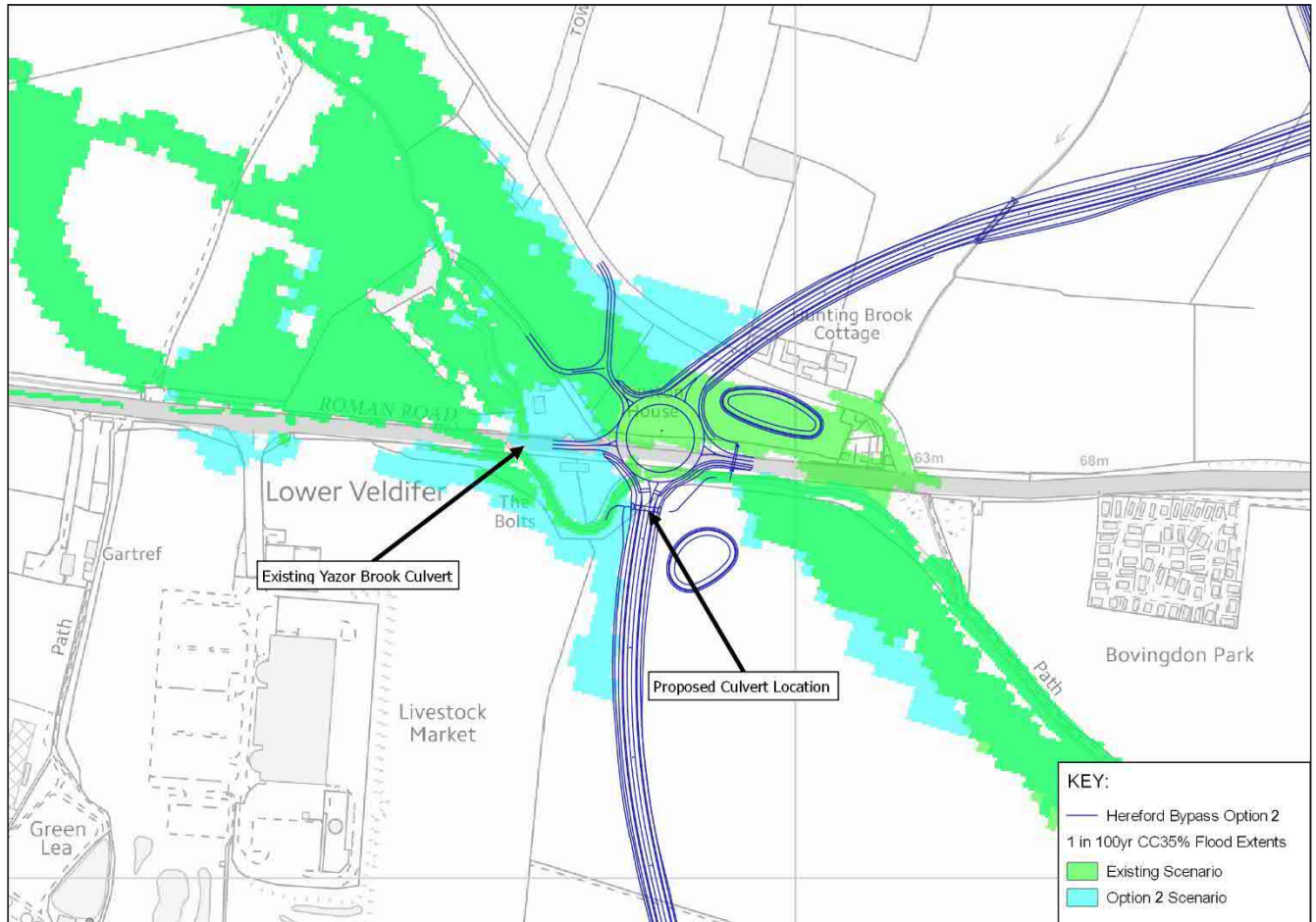


Figure 6 - Option 2 (Cyan) flood extent for the 1 in 100 +35%CC annual probability event

Figure 6 shows an increase in flood extent to the north and west of the proposed Scheme, notably increasing risk to Pinston House and The Bolts. The Scheme does, however, reduce flood risk to the cottages at Towtree Lane. The primary cause of change is the impedance of the overland flow path that allows flood waters to overtop the flood relief channel and flow towards the junction of Roman Road and Towtree Lane in the existing scenario.

Blockage of this overland flow path causes flood waters to pond to the north-west of the proposed junction, inundating the area around Pinston House before overtopping Roman Road and flowing towards The Bolts. Once flood flows have crossed over Roman Road, the flood risk is exacerbated by the constriction in flow at the new culverted crossing of Yazor Brook, leading to further flooding of The Bolts and land to the west of the Scheme.

The proposed culvert for the new crossing of the Yazor Brook comprises a 3.3m x 1.2m box culvert. During the design event this culvert becomes completely submerged, leading to an upstream water level of 64.5mAOD. The current culvert design therefore does not comply with EA and LLFA requirements that stipulate a 600mm freeboard between the peak flood water level and the structure soffit.

Option 2 (Cyan) mitigation options

The primary cause of increased flood risk associated with Option 2 (Cyan) is the blockage of the overland flow route to the north of Roman Road towards Towtree Lane. The secondary cause of increased flood risk is the constriction in flow at the new crossing of the Yazor Brook to the south of Roman Road.

The following methods can be used to mitigate the increased flood risk as illustrated in Figure 7:

- Installation of a flood relief channels and culverts to the north of Roman Road to convey overland flows beneath the proposed Scheme in a similar manner to the existing situation, coupled with a new flood relief culvert beneath Roman Road that conveys flood waters back into the Yazor Brook downstream of the proposed Scheme.
- A flood defence bund to protect Pinston House and direct overland flows towards the new flood relief channels and culverts. This barrier will also provide protection to The Bolts by preventing build-up of flood waters at Pinston House that would eventually overtop Roman Road and flow towards the Bolts house.

As discussed above, the current culvert size used in this analysis is not sufficiently large to comply with Environment Agency and LLFA requirements. A larger culvert would therefore be required that would change the modelled flood extents as presented in the figures above, most likely indicating an improved scenario that would allow more flood water to pass through the new structure and reduce upstream flood extents. This may also require regrading and widening of the Yazor Brook upstream and downstream of the proposed culvert location to allow for a larger structure to be provided, and/or moving the watercourse further south to allow for a taller culvert to be provided.

It is recommended that the potential benefits of the Scheme to existing flood risk to the properties at Towtree Lane and to Roman Road are taken into consideration, and that the design of required mitigation strives to maximise this potential for betterment. That said, the concentration of these overland flood flows through a new diversion channel and culvert beneath Roman Road could lead to an increase in peak flow in the Yazor Brook. In order to alleviate this risk, flood compensation storage can be provided downstream of the proposed Scheme as illustrated in Figure 7.

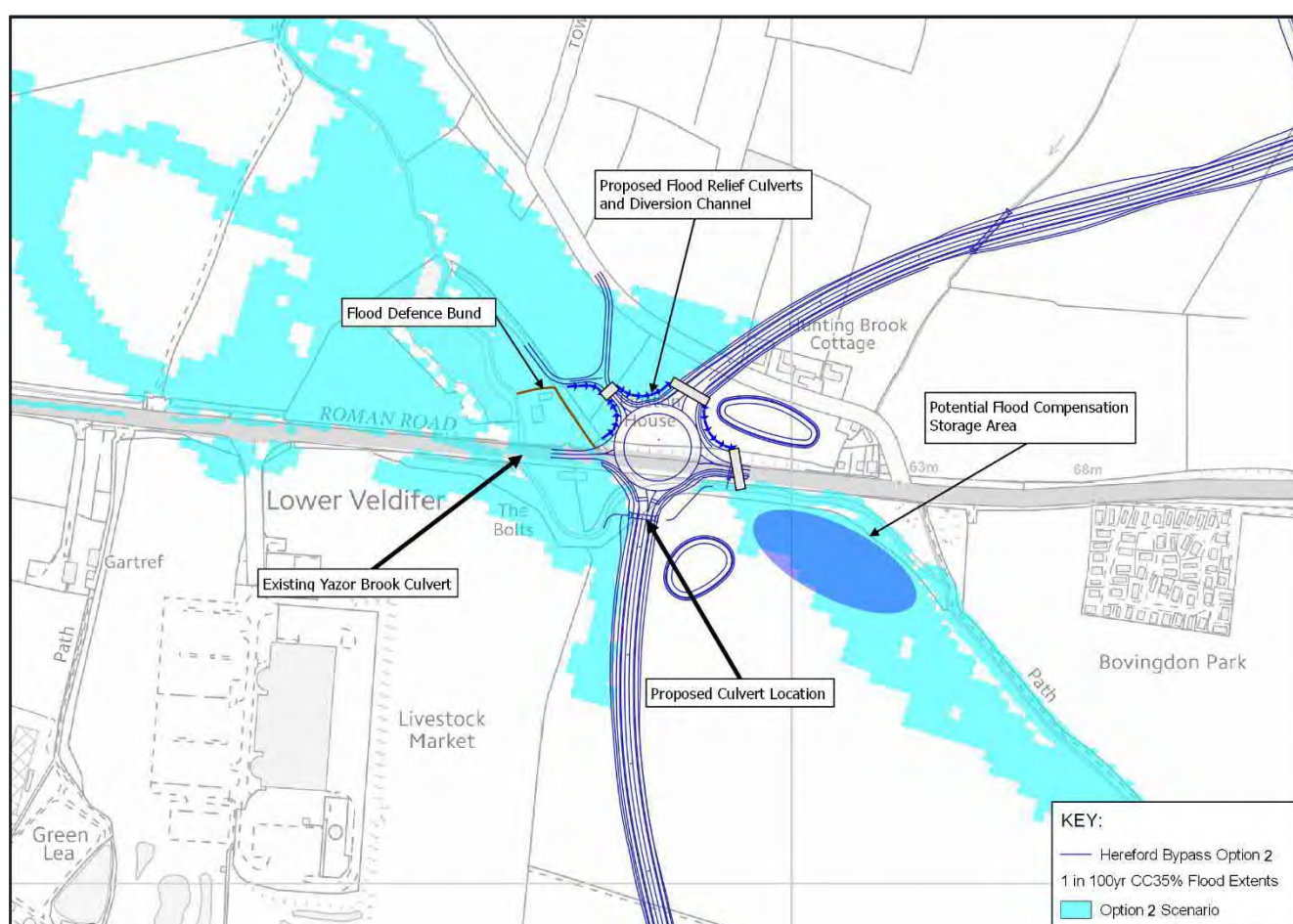


Figure 7 - Option 2 (Cyan) flood mitigation measures

OPTION 6 (BLACK 1) SCENARIO

Option 6 (Black 1) was selected to represent the potential effects and mitigation required for Options 6 and 7. The alignment of Option 6 (Black 1) is illustrated in Figure 8.

The northern arm of Option 6 (Black 1) crosses the Yazor Brook approximately 60m upstream of the existing Yazor Brook culvert beneath Roman Road. The design proposes a bridge structure at this location to span the Yazor Brook and the adjacent pond. A culvert option was therefore not tested, although this may be considered as a viable option in the detailed design of Options 6 (Black 1) and 7 (Black 1) should a) the existing pond be filled in, or b) greater clearance above ground level be required (as the road deck would reduce from c.900mm for a bridge option to c.600mm for a culvert option).

The northern arm of Option 6 (Black 1) also crosses the existing flood relief channel to the east of Yazor Brook. The assessment therefore assumed that the alignment of this existing flood relief channel can be maintained via a 1m x 1m box culvert beneath the proposed Scheme. This culvert size was selected to match the approximate size of the existing flood relief channel. The downstream alignment of this existing channel and the 900mm diameter pipe culvert beneath Roman Road were maintained. A SuDS pond is proposed to the south this road alignment and this was also incorporated into the model.

The eastern arm of the new junction with Roman Road extends over the outlet of the existing Yazor Brook culvert. It was therefore assumed that the existing Yazor Brook culvert would be extended to maintain the existing channel alignment.

The proposed junction completely covers the existing 2.4m x 0.9m flood relief culvert beneath Roman Road located to the west of Yazor Brook. Blockage of this structure was therefore modelled to understand the likely impact of this design.

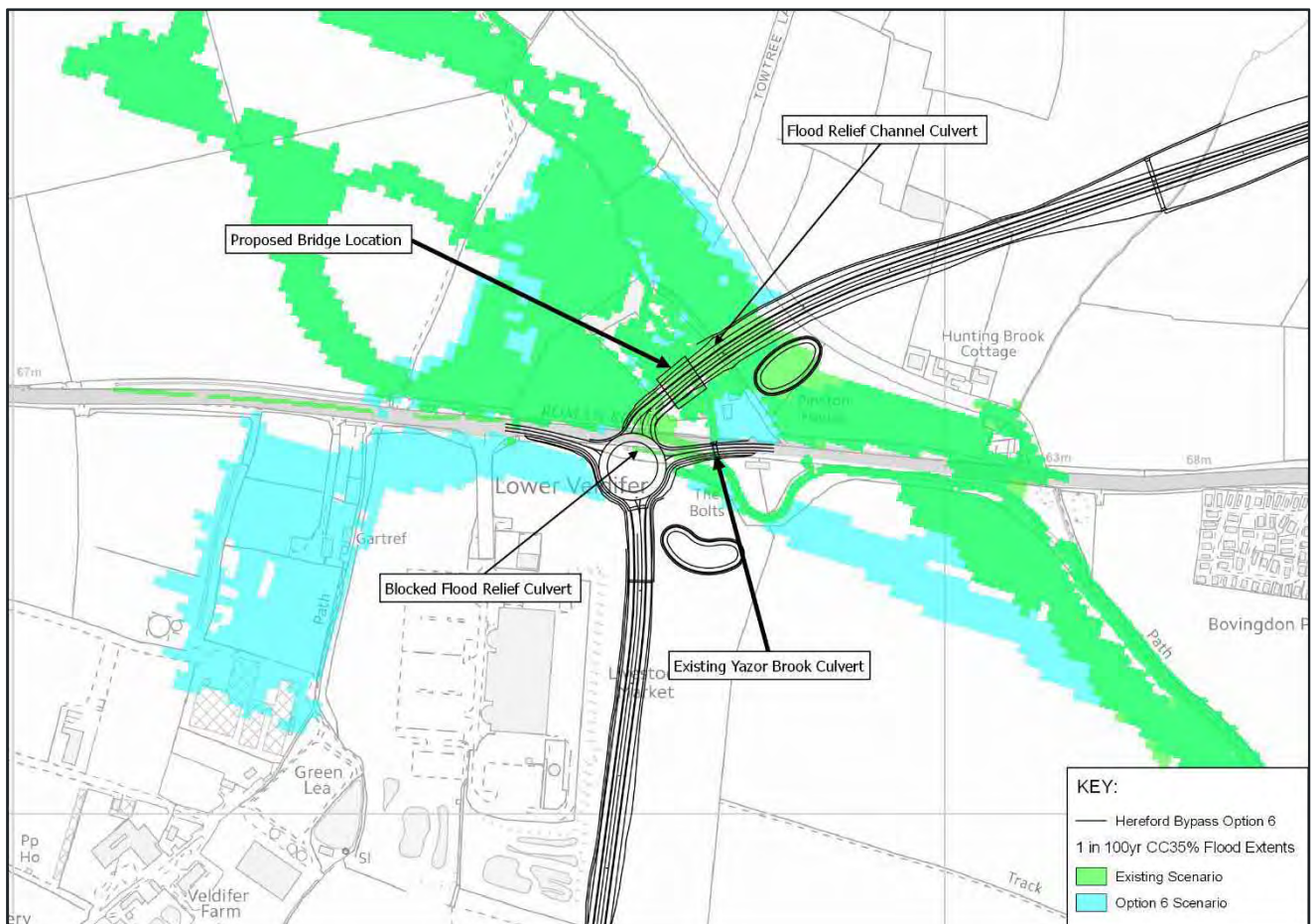


Figure 8 - Option 6 (Black 1) flood extent for the 1 in 100 +35%CC annual probability event

Figure 8 shows a large increase in flood extent to the west of the proposed Scheme, notably increasing flood risk to the existing Wyevale Garden Centre and Cattle Market, as well as increasing flood risk to Pinston House.

The two main contributors to this increased flood risk are:

- The blockage of the overland flow path that flows east towards Towtree Lane when flood waters overtop the banks of the existing flood relief channel; and
- The blockage of the existing 2.4m x 0.9m flood relief culvert beneath Roman Road.

The blockage of the overland flow path that flows east towards Towtree Lane causes flood waters to pond to the north of the proposed Scheme due to the constriction caused by the 1m x 1m culvert. This leads to an increase in flow that flows to the south-west and ponds to the north of Roman Road. The blockage of the existing 2.4m x 0.9m flood relief culvert beneath Roman Road caused flood waters to build up until they overtop the road, leading to the inundation of the area to the south-west.

The change in flow dynamics and the location of the proposed SuDS pond to the north of Roman Road also leads to an increase in the flow passing through the existing Yazor Brook culvert. South of Roman Road this causes the Yazor Brook to exceed its banks in smaller return period events than the current scenario, and flow overland towards the south-east before re-joining the watercourse.

The proposed bridge crossing of the Yazor Brook has been modelled with a 15m span and a soffit level of 64.8mAOD. During the design event this bridge becomes surcharged, leading to a water level at the upstream face of 64.9mAOD. The current bridge design therefore does not comply with EA and LLFA requirements that stipulate a 600mm freeboard between the peak flood water level and the structure soffit.

Option 6 (Black 1) mitigation options

The primary cause of increased flood risk associated with Option 6 (Black 1) is the blockage of the existing overland flow path from the overtopping of the flood relief channel to the east of Yazor Brook, and the further constriction of the overland flow path towards Towtree Lane caused by the proposed SuDS pond. The secondary causes of increased flood risk are the blockage of the western flood relief culvert which exacerbates the ponding of water to the north of Roman Road, and the increase in flow that is discharged through the existing Yazor Brook crossing beneath Roman Road.

The following methods can be used to mitigate the increased flood risk as illustrated in Figure 9 and Figure 10:

- Increase the capacity of the existing flood relief channel to the east of Yazor Brook and the downstream 900mm diameter pipe culvert beneath Roman Road, thereby increasing the volume of flood waters that can be conveyed through this channel and beneath Roman Road.
- Relocation of the proposed SuDS pond to the north of Roman Road to allow flows that exceed the capacity of the flood relief channel to follow the existing overland flow route towards Towtree Lane.
- Reinstatement of the blocked 2.4m x 0.9m flood relief culvert beneath Roman Road using one of the following options:
 - As illustrated in Figure 9: Construct a new culvert immediately to the north of the proposed junction to convey flood flows to Yazor Brook upstream of its crossing beneath Roman Road. This option provides a shorter flow path but will require the regrading (specifically lowering) of Yazor Brook to allow for the tie-in with the new flood relief culvert. This will also increase the size of the existing Yazor Brook culvert.
 - As illustrated in Figure 10: Construct a new culvert and flood relief channel to the west and south of the proposed junction and convey this flood water to Yazor Brook downstream of its crossing beneath Roman Road. This option should not require the regrading of Yazor Brook, but does pose greater risk of blockage.
- Provision of flood compensation storage to the north of Roman Road.

Option 6 (Black 1) has the potential to offer improved flood risk to the properties at Towtree Lane. It is recommended that the potential benefits of the Scheme to this existing flood risk and to Roman Road are taken into consideration, and that the design of required mitigation strives to maximise this potential for betterment.

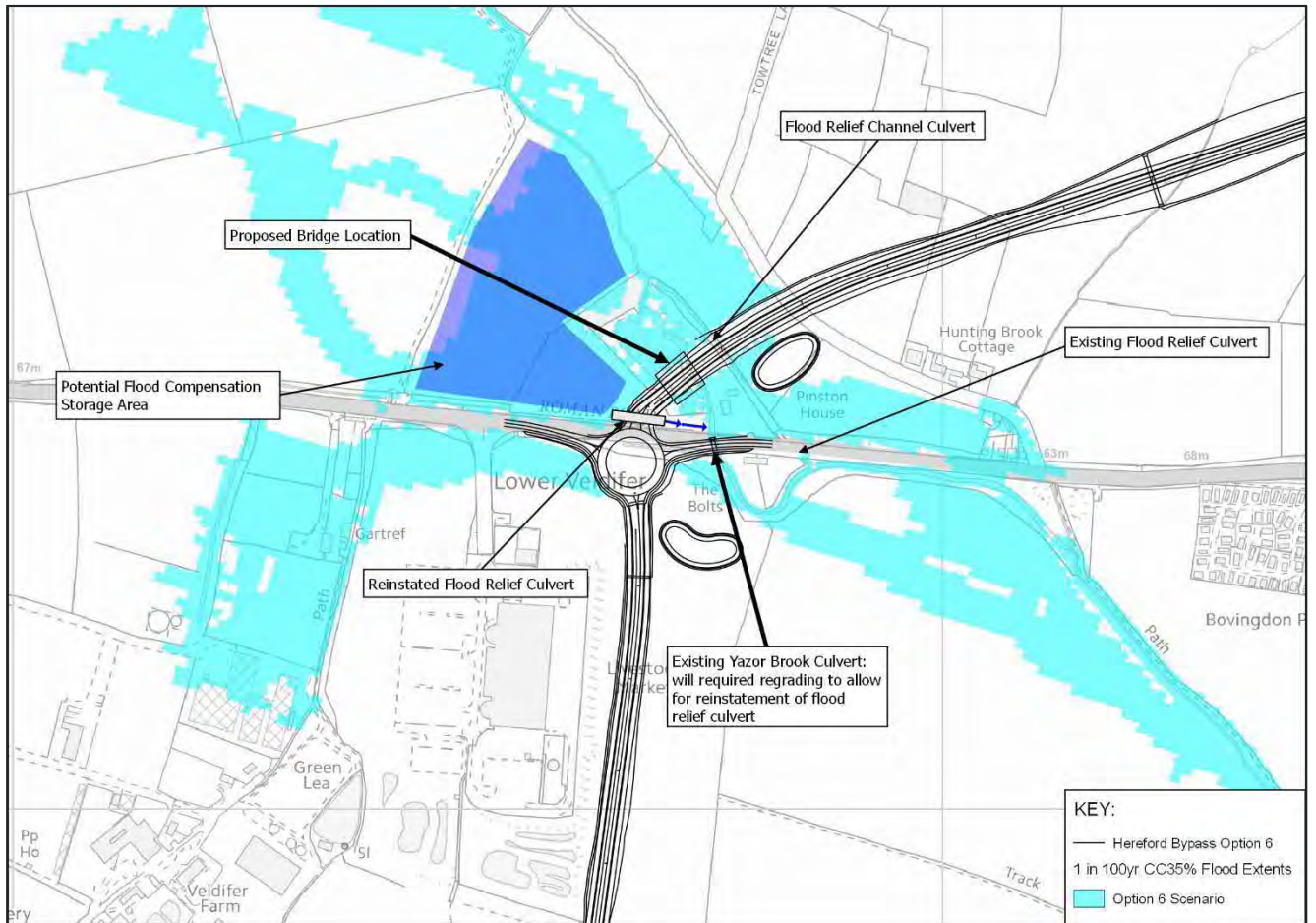


Figure 9 – Option 6 (Black 1) flood mitigation measures with flood relief culvert north of Roman Road

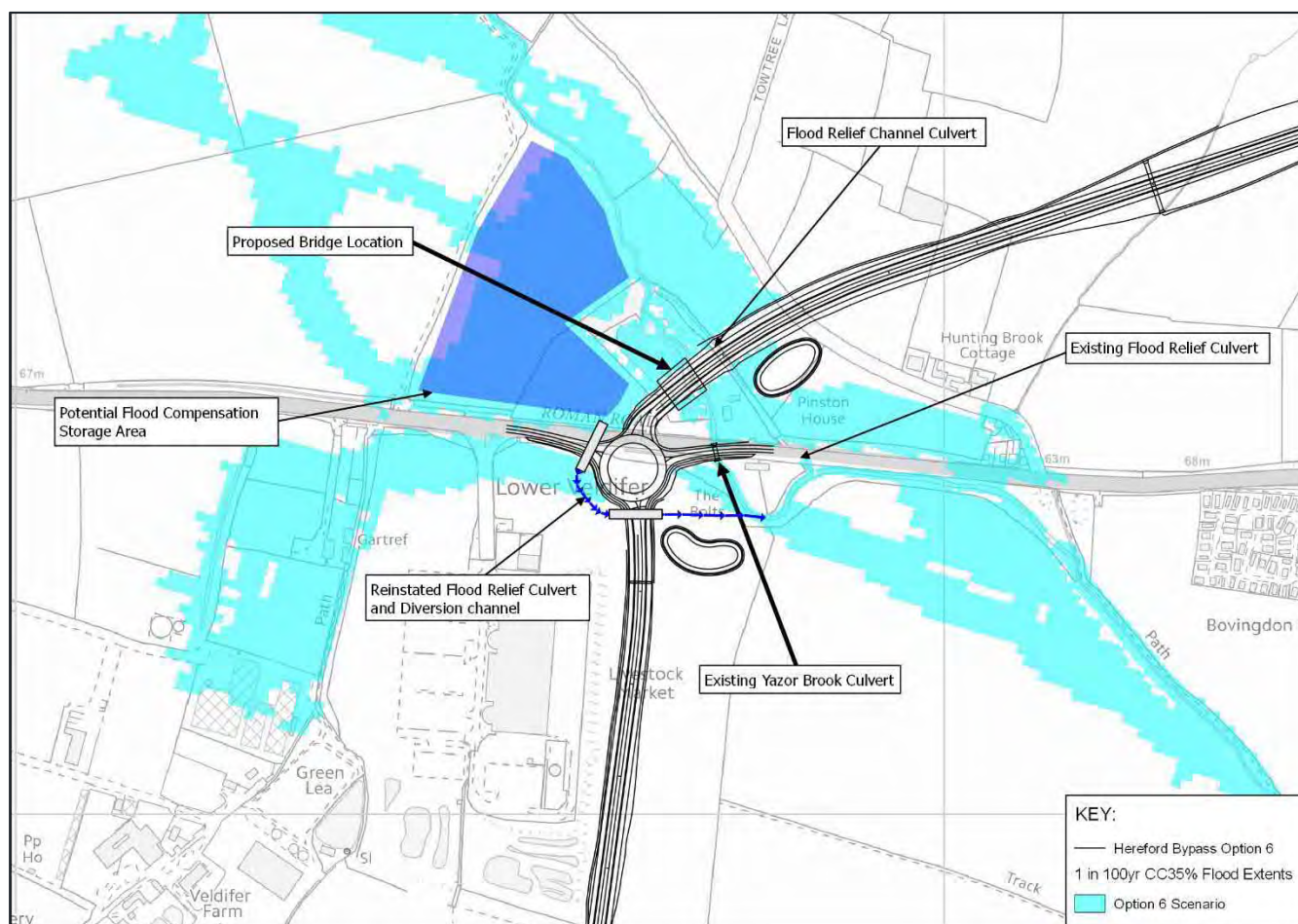


Figure 10 - Option 6 (Black 1) flood mitigation measures with flood relief culvert west and south of Roman Road



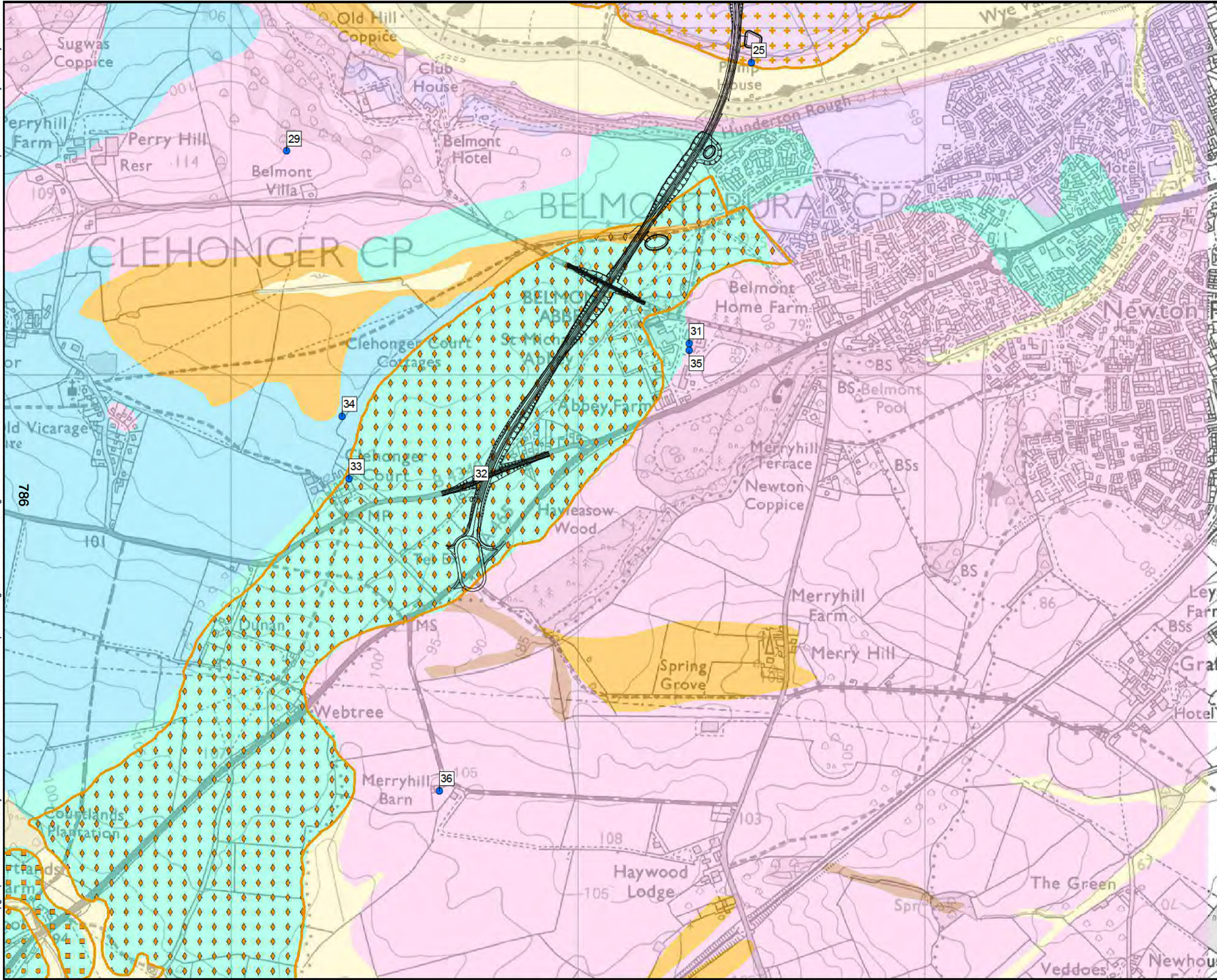
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Appendix 11-1

GEOLOGY & SOILS FIGURES

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Proposed Scheme - Orange Option

Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- River terrace deposits, 1 sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_082. Sand/Grav Deposit
- MINS_SG_083. Sand/Grav Deposit
- MINS_SG_084. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

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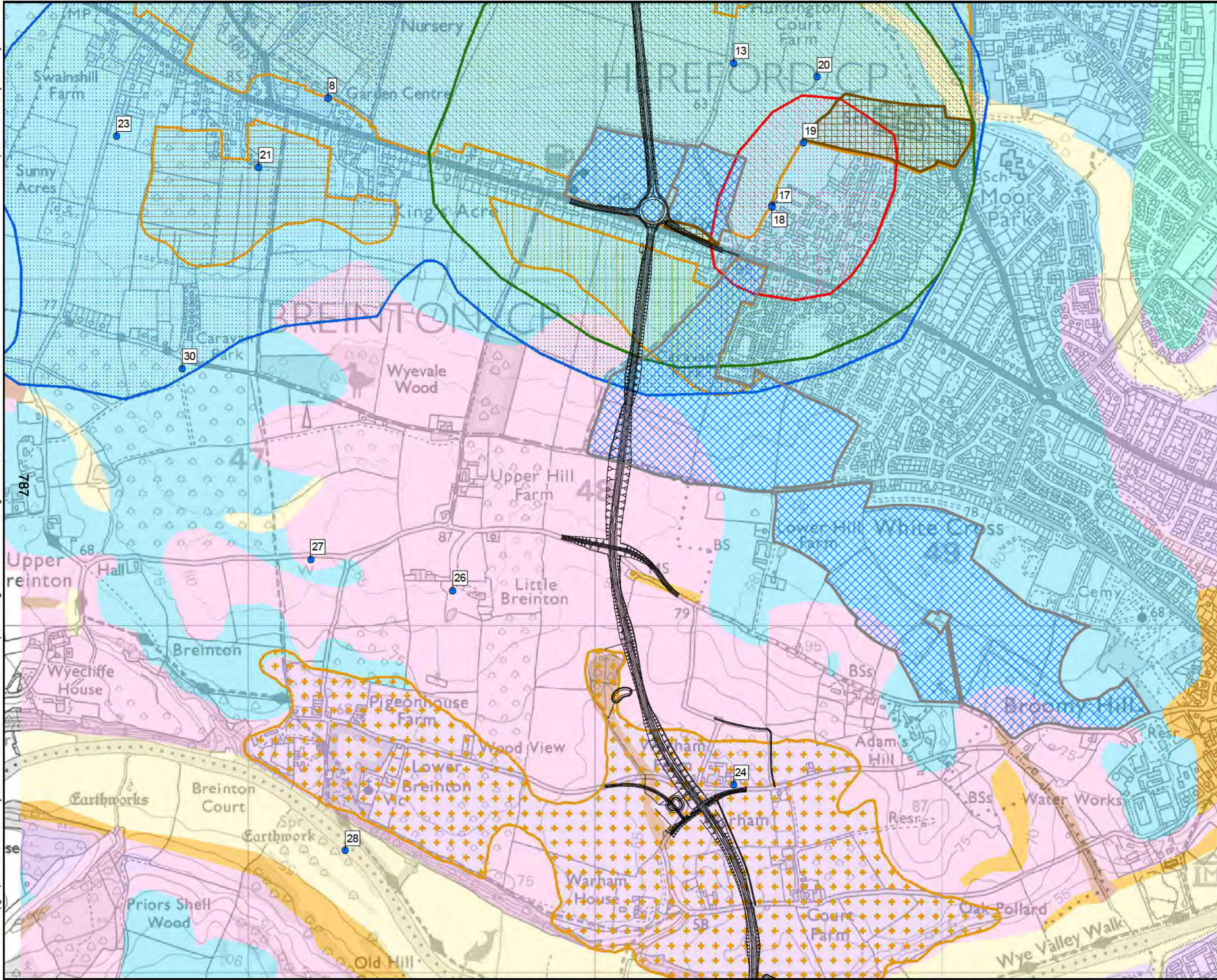
TITLE: FIGURE 11-1
GROUND RISK & REMEDIATION CONSTRAINTS
& PROPOSED SCHEME - ORANGE
PAGE 1 OF 5

SCALE @ A3 1:10,000	CHECKED AI	APPROVED MT
PROJECT NO 70024065	DESIGNED AI	DRAWN JSdS
DATE 03/05/2018		REV P01

DRAWING No: 70024065-WSP-XX-XX-DR-EN-00080

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printed on: 03 May 2018 by: DeSouza



— Proposed Scheme - Orange Option

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- MINS_SG_074. Sand/Grav Deposit
- MINS_SG_075. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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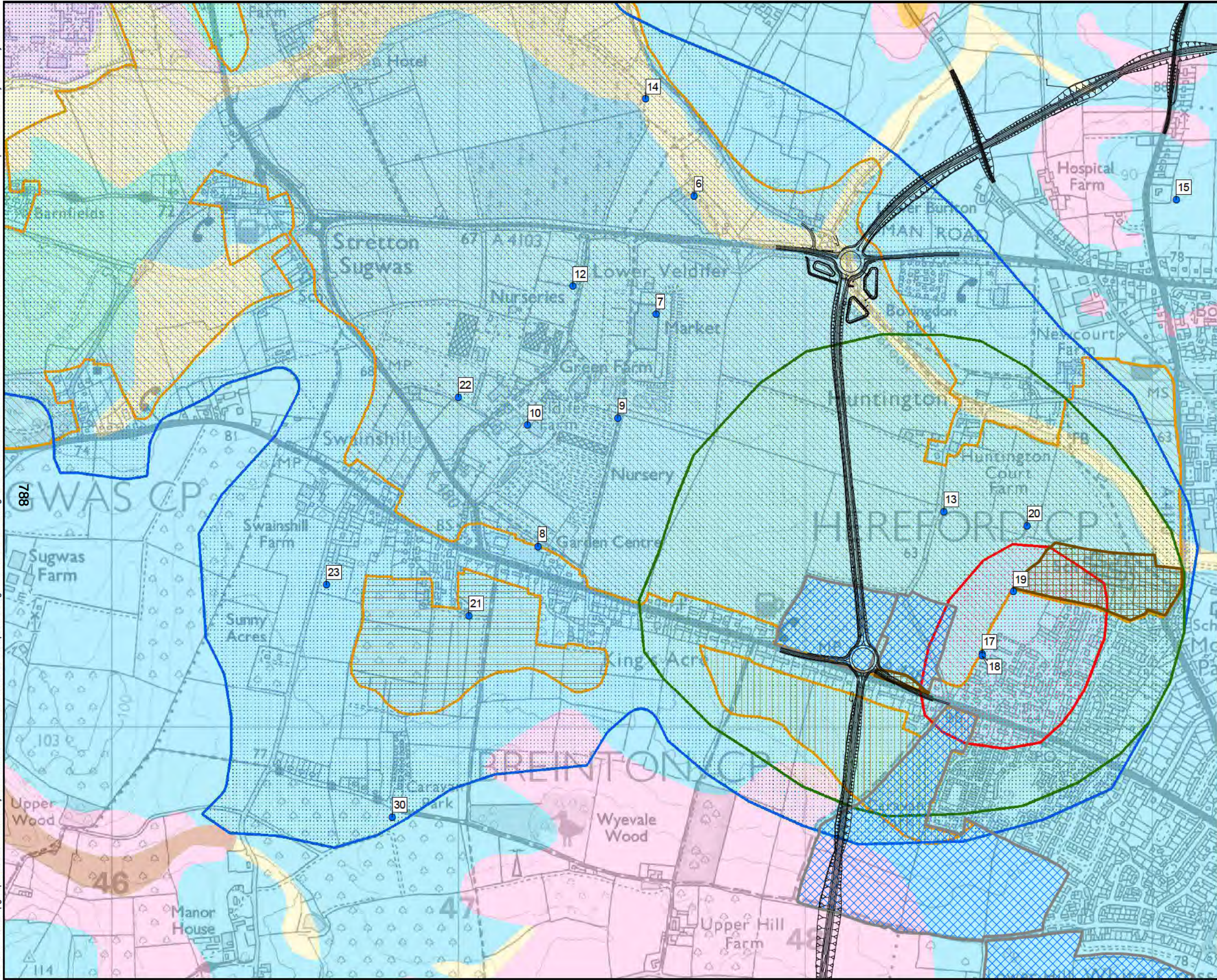
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PAGE 2 OF 5

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— Proposed Scheme - Orange Option

● Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_074. Sand/Grav Deposit
- MINS_SG_075. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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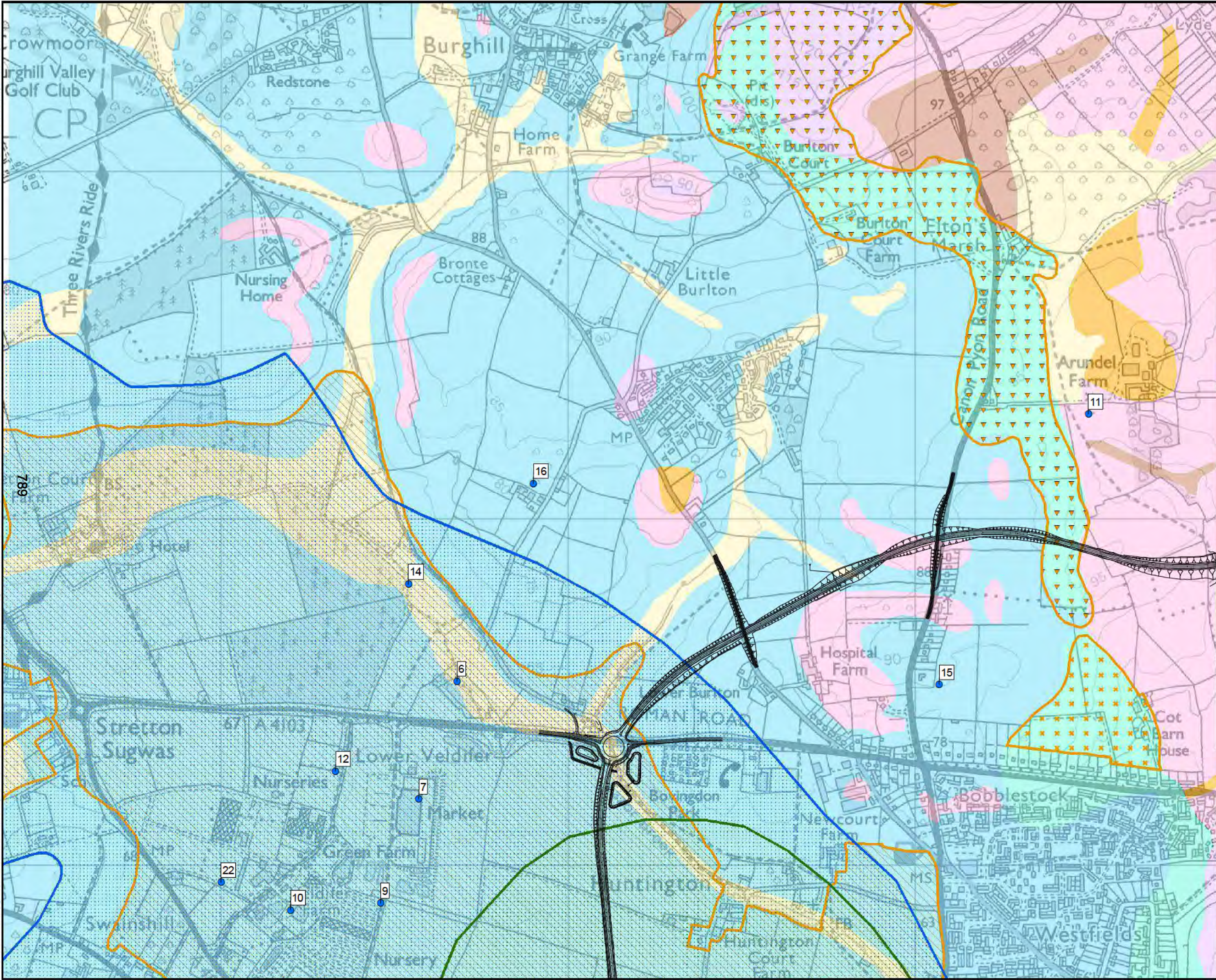
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— Proposed Scheme - Orange Option

● Water abstractions

Superficial Geology

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- Head - clay, silt, sand and gravel
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- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_076. Sand/Grav Deposit
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Source Protection Zone

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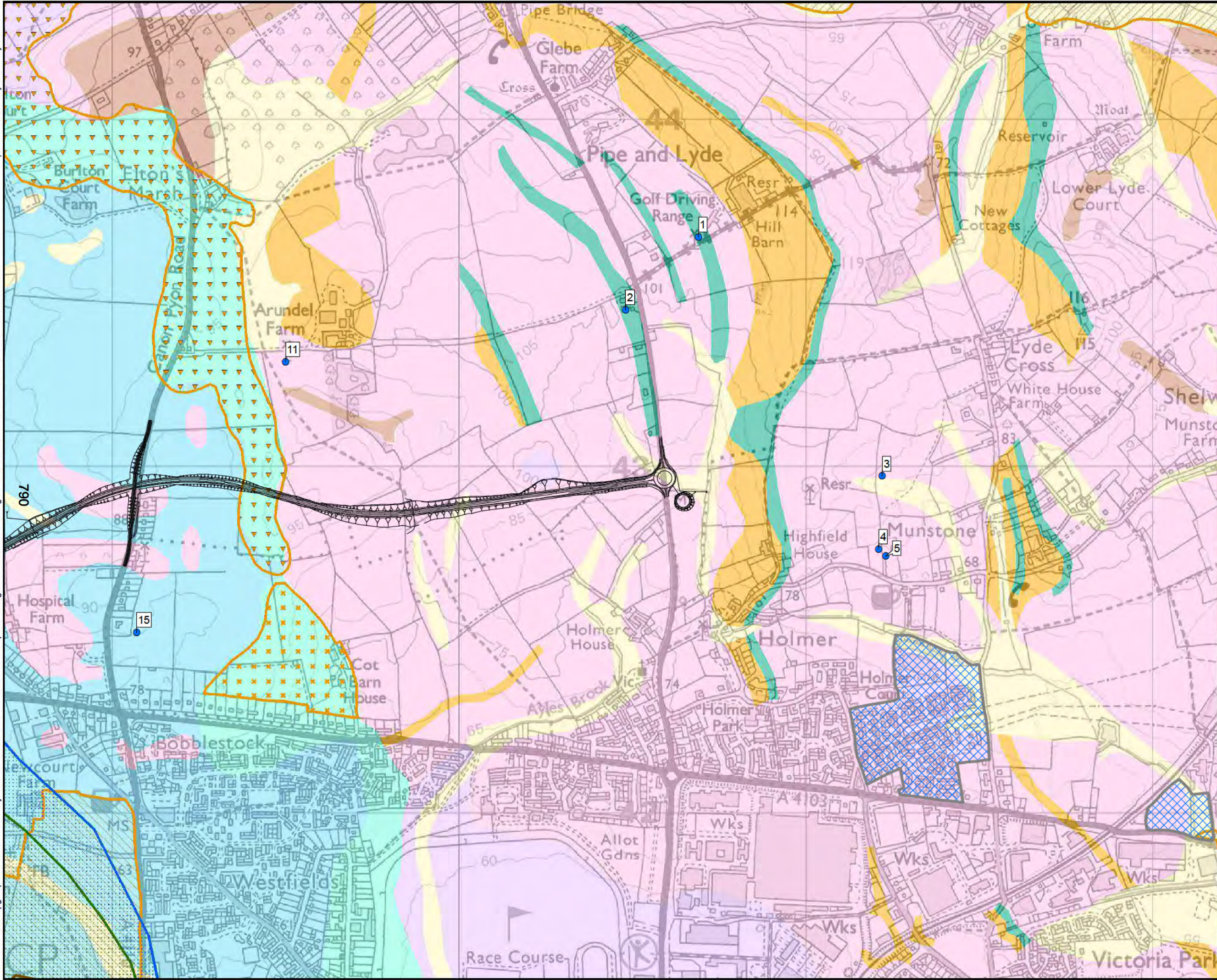
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Proposed Scheme - Orange Option

- Water abstractions

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Bedrock Geology

- Raglan mudstone formation - mudstone, calcareous
- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_044. Sand/Grav Deposit
- MINS_SG_071. Sand/Grav Deposit
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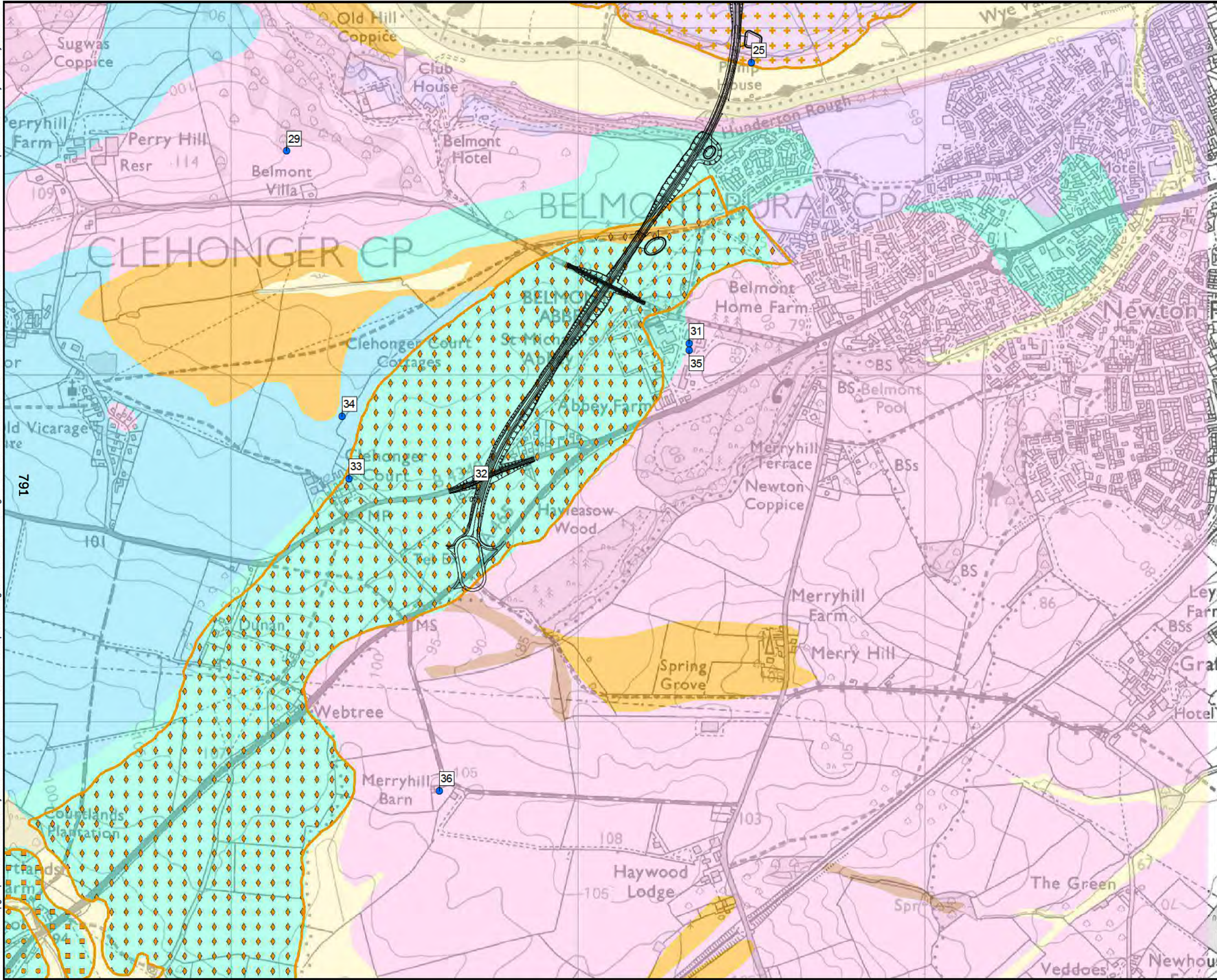
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Proposed Scheme - Cyan Option

Water abstractions

Superficial Geology

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- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- River terrace deposits, 1 sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_082. Sand/Grav Deposit
- MINS_SG_083. Sand/Grav Deposit
- MINS_SG_084. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

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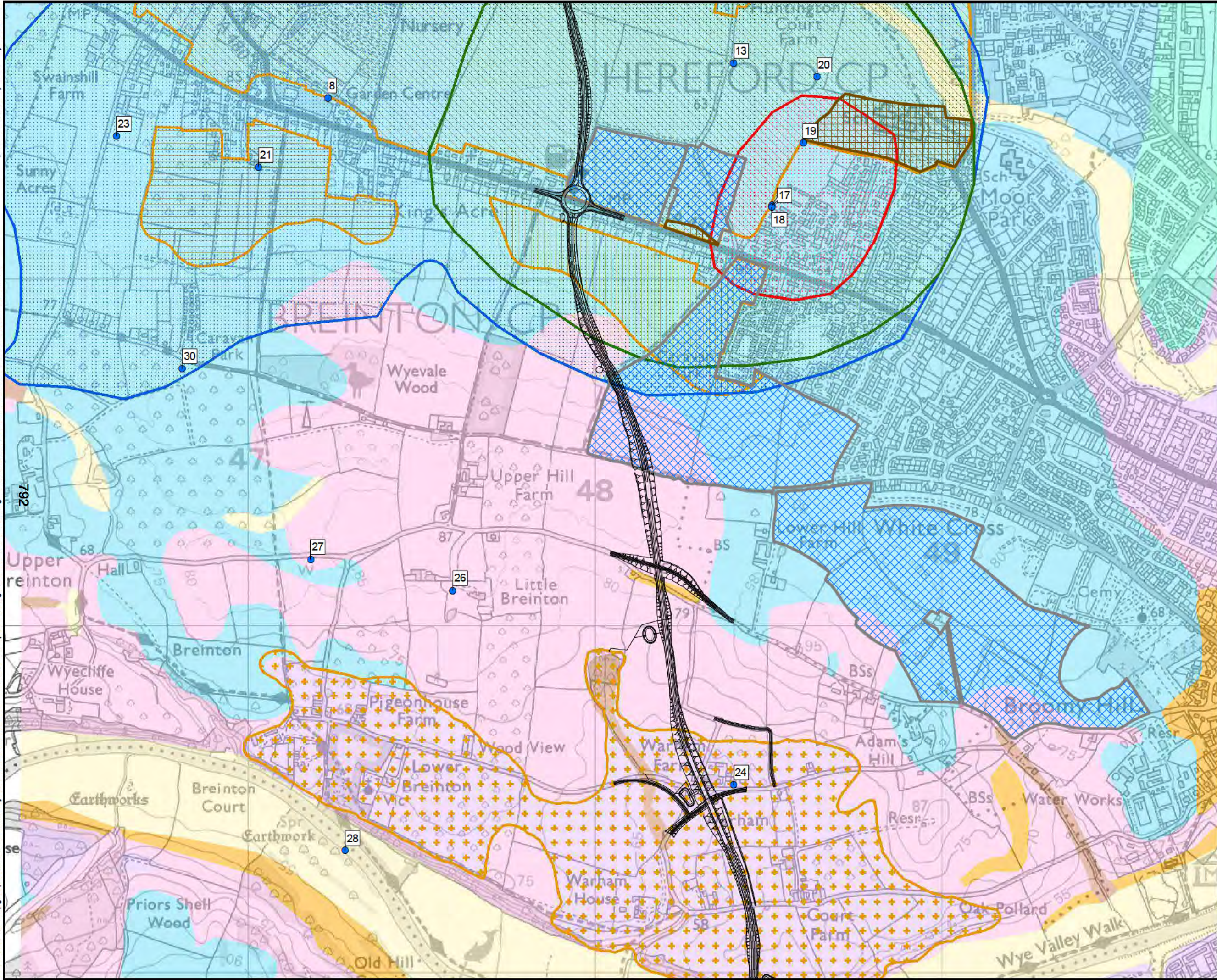
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— Proposed Scheme - Cyan Option

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Bedrock Geology

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Mineral Reserves

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- MINS_SG_087. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

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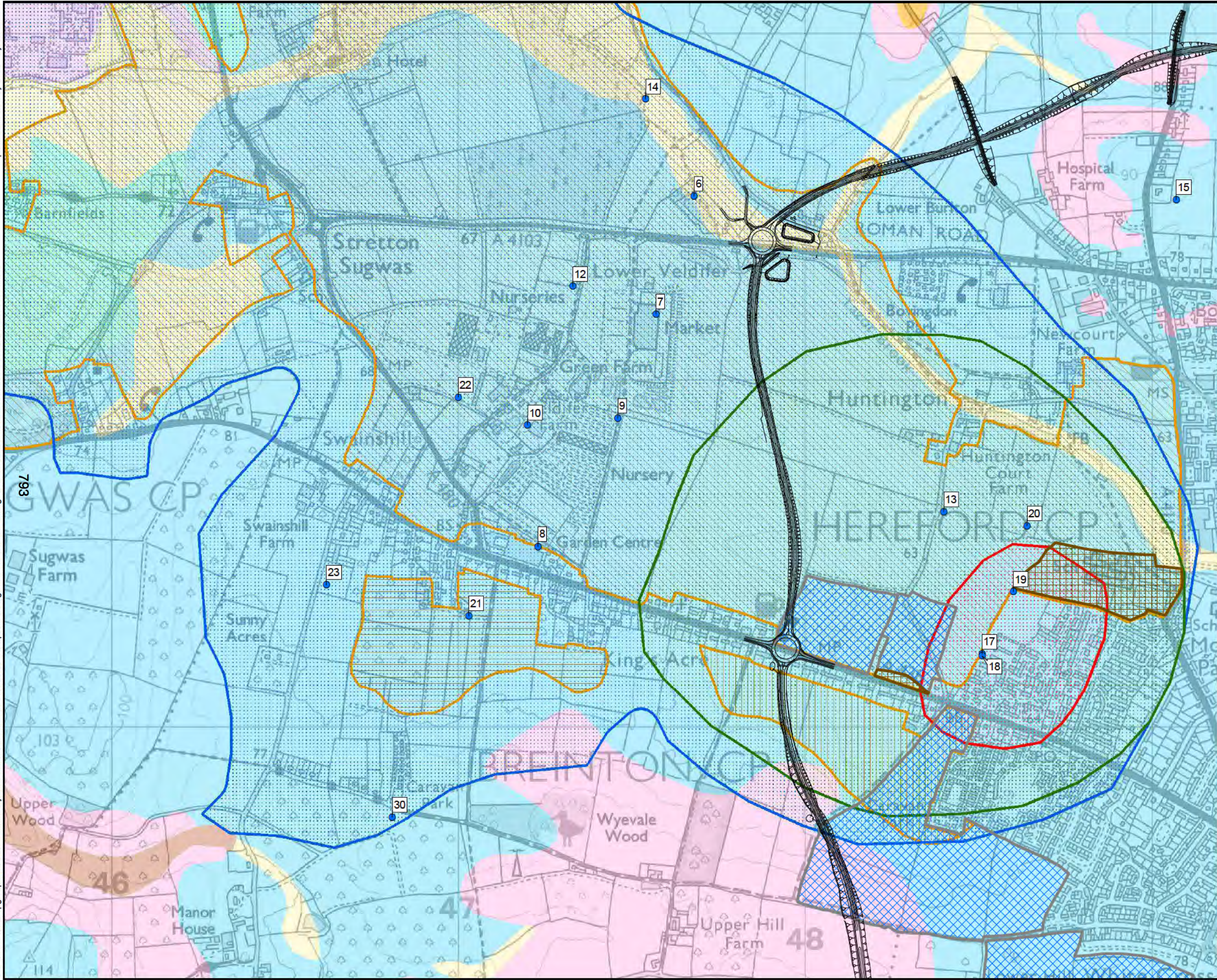
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— Proposed Scheme - Cyan Option

● Water abstractions

Superficial Geology

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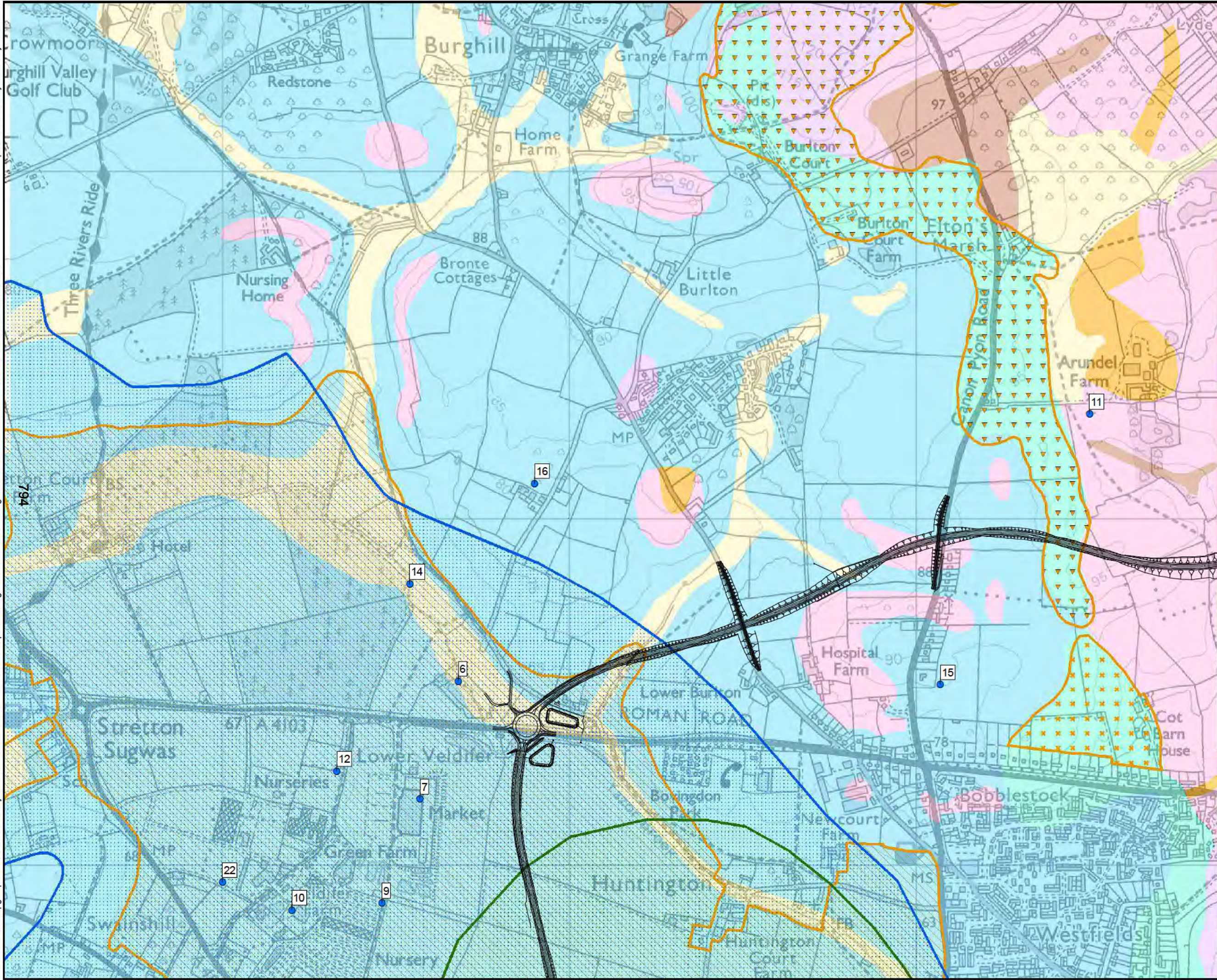
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— Proposed Scheme - Cyan Option

● Water abstractions

Superficial Geology

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Bedrock Geology

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Mineral Reserves

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- MINS_SG_076. Sand/Grav Deposit
- MINS_SG_077. Sand/Grav Deposit

Source Protection Zone

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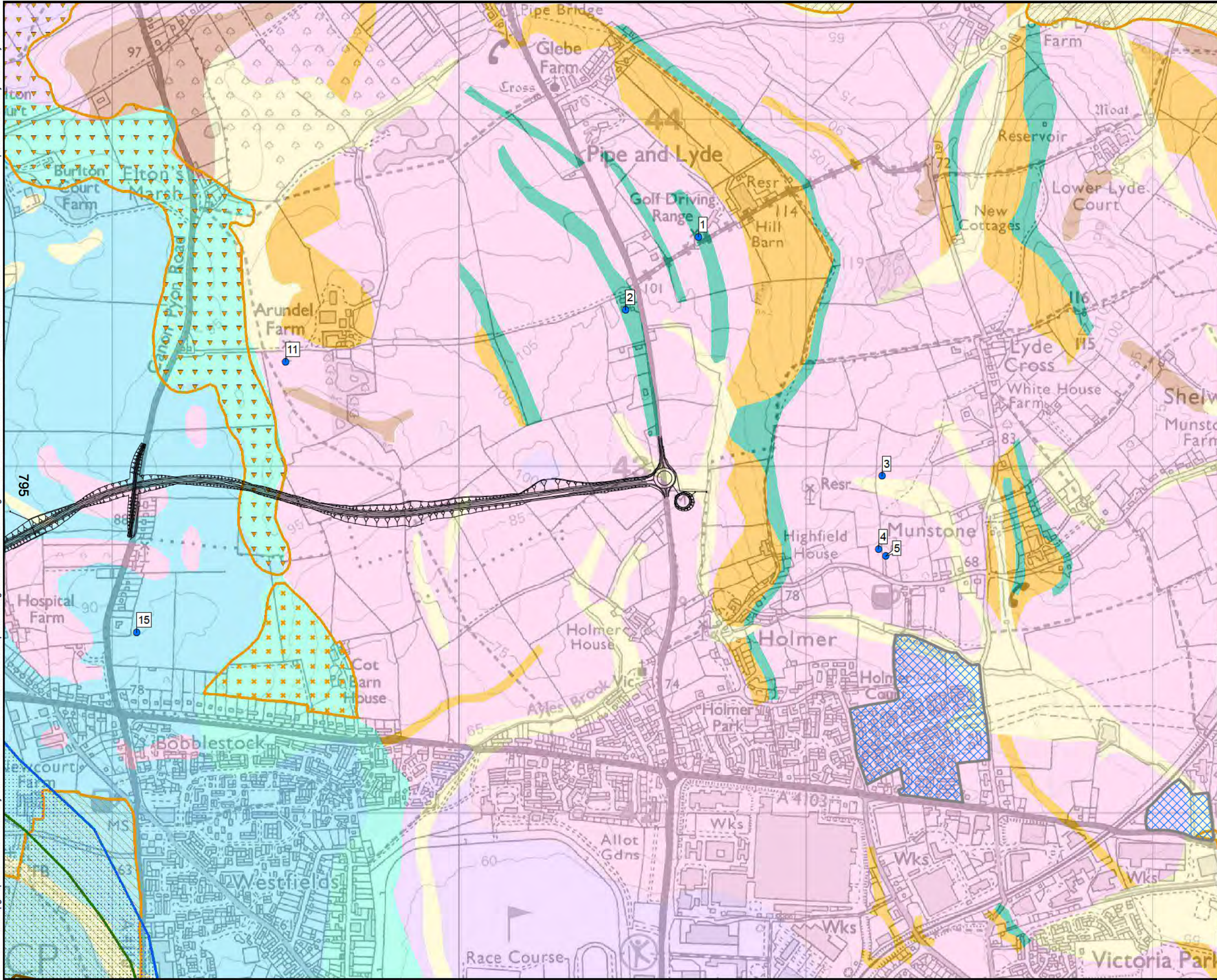
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Proposed Scheme - Cyan Option

Water abstractions

Superficial Geology

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- Glaciofluvial sheet deposits, Devensian - sand and gravel
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- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - mudstone, calcareous
- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_044. Sand/Grav Deposit
- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_076. Sand/Grav Deposit
- MINS_SG_077. Sand/Grav Deposit

Agricultural Land Classifications

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Source Protection Zone

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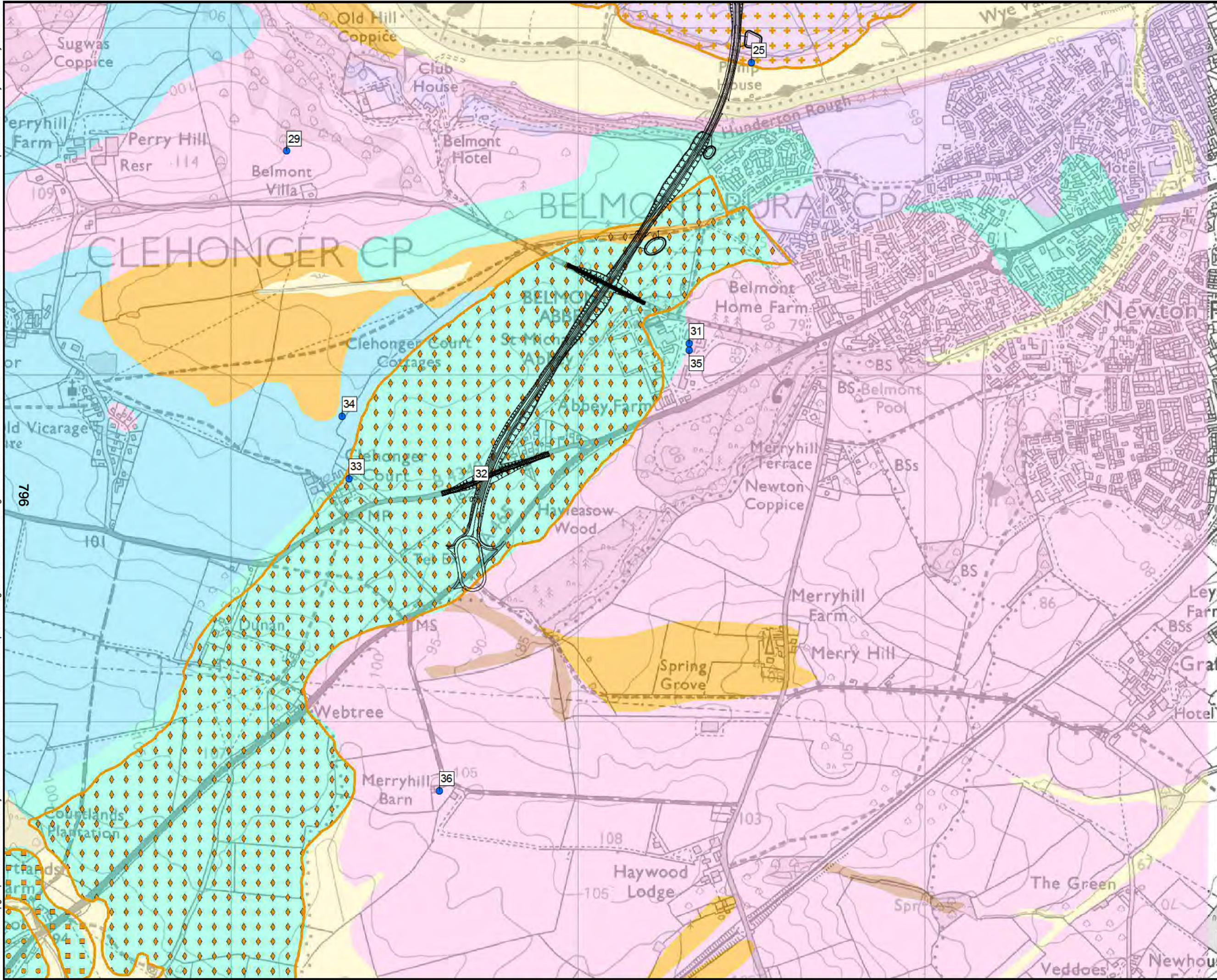
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Proposed Scheme - Yellow Option

Water abstractions

Superficial Geology

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- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- River terrace deposits, 1 sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_082. Sand/Grav Deposit
- MINS_SG_083. Sand/Grav Deposit
- MINS_SG_084. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

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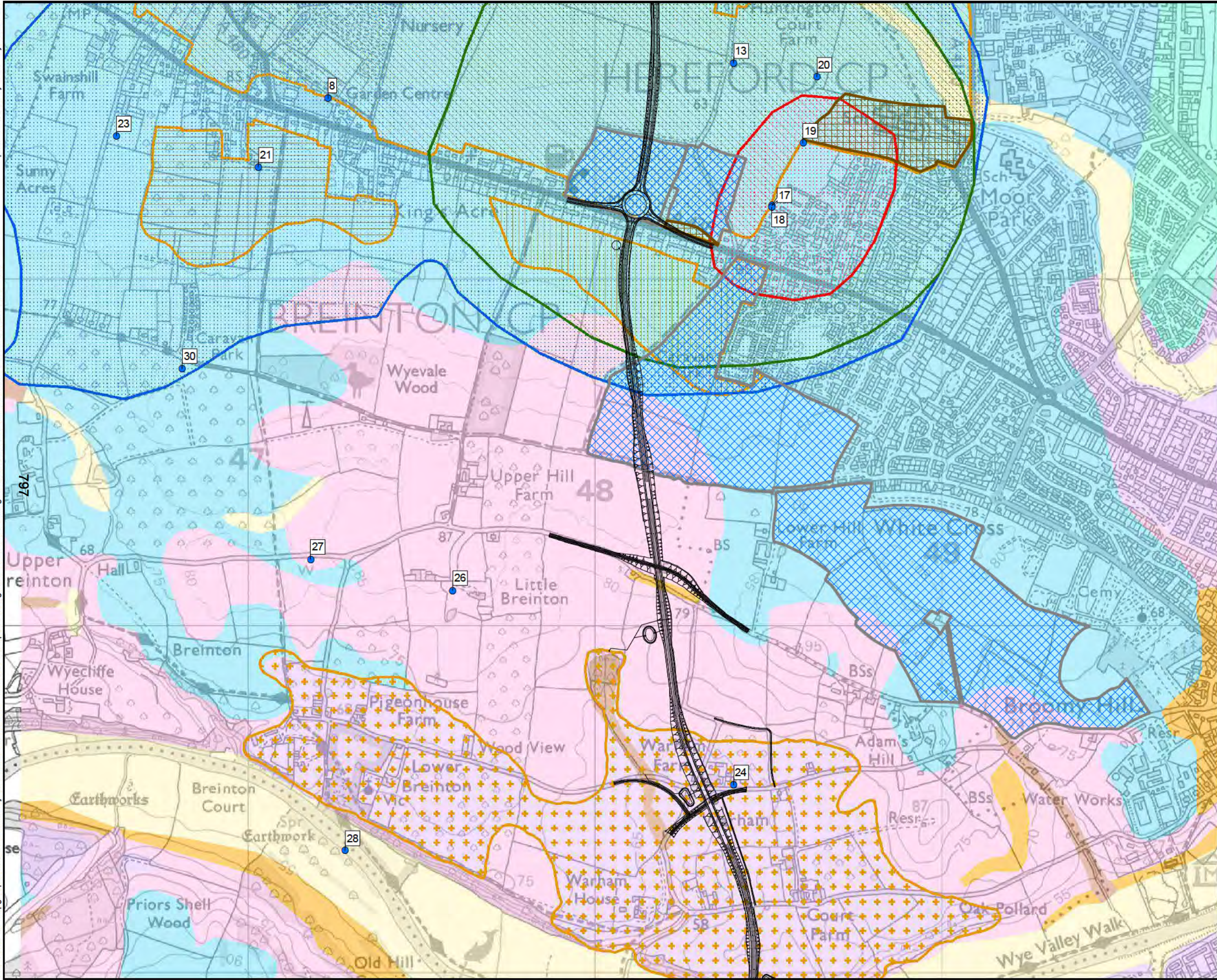
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Proposed Scheme - Yellow Option

- Water abstractions

Superficial Geology

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Bedrock Geology

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Mineral Reserves

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Agricultural Land Classifications

- Grade 1
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Source Protection Zone

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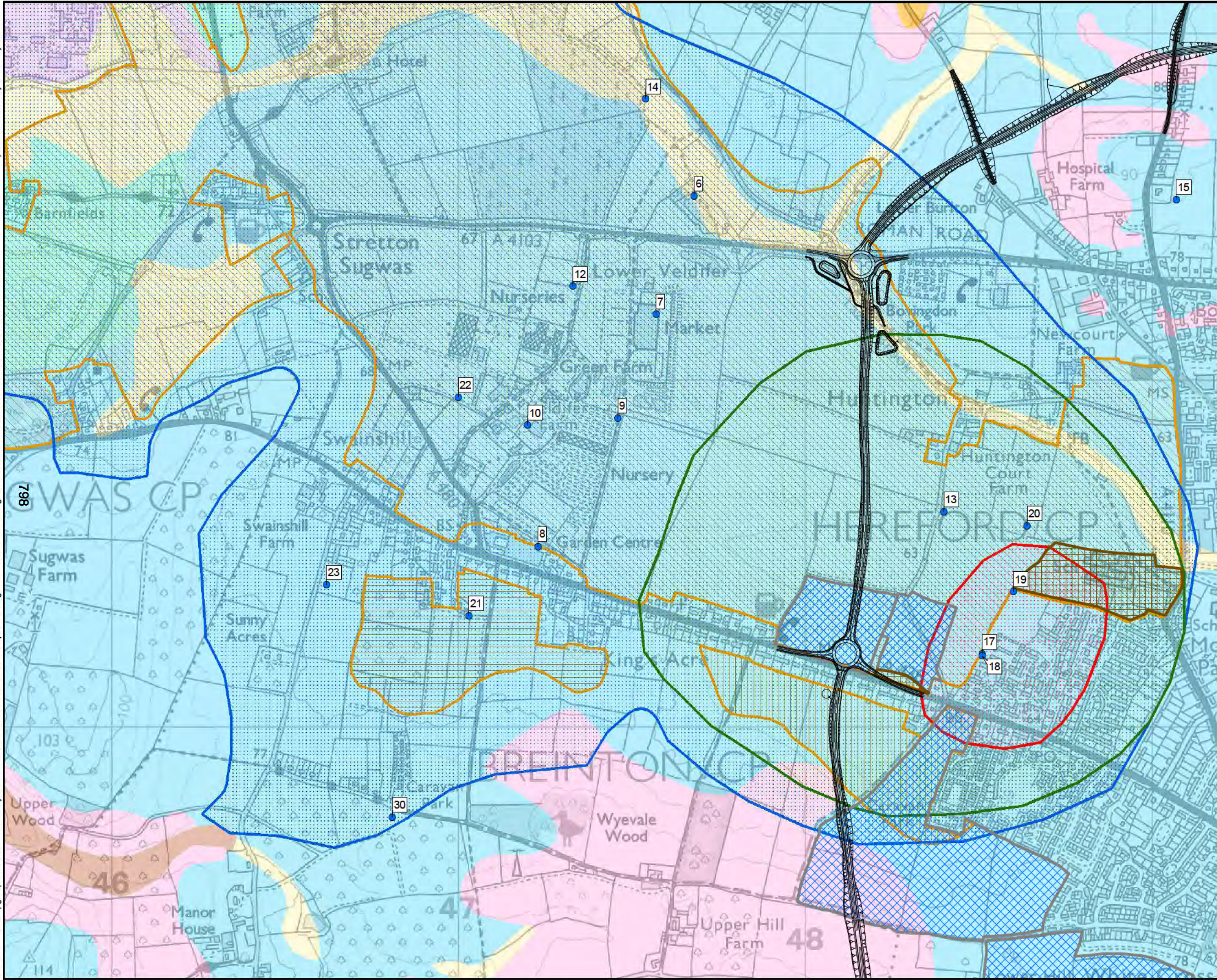
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Proposed Scheme - Yellow Option

Water abstractions

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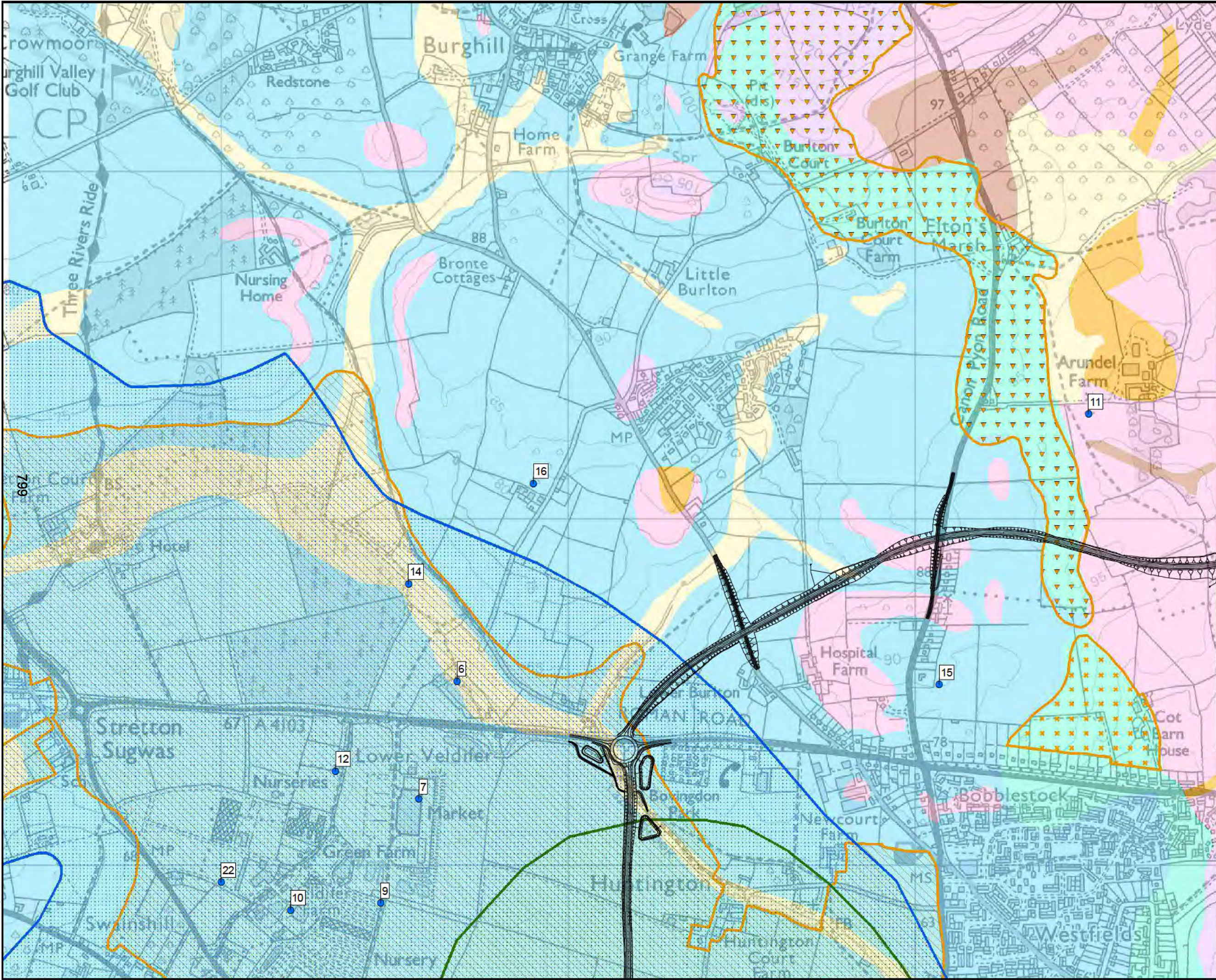
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— Proposed Scheme - Yellow Option

● Water abstractions

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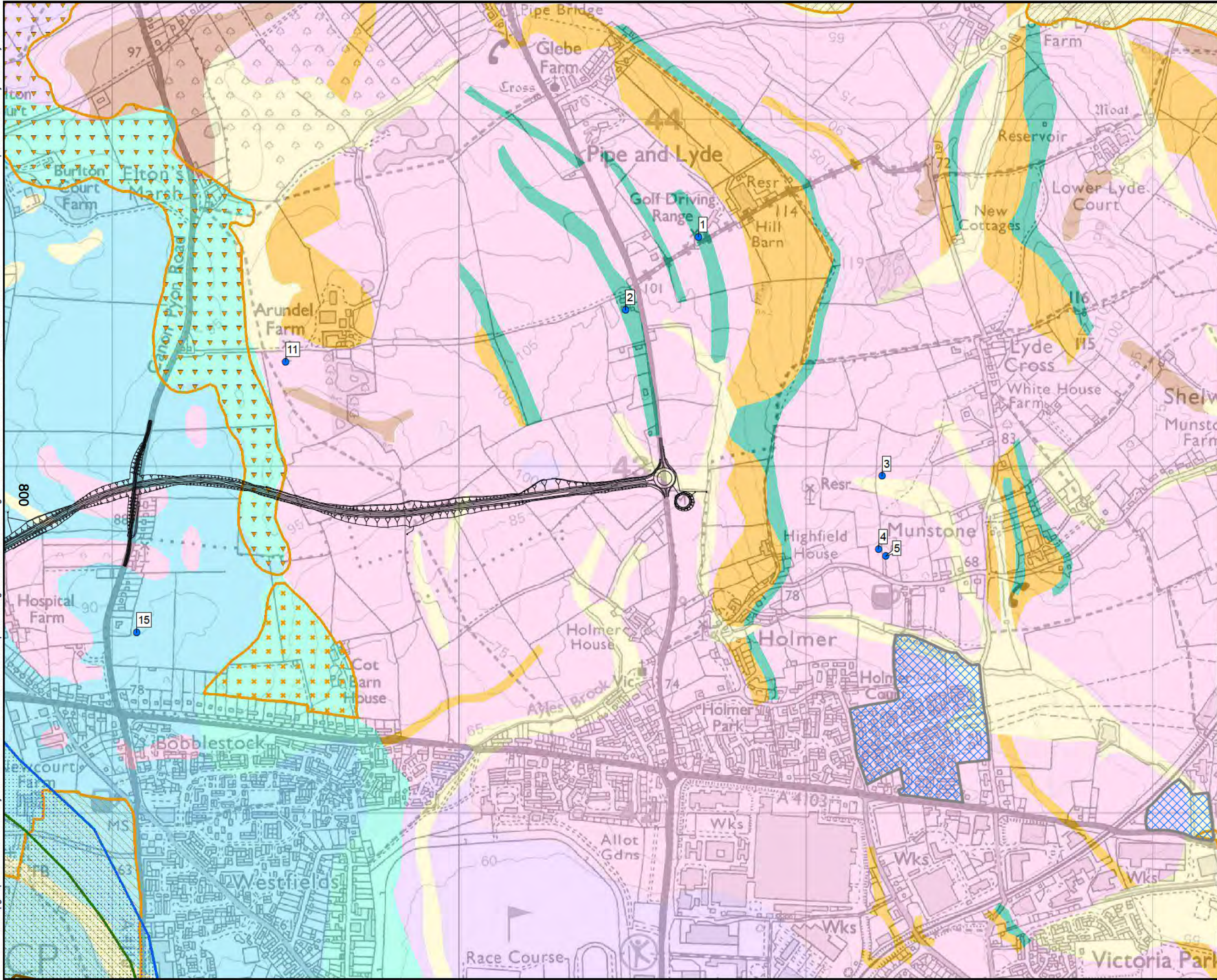
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Proposed Scheme - Yellow Option

- Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - mudstone, calcareous
- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_044. Sand/Grav Deposit
- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_076. Sand/Grav Deposit
- MINS_SG_077. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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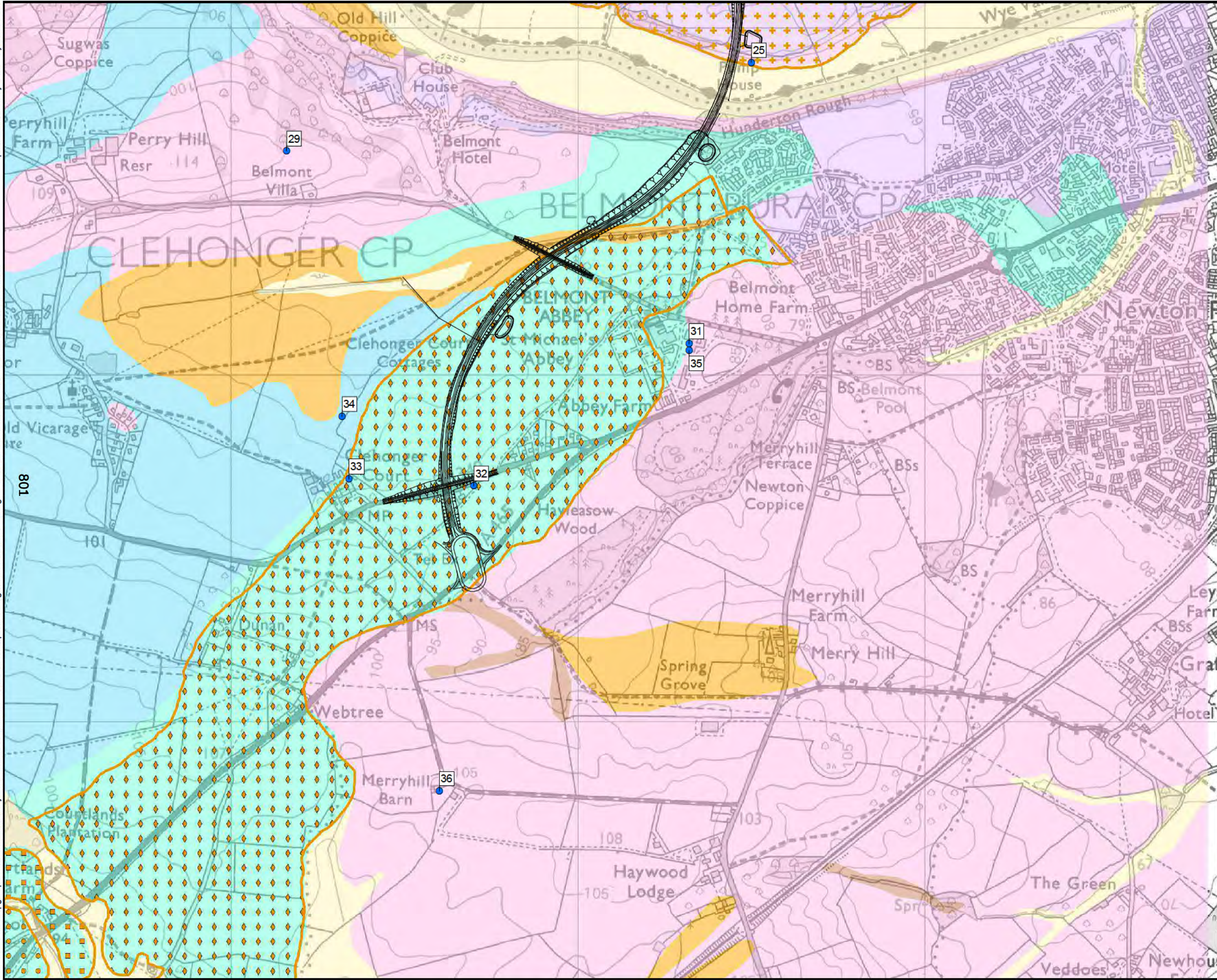
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GROUND RISK & REMEDIATION CONSTRAINTS
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PAGE 5 OF 5

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Proposed Scheme - Red Option

Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- River terrace deposits, 1 sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_082. Sand/Grav Deposit
- MINS_SG_083. Sand/Grav Deposit
- MINS_SG_084. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

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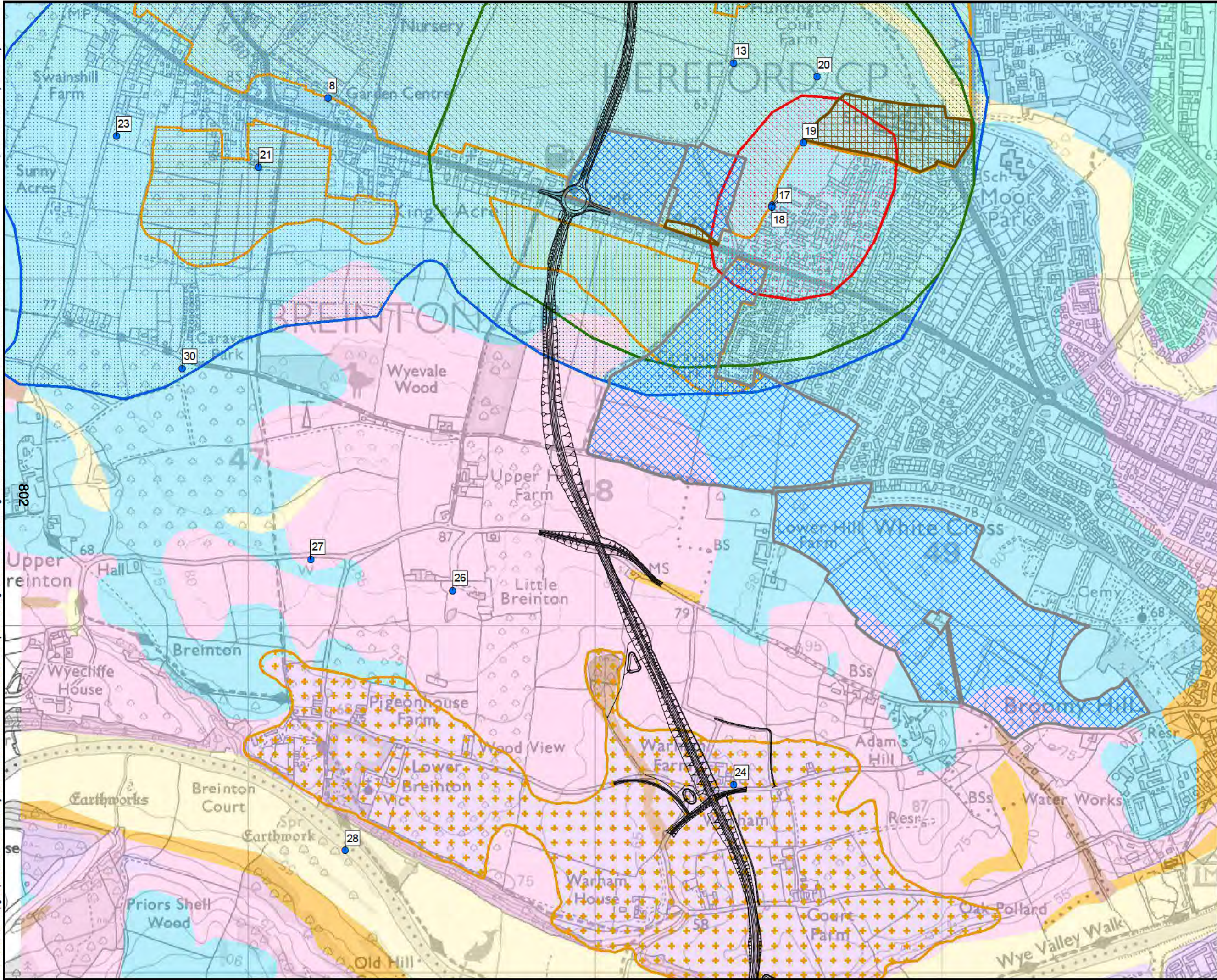
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GROUND RISK & REMEDIATION CONSTRAINTS & PROPOSED SCHEME - RED
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Proposed Scheme - Red Option

Water abstractions

Superficial Geology

Alluvium - Clay, silt, sand and gravel

Glaciofluvial sheet deposits, Devensian - sand and gravel

Head - clay, silt, sand and gravel

Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel

River terrace deposits, 1 sand and gravel

Till, devensian - diamicton

Bedrock Geology

Raglan mudstone formation - sandstone

Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

MINS_SG_071. Sand/Grav Deposit

MINS_SG_074. Sand/Grav Deposit

MINS_SG_075. Sand/Grav Deposit

MINS_SG_087. Sand/Grav Deposit

Agricultural Land Classifications

Grade 1

Grade 2

Source Protection Zone

Zone I - Inner Protection Zone

Zone II - Outer Protection Zone

Zone III - Total Catchment

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FIGURE 11-4
GROUND RISK & REMEDIATION CONSTRAINTS
& PROPOSED SCHEME - RED
PAGE 2 OF 5

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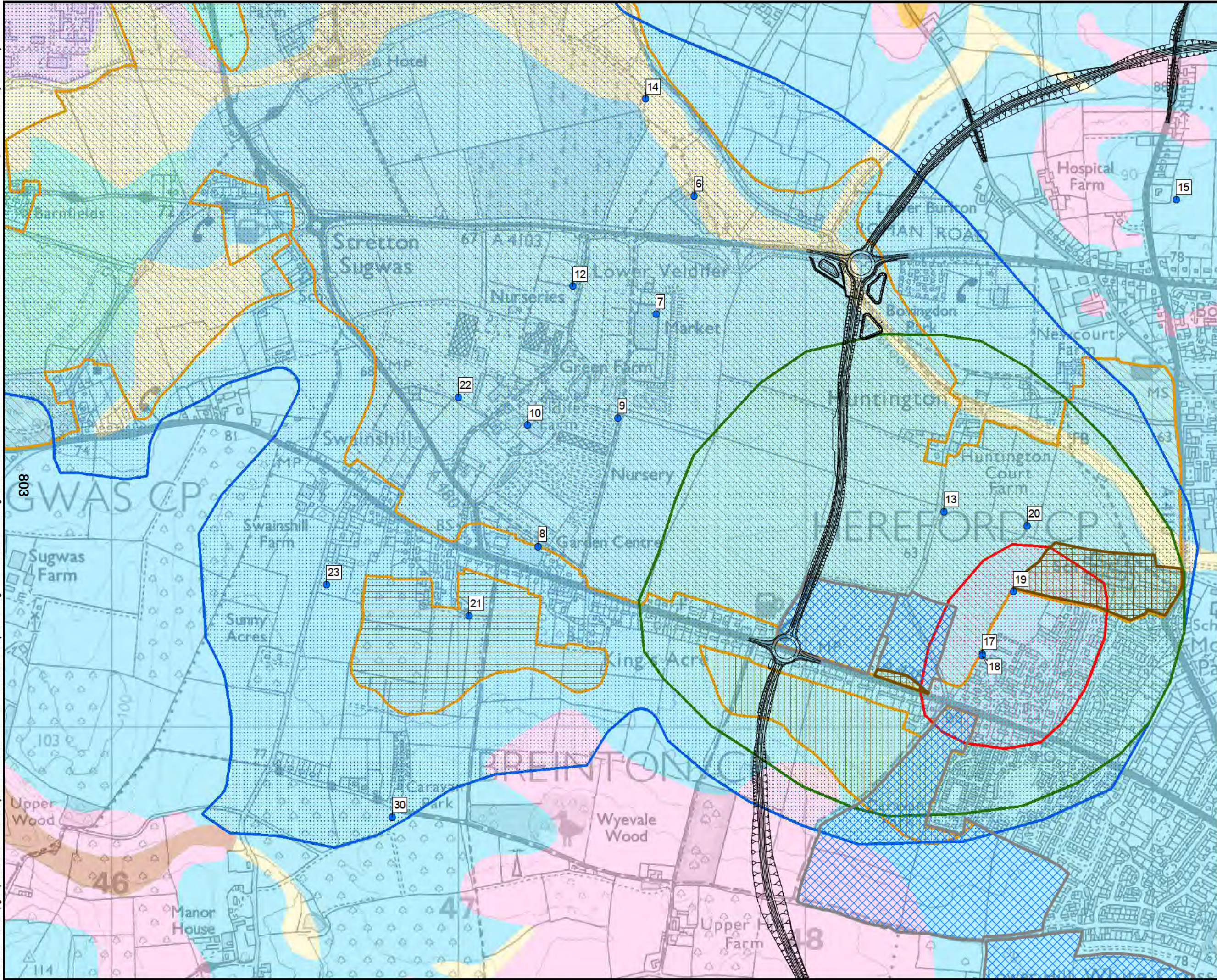
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— Proposed Scheme - Red Option

● Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_074. Sand/Grav Deposit
- MINS_SG_075. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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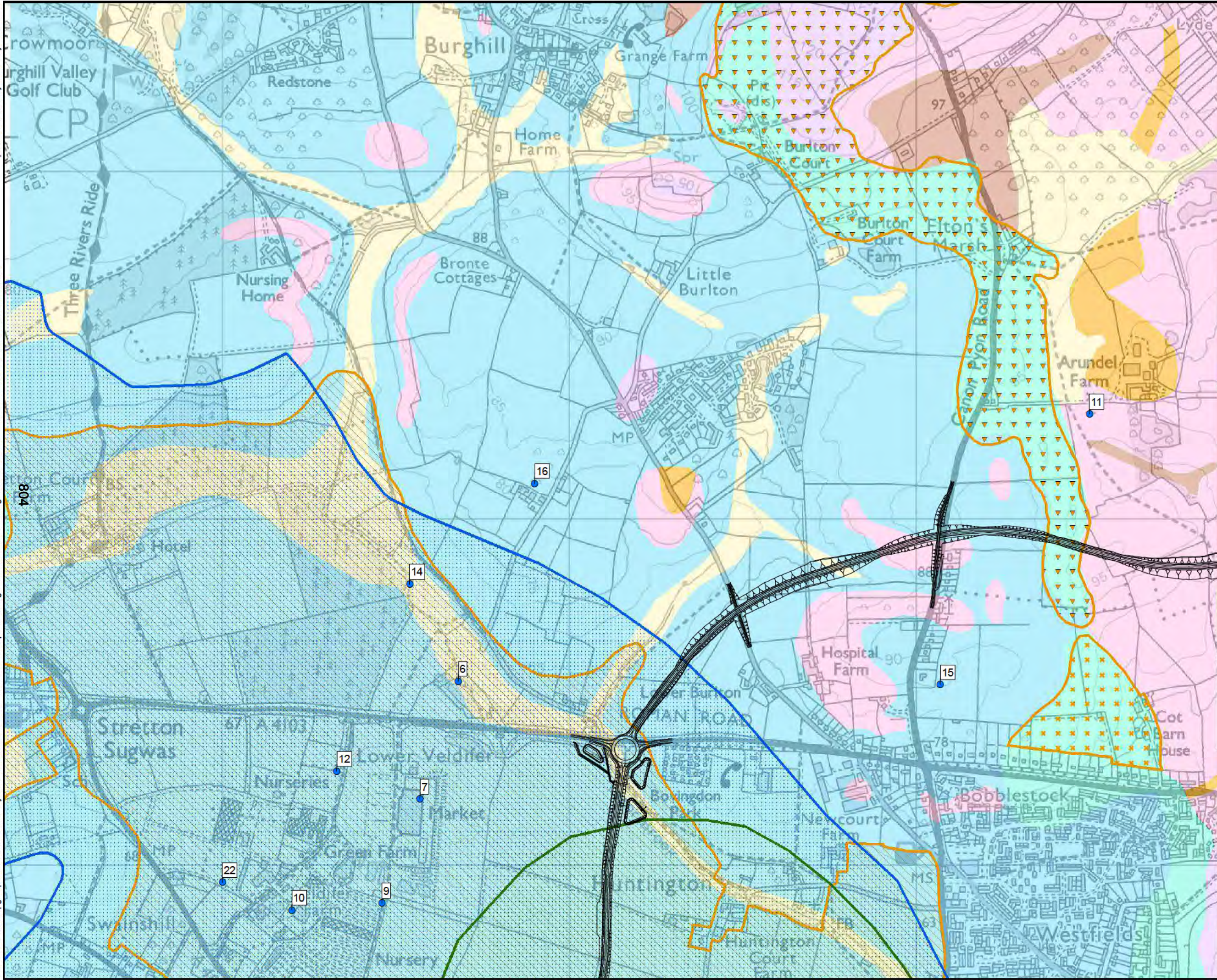
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GROUND RISK & REMEDIATION CONSTRAINTS & PROPOSED SCHEME - RED
PAGE 3 OF 5

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Proposed Scheme - Red Option

Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_076. Sand/Grav Deposit
- MINS_SG_077. Sand/Grav Deposit

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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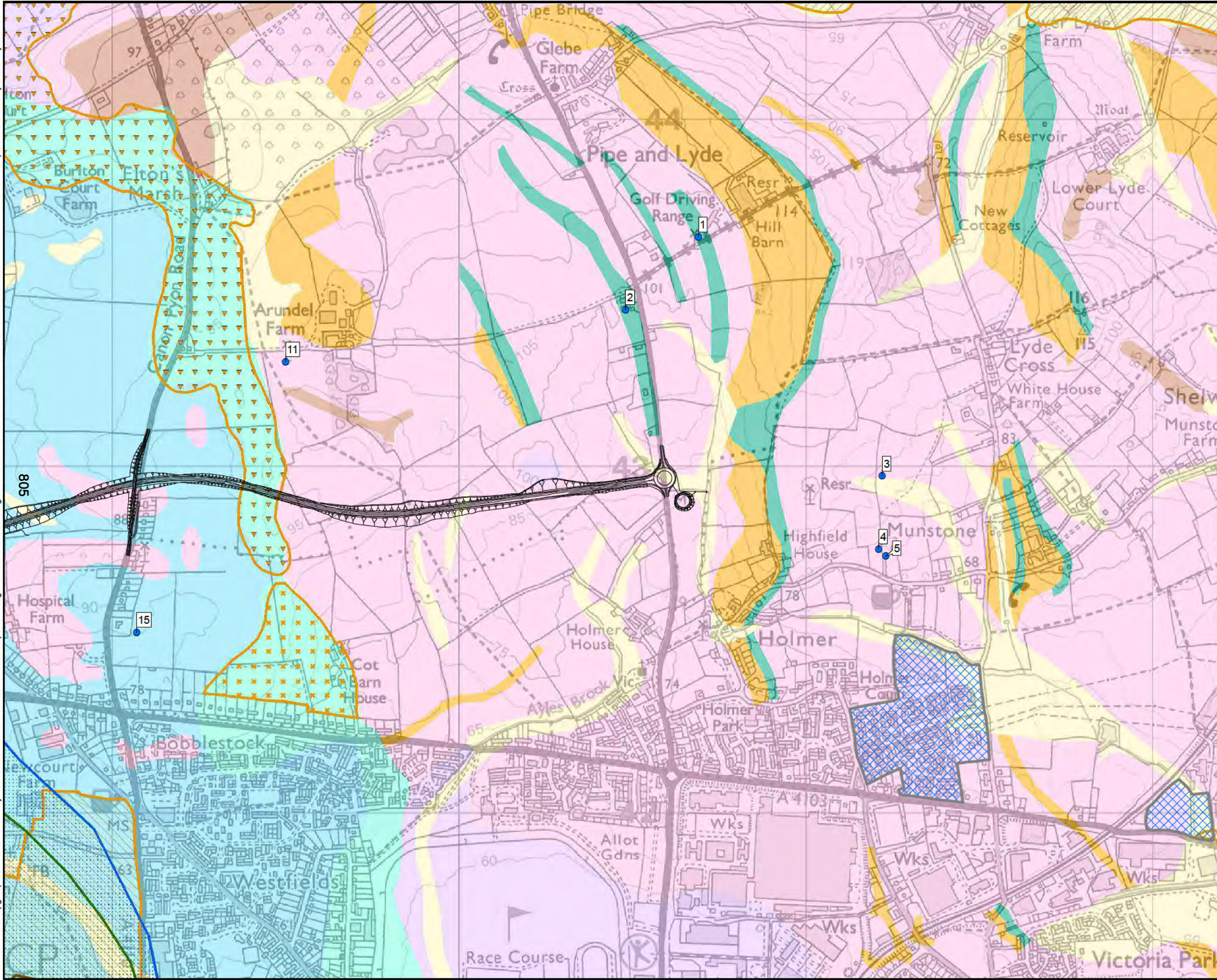
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GROUND RISK & REMEDIATION CONSTRAINTS & PROPOSED SCHEME - RED
PAGE 4 OF 5

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— Proposed Scheme - Red Option

● Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - mudstone, calcareous
- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_044. Sand/Grav Deposit
- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_076. Sand/Grav Deposit
- MINS_SG_077. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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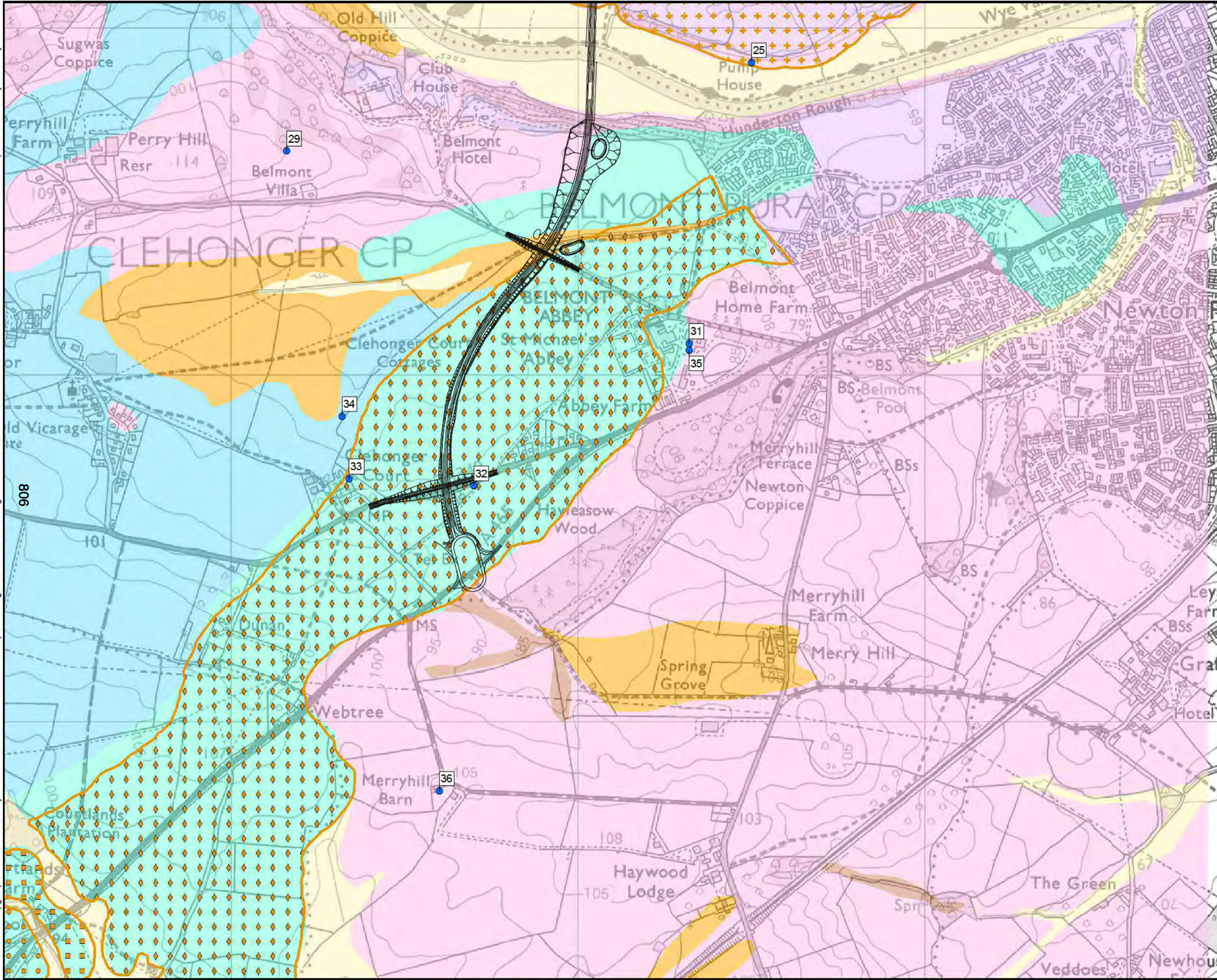
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Proposed Scheme - Olive Option

- Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- River terrace deposits, 1 sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_082. Sand/Grav Deposit
- MINS_SG_083. Sand/Grav Deposit
- MINS_SG_084. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

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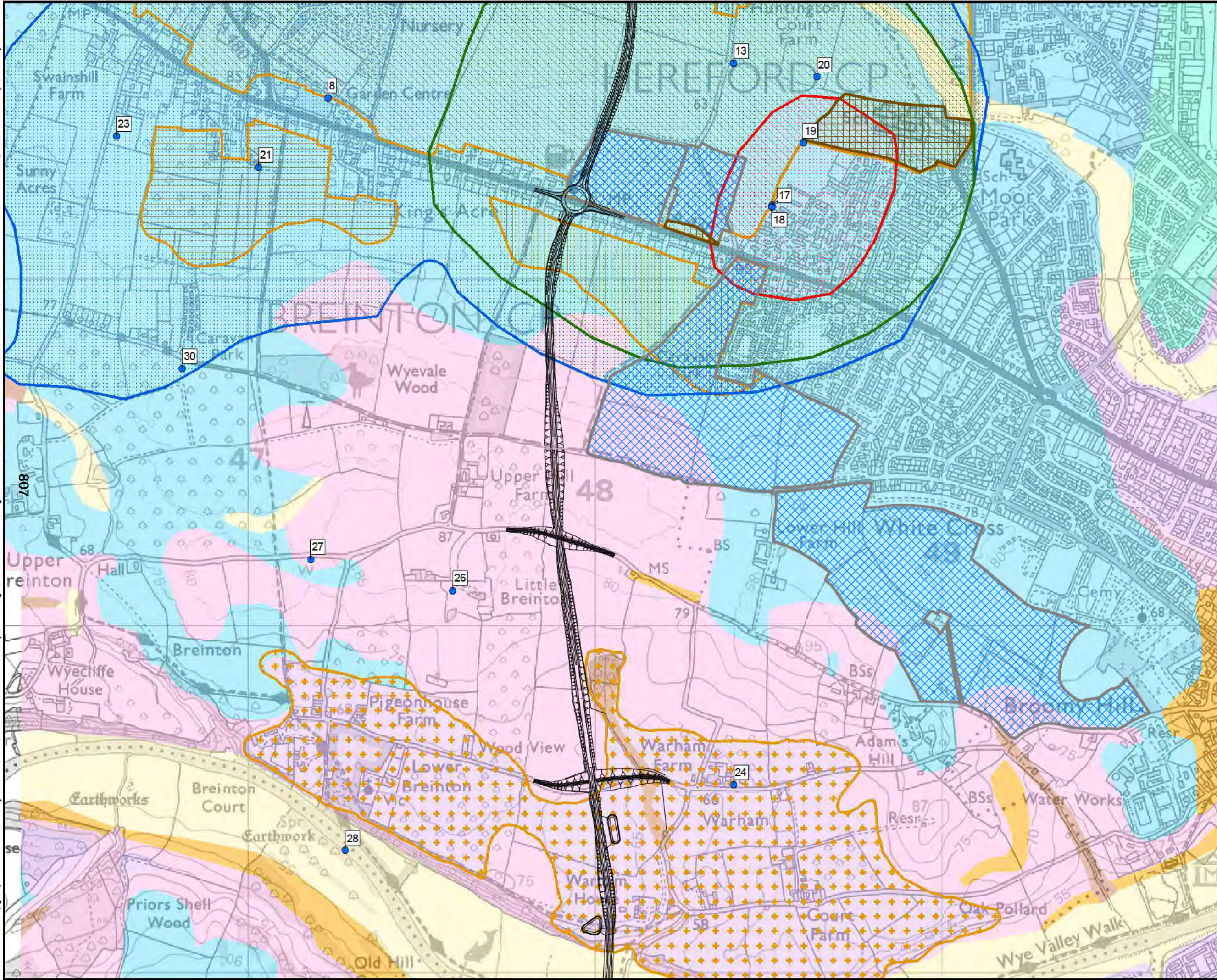
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& PROPOSED SCHEME - OLIVE
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— Proposed Scheme - Olive Option

● Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- River terrace deposits, 1 sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_074. Sand/Grav Deposit
- MINS_SG_075. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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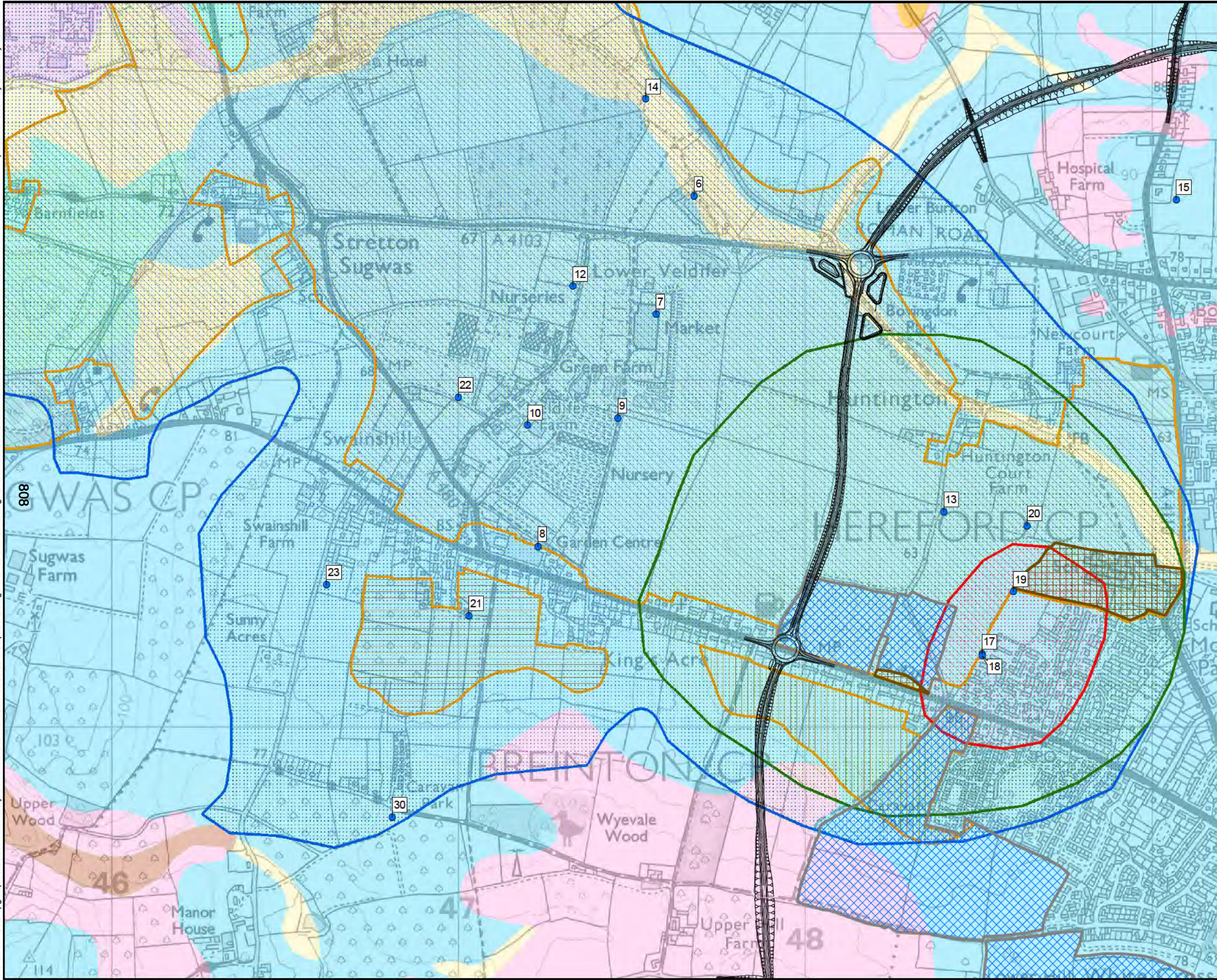
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GROUND RISK & REMEDIATION CONSTRAINTS
& PROPOSED SCHEME - OLIVE
PAGE 2 OF 5

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— Proposed Scheme - Olive Option

● Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_074. Sand/Grav Deposit
- MINS_SG_075. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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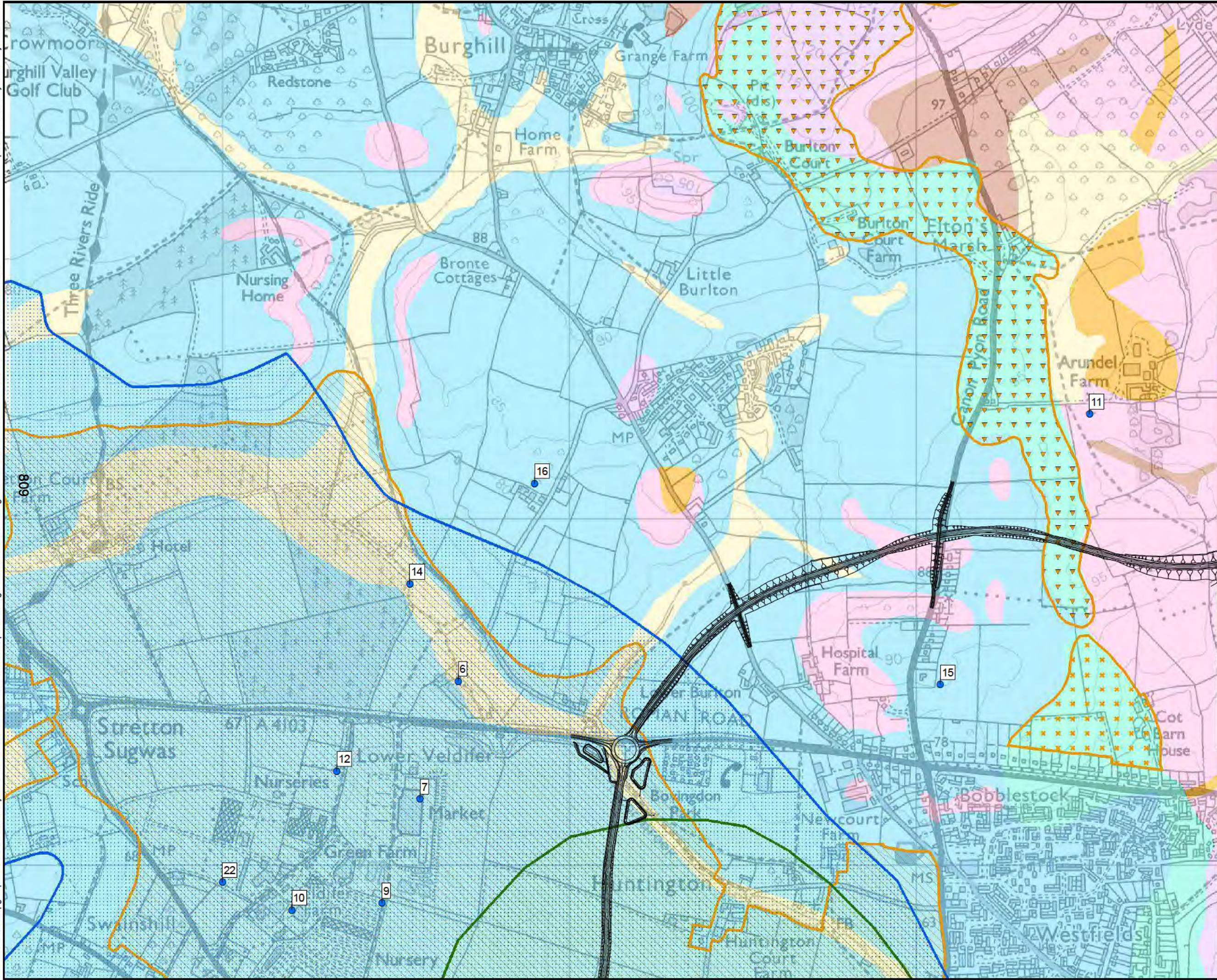
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PAGE 3 OF 5

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— Proposed Scheme - Olive Option

● Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_076. Sand/Grav Deposit
- MINS_SG_077. Sand/Grav Deposit

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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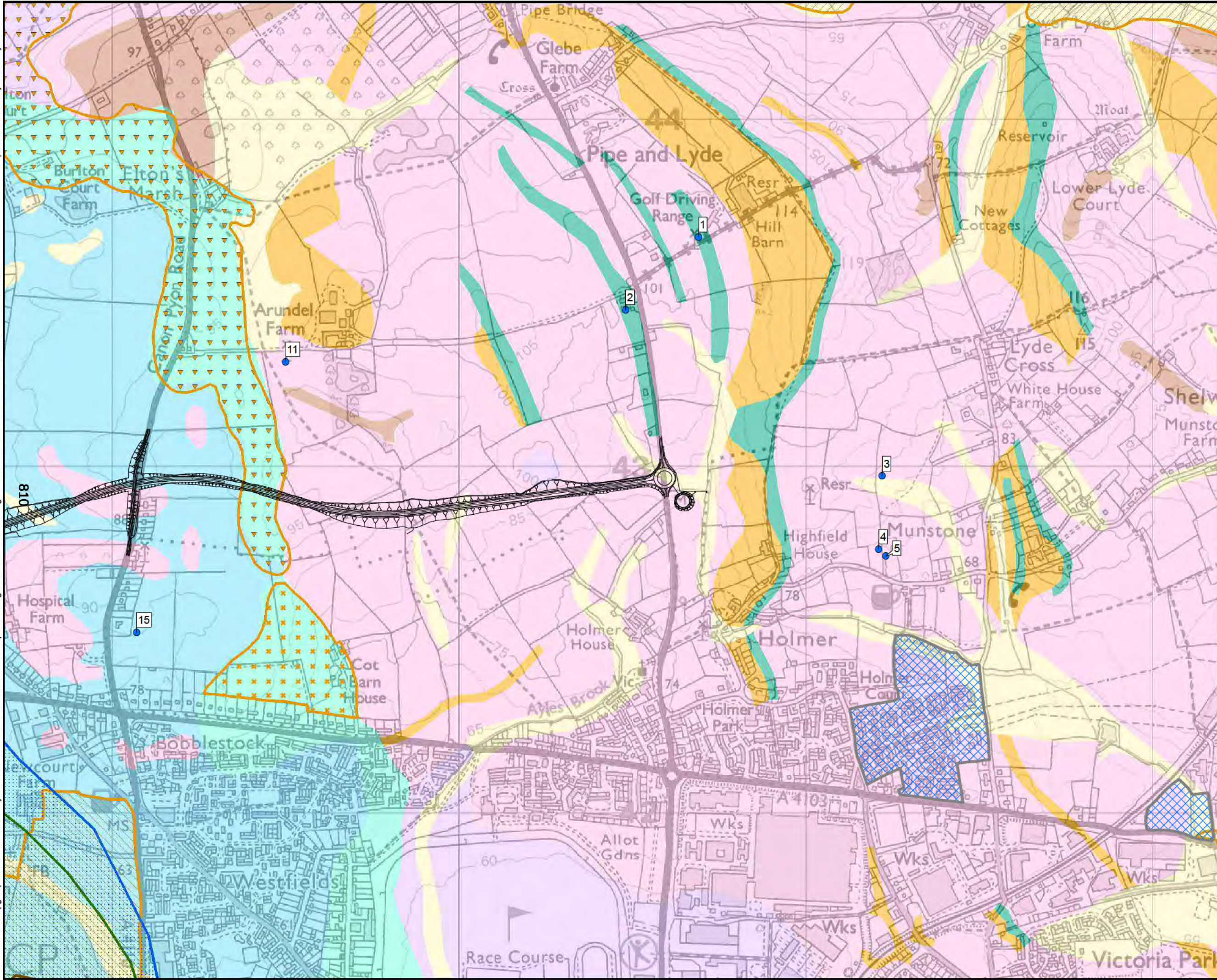
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GROUND RISK & REMEDIATION CONSTRAINTS
& PROPOSED SCHEME - OLIVE
PAGE 4 OF 5

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Proposed Scheme - Olive Option

Water abstractions

Superficial Geology

Bedrock Geology

Mineral Reserves

Agricultural Land Classifications

Source Protection Zone

● Water abstractions

Alluvium - Clay, silt, sand and gravel

Glaciofluvial sheet deposits, Devensian - sand and gravel

Head - clay, silt, sand and gravel

Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel

Till, devensian - diamicton

Raglan mudstone formation - mudstone, calcareous

Raglan mudstone formation - sandstone

Raglan mudstone formation - siltstone and mudstone, interbedded

MINS_SG_044. Sand/Grav Deposit

MINS_SG_071. Sand/Grav Deposit

MINS_SG_076. Sand/Grav Deposit

MINS_SG_077. Sand/Grav Deposit

Grade 1

Grade 2

Zone I - Inner Protection Zone

Zone II - Outer Protection Zone

Zone III - Total Catchment

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FIGURE 11-5
GROUND RISK & REMEDIATION CONSTRAINTS
& PROPOSED SCHEME - OLIVE
PAGE 5 OF 5

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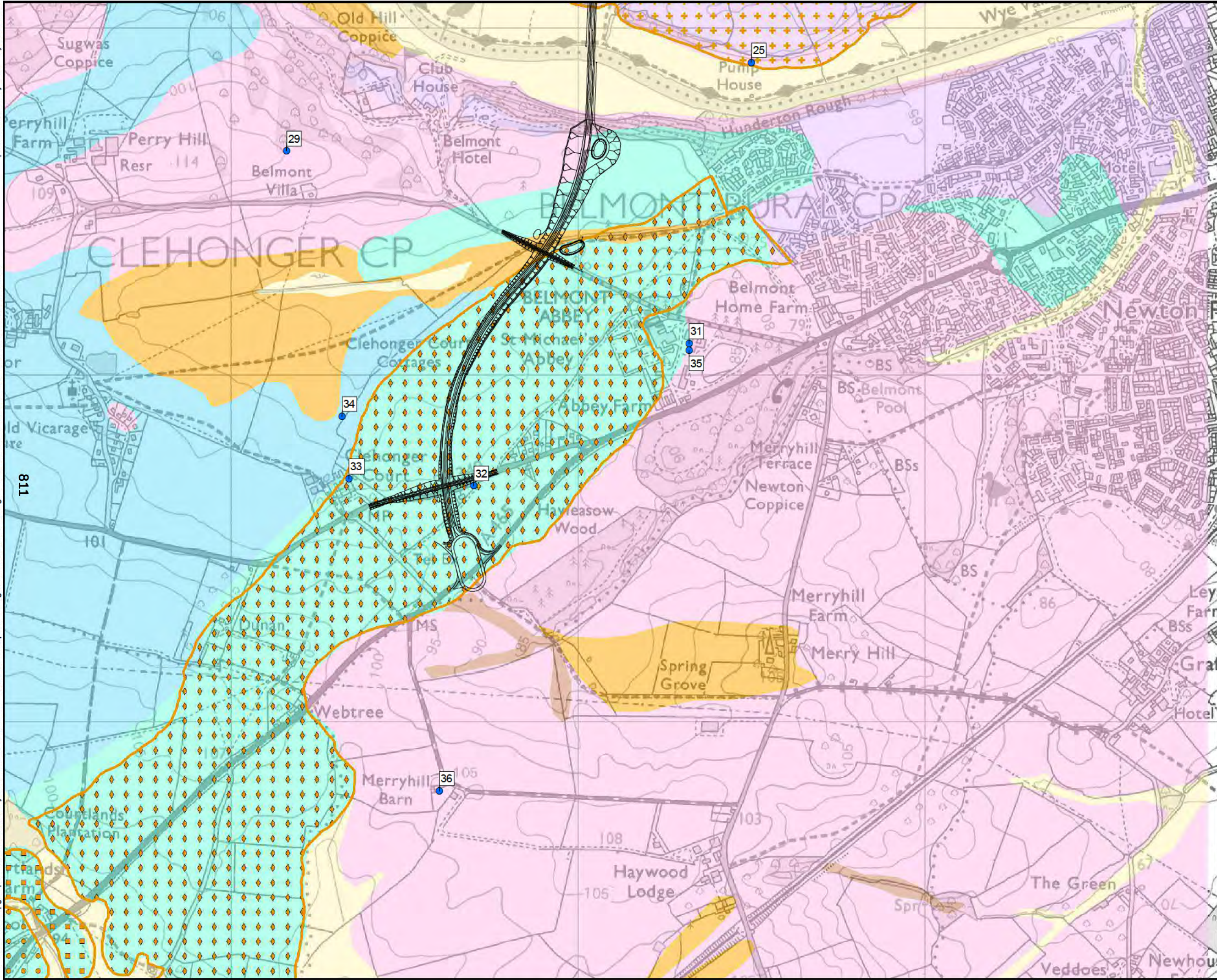
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Proposed Scheme - Black 1 Option

Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- River terrace deposits, 1 sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_082. Sand/Grav Deposit
- MINS_SG_083. Sand/Grav Deposit
- MINS_SG_084. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

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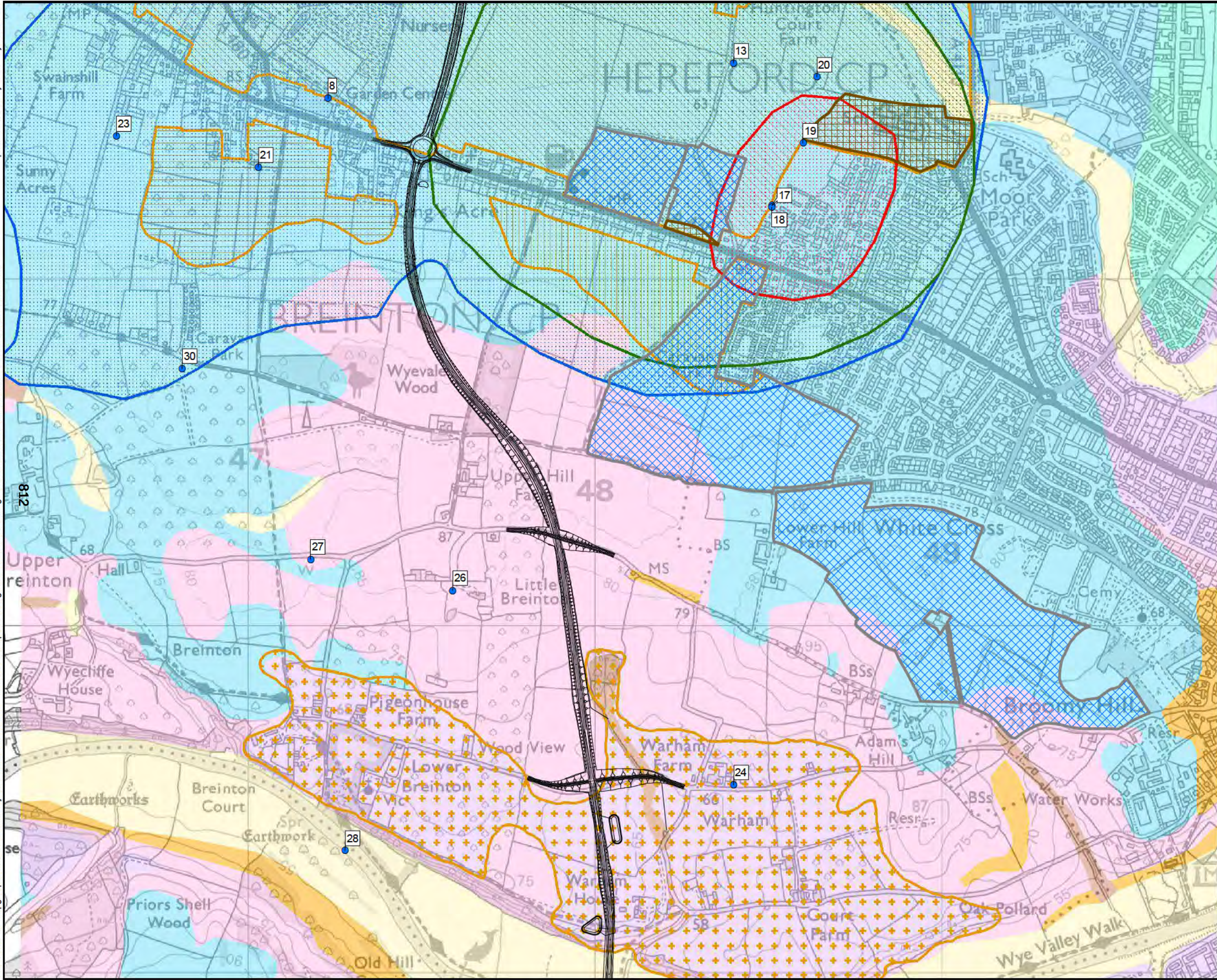
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GROUND RISK & REMEDIATION CONSTRAINTS
& PROPOSED SCHEME - BLACK 1
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— Proposed Scheme - Black 1 Option

● Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- River terrace deposits, 1 sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_074. Sand/Grav Deposit
- MINS_SG_075. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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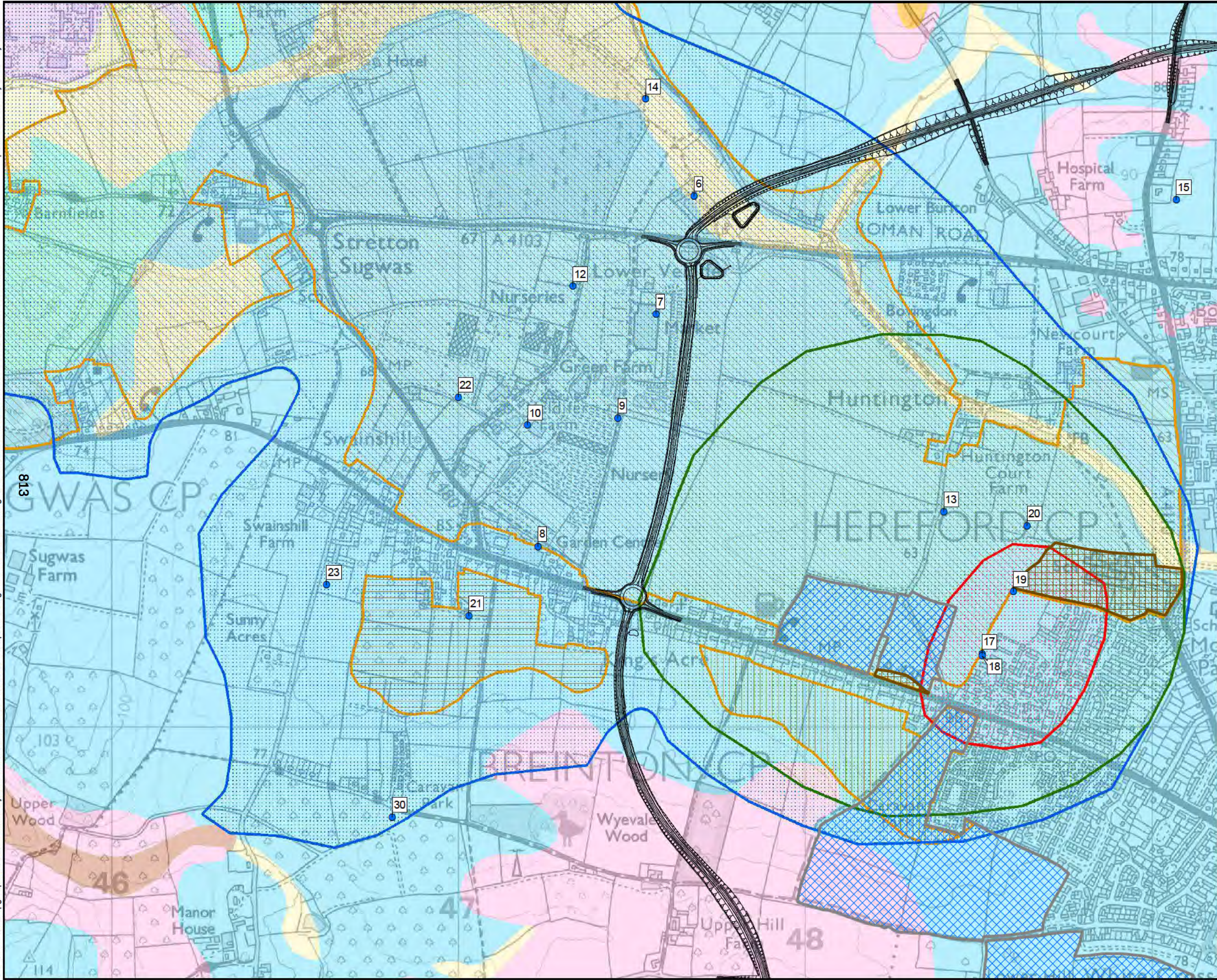
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GROUND RISK & REMEDIATION CONSTRAINTS
& PROPOSED SCHEME - BLACK 1
PAGE 2 OF 5

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— Proposed Scheme - Black 1 Option

● Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_074. Sand/Grav Deposit
- MINS_SG_075. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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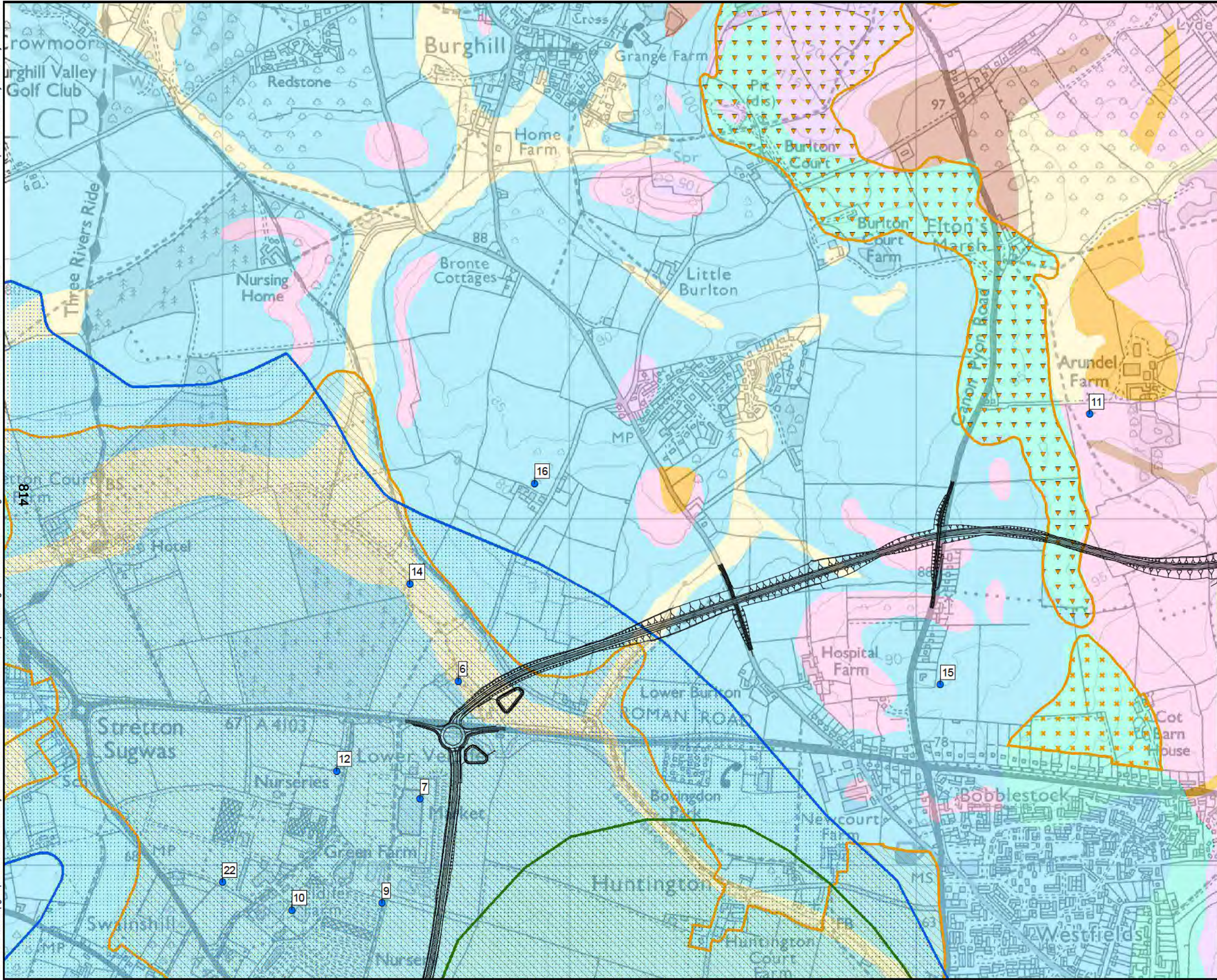
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GROUND RISK & REMEDIATION CONSTRAINTS
& PROPOSED SCHEME - BLACK 1
PAGE 3 OF 5**

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Proposed Scheme - Black 1 Option

- Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_076. Sand/Grav Deposit
- MINS_SG_077. Sand/Grav Deposit

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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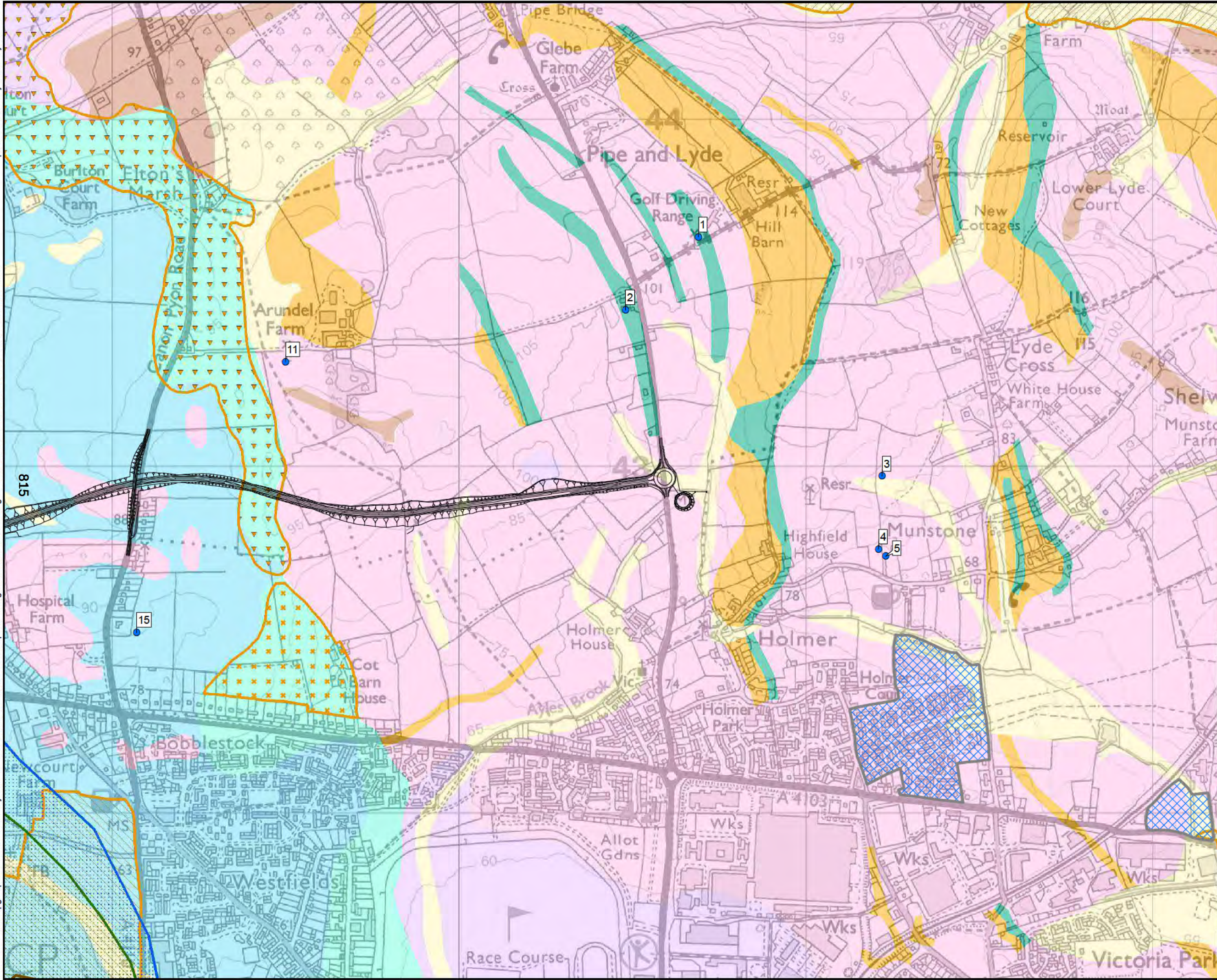
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GROUND RISK & REMEDIATION CONSTRAINTS
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Proposed Scheme - Black 1 Option

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- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - mudstone, calcareous
- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_044. Sand/Grav Deposit
- MINS_SG_071. Sand/Grav Deposit
- MINS_SG_076. Sand/Grav Deposit
- MINS_SG_077. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

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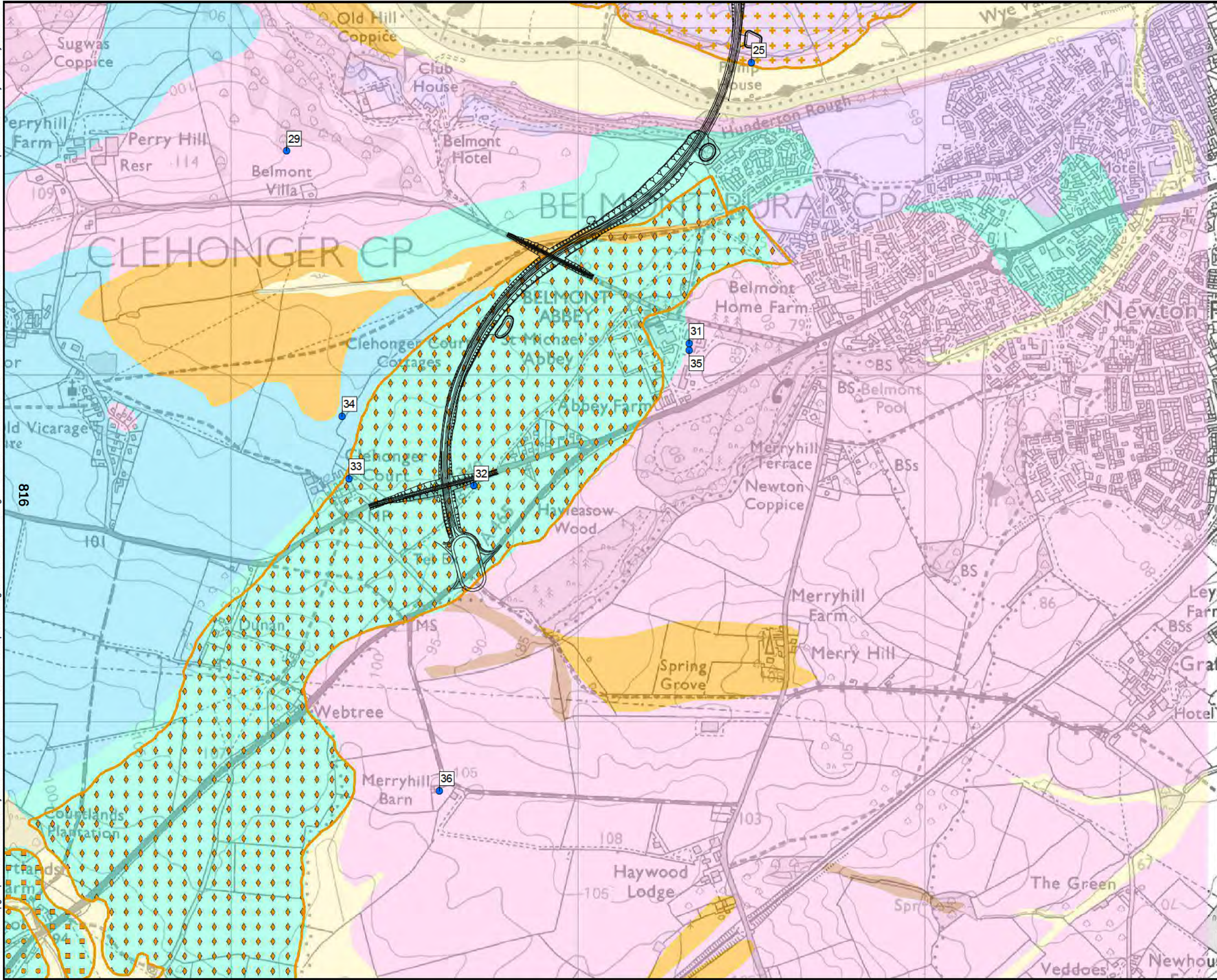
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Proposed Scheme - Black 2 Option

Water abstractions

Superficial Geology

- Alluvium - Clay, silt, sand and gravel
- Glaciofluvial sheet deposits, Devensian - sand and gravel
- Head - clay, silt, sand and gravel
- Hummocky (moundy) glacial deposits, devensian - diamicton, sand and gravel
- River terrace deposits, 1 sand and gravel
- Till, devensian - diamicton

Bedrock Geology

- Raglan mudstone formation - sandstone
- Raglan mudstone formation - siltstone and mudstone, interbedded

Mineral Reserves

- MINS_SG_082. Sand/Grav Deposit
- MINS_SG_083. Sand/Grav Deposit
- MINS_SG_084. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

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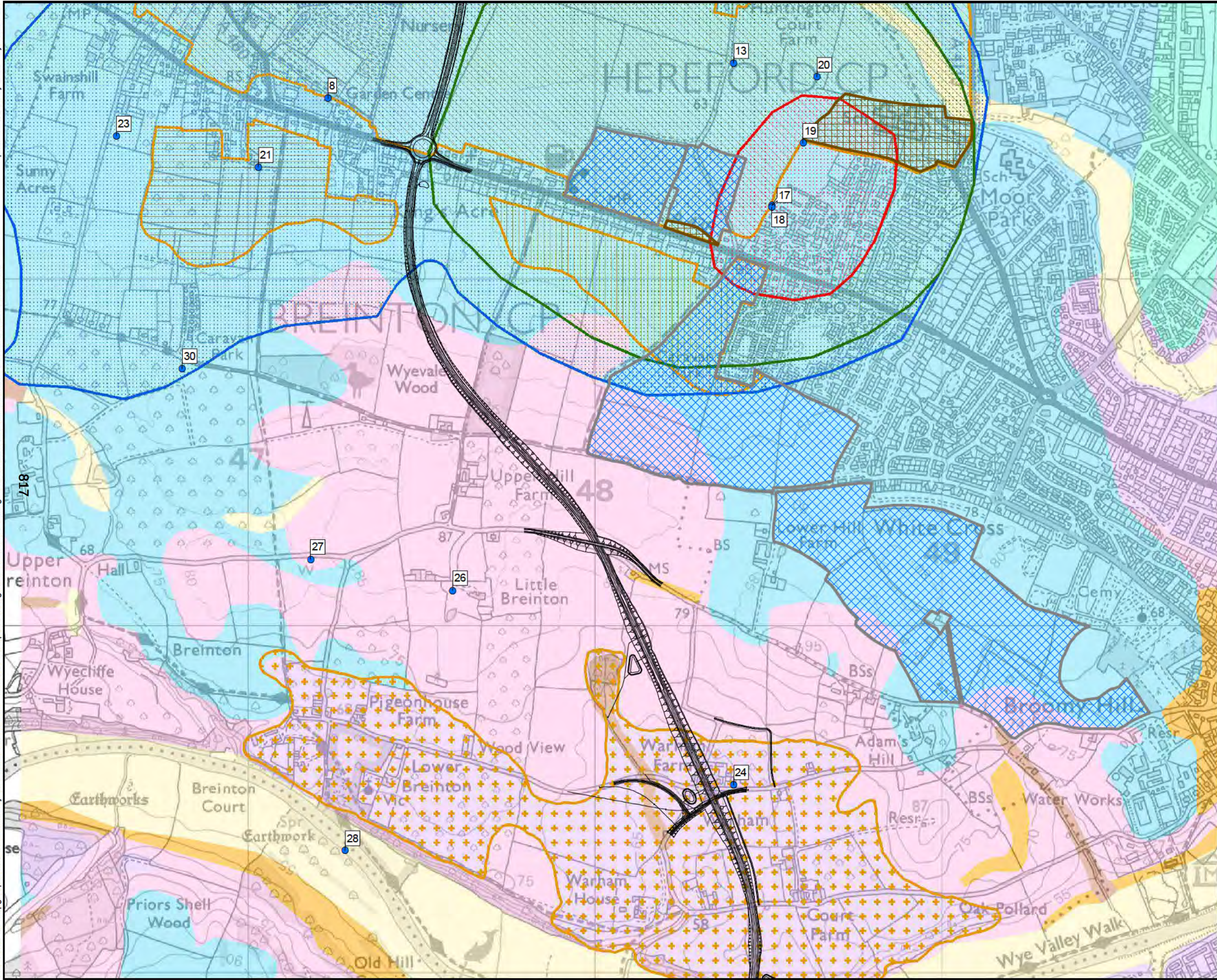
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PAGE 1 OF 5

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— Proposed Scheme - Black 2 Option

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Mineral Reserves

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- MINS_SG_074. Sand/Grav Deposit
- MINS_SG_075. Sand/Grav Deposit
- MINS_SG_087. Sand/Grav Deposit

Agricultural Land Classifications

- Grade 1
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Source Protection Zone

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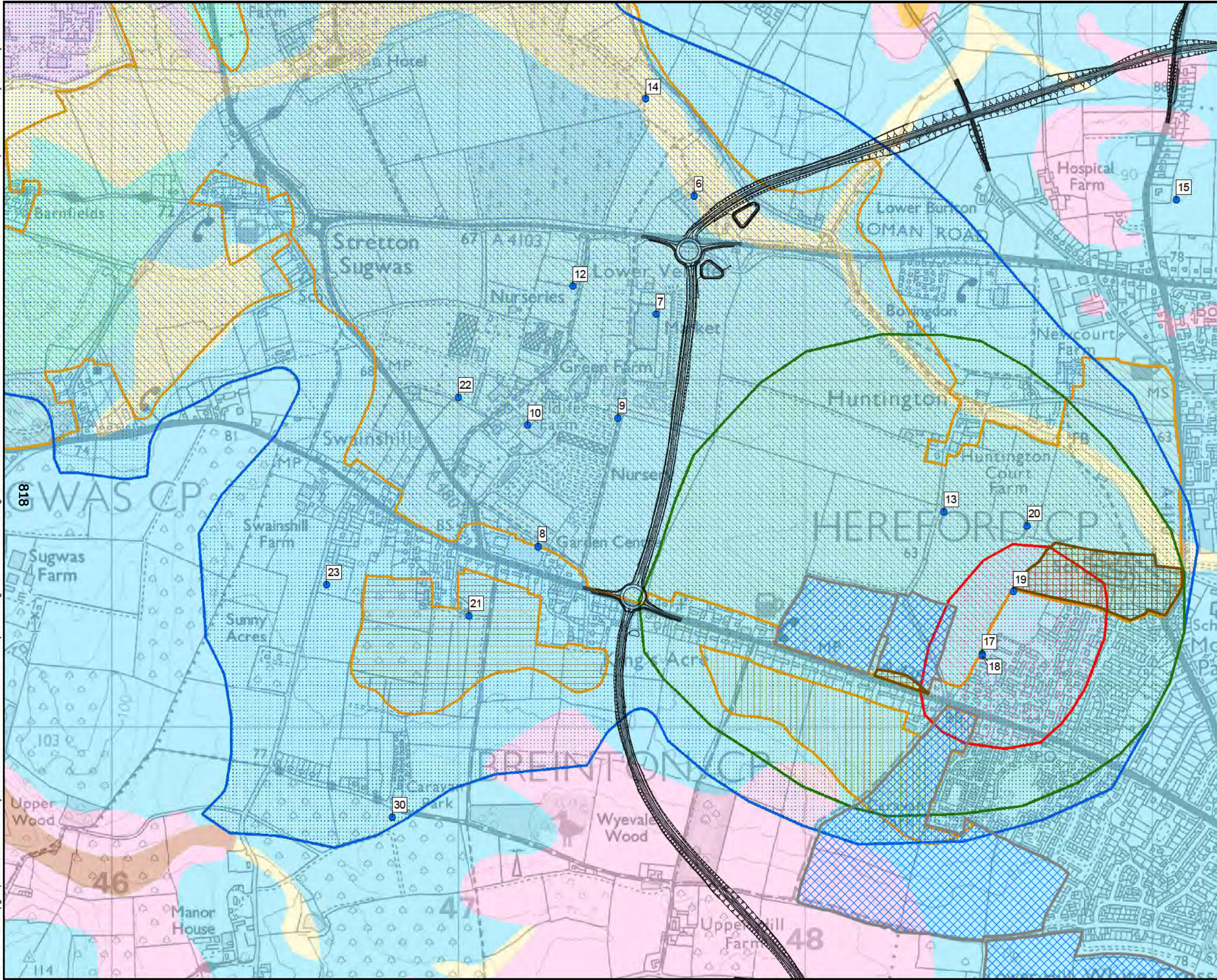
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— Proposed Scheme - Black 2 Option

● Water abstractions

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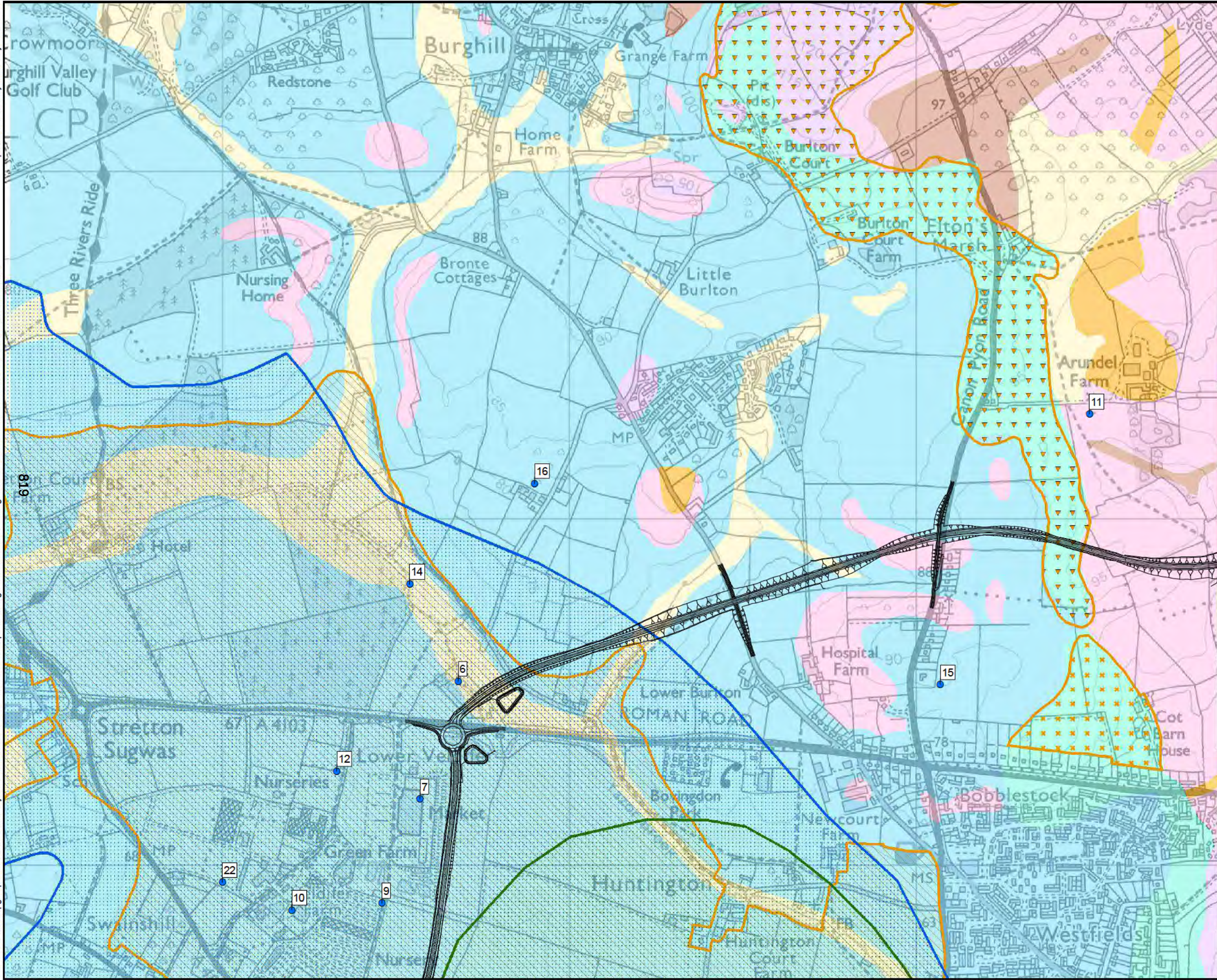
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Proposed Scheme - Black 2 Option

- Water abstractions

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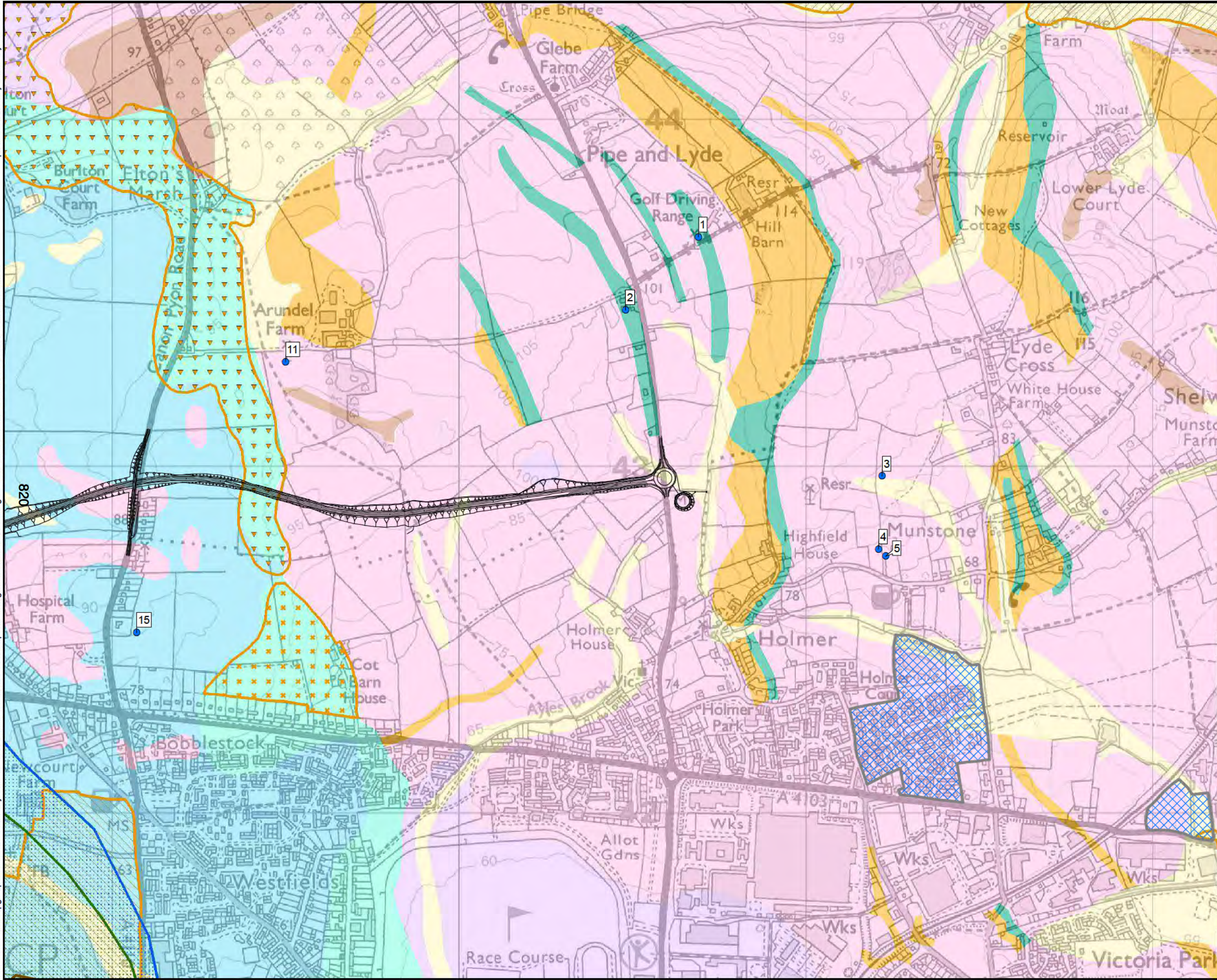
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Proposed Scheme - Black 2 Option

- Water abstractions

Superficial Geology

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Bedrock Geology

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Mineral Reserves

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Agricultural Land Classifications

- Grade 1
- Grade 2

Source Protection Zone

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TITLE: FIGURE 11-7
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& PROPOSED SCHEME - BLACK 2
PAGE 5 OF 5

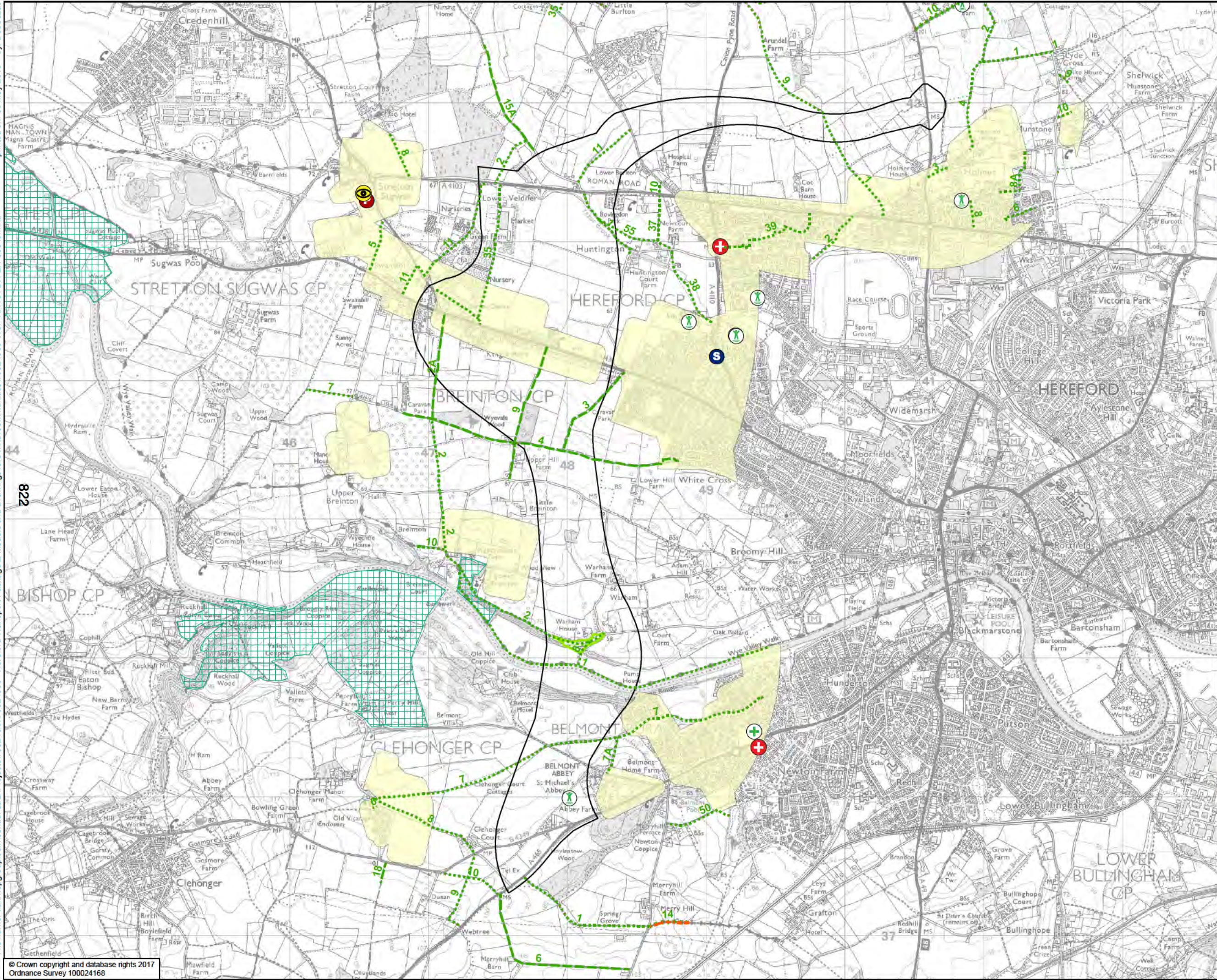
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Appendix 13-1

PEOPLE & COMMUNITIES FIGURES

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Study Area

Healthcare Services

GP Practice

Pharmacy

Optician

Sports and Fitness

SchoolType

Primary

Secondary

National Trust sites

Queen Elizabeth II Field

Residential and Commercial Areas

PRoW

Bridleway

Byway

Footpath

National Cycle Network (46)

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FIGURE 13-1
COMMUNITIES AND TRANSPORTATION
CONSTRAINTS MAP

SCALE @ A3
1:25,000

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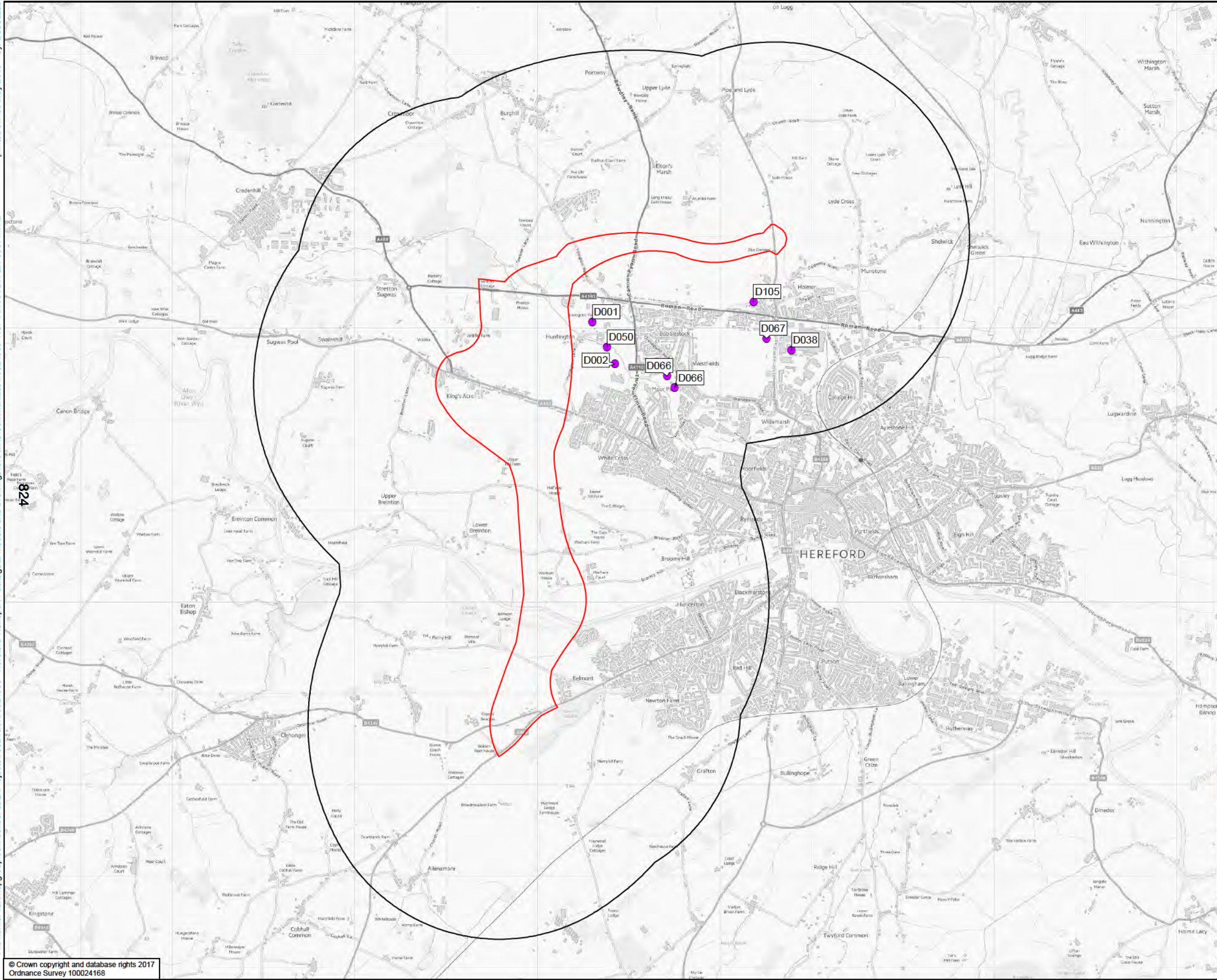
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Appendix 15-1

COMBINED AND CUMULATIVE FIGURES

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Core Strategy Area

2km Study Area

Other Development Sites

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TITLE

FIGURE 15-1
DEVELOPMENT SITES WITHIN
THE CUMULATIVE ASSESSMENT
STUDY AREA

SCALE @ A3
1:38,000

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RG

APPROVED
MT

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Appendix 15-2

COMBINED AND CUMULATIVE UNCERTAINTY LOG

Site Code	Dev Type	Area	Location	Associated Package	Location Details	Input / Details	Hereford Council Planning App Link	Development falls under CA criteria/2km buffer?	Checked by RT	Size	Employment Type	Forecast Year	Primary Source	Policy	Uncertainty Assumption	Status	Dependencies	Delivery Lead	Public Investment	Developer Contributions
D001	Schools	Hereford	Hereford Western Urban Expansion (Three Elms)	Hereford Western Urban Expansion (Three Elms)	Location dependent on expanded capacity of A49 and local highway network, by the provision of sustainable transport measures and/or the construction of the Hereford Relief Road.	Relocation/expansion of primary school	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=162920&search-term=three+elms&search-service_search&search-source_the+keywords&search-item_Three%27and%27elms	Yes	Yes	1FE/630 places	N/A	2023	IDP	HD5	More than Likely	planning application in for 3 elms, but having issues with objections. At least 6 months to resolve.				
D002	Schools	Hereford	Hereford Western Urban Expansion (Three Elms)	Hereford Western Urban Expansion (Three Elms)		Expansion of Whitcress High School with new playing fields	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=162920&search-term=three+elms&search-service_search&search-source_the+keywords&search-item_Three%27and%27elms	Yes	Yes	1FE/150 places	N/A	2023	IDP	HD5	More than Likely		HC	HC	CIL / Sec106	
D003	Schools	Hereford	Hereford Southern Urban Expansion (Lower Bullingham)	Hereford Southern Urban Expansion (Lower Bullingham)		Primary School with pre-school accommodation	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=174101&search-term=Hereford+Lower+Bullingham&search-service_settlement&search-source_Town&search-item_Hereford+Lower+Bullingham	Yes	Yes	1FE/210 places	N/A	2021	IDP	HD6	Reasonably Foreseeable	planning application prepared but not submitted	HC	HC	CIL / Sec106	
D004	Schools	Hereford	Hereford City Centre			Expansion of Aylestone Secondary School	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=151204&search-term=Aylestone+School&search-service_search&search-source_the+keywords&search-item_Aylestone%27and%27School	No information found	Found info on planning portal - several applications with development proposals for the school including: new sports pitch, single storey extension and demolition of building and replace with five new two-bay mobile classrooms. Yes	120 places	N/A	2025	IDP		Reasonably Foreseeable		HC	HC	CIL / Sec106	
D005	Schools	Ledbury	Land north of the Viaduct	Land north of the Viaduct	Site for a mixed use development including the erection of up to 625 new homes (including affordable housing), up to 2.9 hectares of B1 employment land, a canal corridor, public open space (including a linear park).		https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=171532&search-north%20of%20the%20viaduct	No over 2km/s	2.9ha for 625 new houses	210 places	N/A	2021	IDP	LB2	More than Likely	new school or a redevelopment, planning application in	HC	HC or Developer through developer contributions.	CIL / Sec106	
D006	Schools	Ross-on-Wye	Hildersley	Hildersley		Additional capacity for John Kyrie Secondary School; secondary, post-16 and youth/community infrastructure and further special educational needs.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=152938&search-term=John+Kyrie+School&search-service_search&search-source_the+keywords&search-item_John%27Kyrie%27and%27School	No over 2km/s	100sqm	Unknown	Unknown	2020	IDP		Near Certain	been to comm tee subject to S106 signed. Not a new school, but just an extension	HC	HC	CIL / Sec106	
D007	Schools	Leominster				Primary School with pre-school facilities	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=152258&search=leominster%20primary%20school	No over 2km/s	0.5ha	2FE/420 places	N/A	2025	IDP	LO2	Reasonably Foreseeable		HC	HC	CIL / Sec106	
D008	Schools	Bromyard	Land at Hardwick Bank	Land at Hardwick Bank		Additional capacity at existing primary school with publicly accessible incorporated youth facilities.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=163932&search-land%20at%20hardwick%20bank	No over 2km/s	27.4ha	Unknown	Unknown	2020	IDP	BY2	More than Likely	Phased in line with rate of development. Application in - extra couple of classrooms	HC	HC	CIL / Sec106	
D015	Employment	Ross-on-Wye	Hildersley	Hildersley	North of the strategic housing location Focused in town centre. Developments to be located within walking and cycling distance of new and existing facilities.	Carried forward from UDP 2007	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=173600&search_employment%20near%20the%20viaduct	No over 2km/s	15ha	10ha	B1(a), B2, B8	2020	IDP / CS	RW2/E1	Reasonably Foreseeable		Ensure the Environment Agency is satisfied that the pollution prevention measures are adequate to protect ground and surface waters as it is located on a source protection zone of the Alton Court aquifer. Should avoid any flood risks.	HC	LGF / HCC Capital Programme	CIL / Sec106
D023	Housing	Ross-on-Wye				The remainder of homes outside the urban extension will be provided on a range of primarily smaller sites of less than 100 dwellings in and around the town in a dispersed manner between a single strategic site and other smaller sites. Further development will take place through the implementation of existing commitments, windfalls, infill development and peripheral town sites allocated from the Neighbourhood Development Plan.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=140684&search_housing%20near%20the%20viaduct https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=143190&search_housing%20near%20the%20viaduct https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=150938&search_housing%20near%20the%20viaduct	No over 2km/s	22.98Ha 290 dwellings 0.8ha 10 dwellings 10.9Ha 121 dwellings	700dw	N/A	2032	CS	RW1	Near Certain					
D029	Housing	Hereford	Hereford City Centre	Urban Village - ESG		Edgar Street Grid - East of Edgar Street, west of Widemarsch Street, south of Newtown Road	One of two scenarios.	No information found	Found several planning applications relating to works on private houses etc - within 1ha and improvements to private residential flats such as bicycles replacement of doors etc - No	800	N/A	2022	CS	HD2	Reasonably Foreseeable	192 dwellings have housing permission (application P130888/O, but could be reduced to 173 for the police and fire station (application also in - application number152487) - LAPSED	130888 has lapsed. However around 190 dwellings completed in the area since 2011 with a further 160 outstanding planning permissions as of Apr 1 2017.			
D030/D073	Housing	Hereford				Unallocated housing across Hereford. Further residential development within Hereford City Centre will take place through the implementation of existing commitments, re-development of existing brownfield sites, re-use of upper floors above commercial premises, infill development and site allocations through the Hereford Area Plan. Best use of existing properties by using vacant and underused spaces above shops and offices, promote 'levelling economy'.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=180948&search_hereford%20housing	Outside 2km buffer zone	3.3ha	approx 2660dw	N/A	2032	CS	HD1/HD2	Reasonably Foreseeable	outside of the strategic sites. Siobhan has done an early sit based on the SHLAA -	813 net housing completions 20011-17. 430 net outstanding planning permissions April 2017.			
D032	Employment	Hereford	Hereford City Centre	Urban Village		Link Road will serve development parcels forming part of the urban village (connects Edgar Street to the west and Commercial Road to the east, with a spur linking Blackfriars Street to the south).		Outside 2km buffer zone	same	Unknown	Retail and office	2031	CS	HD2	Hypothetical	Huge amount of uncertainty due to development partnership - meant to be updated in the masterplan.				
D033	Schools	Hereford	Hereford City Centre			Hereford University	No relevant development identified on the Herefordshire council website.	same	same	5000 students	Unknown	2032	Maird Lane		Hypothetical	where is student accommodation going to go?? Get Peter Clabby to provide proposal				
D037	Employment	Hereford	Hereford City Centre			New retail centre. Proposals for new retail, leisure of office development outside the town centre will need to be supported by an impact assessment if over 500m2 GFS. Developments to be located within walking and cycling distance of new and existing facilities. In addition to existing planning applications, no need for further convenience or comparison retail capacity of plan period. The need for retail provision will be reviewed.	Application withdrawn from the website	Application withdrawn from the website	same	Unknown	Unknown	2032	CS	HD2	Hypothetical	setting out policy proposal rather than proposal				
D038	Housing	Hereford	Holmer Trading Estate				https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=150559&search_holmer%20trading%20estate%20150559	3.71 ha - Falls outside of the cumulative impact assessment criteria	same	100dw	N/A	2018	Kevin Bishop		Near Certain	Application has been granted on appeal on a brownfield site. Planning application P150659/O. Application is Near certain but has gone to appeal.				
D039.1	Employment	Hereford				North of Hampton Park Road, east of Holywell Gutter Lane.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=102921&search_hereford%20rugby%20club%20102921	Outside of the 2km buffer zone	20ha	11.7ha	Unknown	2020	Kevin Bishop	D2	More than Likely	Planning Application 102921 approved with reserved matters. (Ref 152404)				
D039.2	Housing	Hereford				North of Hampton Park Road, east of Holywell Gutter Lane.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=102921&search_hereford%20rugby%20club%20102922	Outside of the 2km buffer zone	20ha	190dw	N/A	2020	Kevin Bishop		More than Likely	Planning Application 102921				
D050.1	Housing	Hereford	Hereford Western Urban Expansion (Three Elms)	Hereford Western Urban Expansion (Three Elms)		Access onto A438 and A4103 and three elms road. Phased delivery.	See earlier row	See earlier row		500dw	N/A	2020	CS	HD5	More than Likely	Planning Application is in for 1300, but limited to 500 without infrastructure. Has a third access onto 3 elms road	Dependent on how wide the protective corridor of the WRR is.			
D050.2	Housing	Hereford	Hereford Western Urban Expansion (Three Elms)	Hereford Western Urban Expansion (Three Elms)		Access onto A438 and A4103. Phased delivery.	See earlier row	See earlier row		500dw	N/A	2032	CS	HD5	More than Likely	Are talks of a total of 1300 dwellings (hypothetical).				
D058	Housing	Hereford	Hereford Southern Urban Expansion (Lower Bullingham)	Hereford Southern Urban Expansion (Lower Bullingham)		Phased delivery.	See earlier row	See earlier row		500dw	N/A	2022	CS	HD6	Reasonably Foreseeable					
D058	Housing	Hereford	Hereford Southern Urban Expansion (Lower Bullingham)	Hereford Southern Urban Expansion (Lower Bullingham)		Phased delivery.	See earlier row	See earlier row		500dw	N/A	2032	CS	HD6	Reasonably Foreseeable					
D059	Employment	Hereford	Hereford Southern Urban Expansion (Lower Bullingham)	Hereford Southern Urban Expansion (Lower Bullingham)		Land west of Watery Lane. Location dependent on expanded capacity of A49 and local highway network, by the provision of sustainable transport measures and/or the construction of the Hereford Relief Road.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=083011&search-term=10093122&search-service_upm&search-source_Postal+address&search-item_Unit+3_Pearson+Business+Park_Skydon+Enterprise+Zone_Coldnose+Road_Hereford_HR2+6QS	Outside the 2km buffer zone	same	5ha	B1, B2, B8. Types interpreted from LDO. LDO specifies defence/security/ environmental/ advance technologies/food technologies	2032	CS	HD6	Reasonably Foreseeable	Planning permission granted retrospectively for B2 land-use type on the adjacent site for land use types B1, B2 and B8. Units created are no large scale.				
D064	Employment	Hereford	HEZ	HEZ		Over 120 ha in size.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=083011&search-term=10093122&search-service_upm&search-source_Postal+address&search-item_Unit+3_Pearson+Business+Park_Skydon+Enterprise+Zone_Coldnose+Road_Hereford_HR2+6QS	Outside the 2km buffer zone	same - 20ha	4		2018	CS	HD7	Near Certain	Expansion beyond 2018 to develop entire 30 ha. Near certain development by 2018, reasonably foreseeable after 2018. 15 ha already in place. 300,000 sqm new - assumed to be phased by 2032 Ref - LEP LDO.	Extension beyond 2018 is dependent on the expansion of the LDO.			
D064.2	Employment	Hereford	HEZ	HEZ		As above	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=083011&search-term=10093122&search-service_upm&search-source_Postal+address&search-item_Unit+3_Pearson+Business+Park_Skydon+Enterprise+Zone_Coldnose+Road_Hereford_HR2+6QS	Same comment as row above		26	As above	2032	As above	As above	Reasonably Foreseeable	Expansion beyond 2018 to develop entire 30 ha. Near certain development by 2018, reasonably foreseeable after 2018. 15 ha already in place. 300,000 sqm new - assumed to be phased by 2032 Ref - LEP LDO.	Extension beyond 2018 is dependent on the expansion of the LDO.			

D065	Employment	Hereford	Westfields Trading Estate	Westfields Trading Estate	Small amount of development and redevelopment opportunities.		Unable to find planning application - developments available on planning portal do not fall under CA criteria.	1.74ha		2020	CS	HD7	More than likely	Most of the 25ha is already developed. Site 59 of the Herefordshire County Employment Land Study 2012 identifies only 1.74 ha of previously undeveloped land, however planning permission was granted in 2010 to develop a residential nursing home.			
D066	Employment	Hereford	Three Elms Trading Estate	Three Elms Trading Estate	Phased delivery.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=140373&search=Three%20elms%20trading%20estate%20p140373/cd	Three Elms trading estate, Yes	Same	3ha	B1, B2, B8	2022	CS	HD7	More than Likely	Planning permission granted in 2014 for development of 5574 sq. m. See ref P140373/CD Most of the 16ha site is already developed. Policy HD7 of the pre-submission Local Plan identifies some potential for further development. The 2012 employment land study states that there is still some room for development. No outstanding planning applications.		
D067	Employment	Hereford	Holmer Road	Holmer Road	Contains land available for further employment development	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=071455&search-term=holmer+road&search-service_search&search-source_the_keywords&search-item_holmer_and_road	Yes	Same	16ha	B1, B2, B8	2032	CS	HD7	More than Likely	Presently 6ha of B1 and B8 floorspace although a planning application for a further 51,000sqm of mixed B1, B2 and B8 floorspace is being considered (totalling 21 ha) (see below)		
D068	Employment	Moreton-on-Lugg	Moreton Business Park	Moreton Business Park	Phased delivery.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=162818&search=moreton%20business%20park	Under 1ha, not in buffer zone	same	6ha	B1, B2, B8	2032	CS	HD7	More than Likely	Presently 6ha of B1 and B8 floorspace although a planning application for a further 51,000sqm of mixed B1, B2 and B8 floorspace is being considered (totalling 21 ha) (see below)		
D068	Employment	Moreton-on-Lugg	Moreton Business Park	Moreton Business Park	Site for B1(c) light industrial, B2 general industry and B8 storage and distribution uses, together with motor vehicle showroom, ancillary nursery, access and associated works including demolition of redundant buildings. Phased delivery.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=162818&search=moreton%20business%20park	Under 1ha, not in buffer zone	Same	21ha	B1, B2, B8	2018	CS	HD7	Near Certain	Planning Application 123075. Approved with conditions in 2012. Application approved in 2014. Construction to begin within two years. Application approved for 48500 sq. m B1(a), B2 and B1 land uses.		
D069	Housing	Hereford	Land south of Hampton Dene Road	Land south of Hampton Dene Road	Residential development, access, parking, public open space with play facilities and landscaping. Access onto Hampton Dene Road.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=141526&search=141526	Outside of the 2km buffer zone	Same	110dw	N/A	2018	Kevin Bishop	Near Certain	Planning application 141526. Under construction			
D070	Employment	Bromyard			Focused in town centre	To accommodate small scale employment sites including live/work units. Proposals for new retail, leisure and office development outside the town centre will need to be supported by an impact assessment if over 200m2 GFS.	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.	5ha	Not currently known which land use types will be included.	2032	CS	BY1	Reasonably Foreseeable	Not allocated - it's a target - HC to identify development land. Is in the plan		
D071	Housing	Bromyard	Land at Hardwick Bank		TBC	Average density of up to 35 dwellings per hectare, mix of market and affordable (target 40%) house sizes and types including housing for older persons.	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.	500	N/A	2032	CS	BY2	More than Likely	Application in for 500dw Environmental constraints; located mainly on 'high' and 'medium-high' sensitivity landscape. Including additional and south of the A44 and/or eastwards towards the B4214 will be considered. Brought forward as to not prejudice future development.		
D072	Housing	Bromyard			Focused in town	Further development will take place through the implementation of existing commitments, windfall developments and sites allocated through the Neighbourhood Development Plan or other development plan documents.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=163201&search=bromyard%20housing	No over 2km's	4.75ha	250dw	N/A	2032	CS	BY2	More than Likely	Limited capacity - more the town rather than the town centre. Are applications in	
D075	Housing	Kington			Focused in town centre	Average density of 35 dwellings per hectare, mix of market and affordable (target 35%) house sizes and types. Phasing necessary to enable time to overcome current infrastructure constraints.	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.	200dw	N/A	2032	CS	KG1	Reasonably Foreseeable	Flooding constraints and a compromise with the effects on landscape.		
D076	Employment	Kington			Focused in town centre	On the basis of small scale proposals, mostly within walking distance of the town, and flexible approach to home working. New retail, leisure and office developments to provide impact assessment if over 200m2. No need for further convenience floor space.	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.	0.02ha	B1 B2 B8 mixture	2031	CS	KG1	Reasonably Foreseeable			
D077	Housing	Ledbury			Focused in town centre	Other than the urban extension, remaining housing requirements delivered through windfalls and allocation of sites through the Neighbourhood Development Plan or other development plan documents.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=172501&search=ledbury%20housing https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=171532&search=ledbury%20housing https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=150848&search=ledbury%20housing https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=171532&search=ledbury%20employment	No over 2km's	same	400dw	N/A	2025	CS	LB1	Near Certain	planning permissions for 400dw	Should avoid any flood risks.
D078	Employment	Ledbury			Focused in town centre	Further development will take place through the implementation of existing commitments, infill development and any small-scale sites allocated through the Neighbourhood Development Plan or other development plan documents. Should be in walking/cycling distance of facilities (i.e. railway station). Proposals for new retail, leisure or office development outside the town centre will need to be supported by an impact assessment if over 500m2 GFS. Opportunity to increase special nature of independent shops. Areas at Bye St/Lawside Rd identified as location for convenience retail.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=171532&search=ledbury%20land%20north%20of%20the%20viaduct	No over 2km's	28ha	3ha	Unknown	2019	CS	LB1	Near Certain	Aldi has planning permission and approval	Subject to any retention or the replacement of the existing community facilities, including the swimming pool, either on the site or in an appropriate and accessible location; replacement facilities must be completed prior to the loss of the existing. Should avoid any flood risks.
D079	Housing	Ledbury	Land north of the Viaduct	Land north of the Viaduct	Average density of 40 dwellings per hectare, mix of market and affordable (target 40%) house sizes and types, including housing for older persons. Phased to tie in with associated community infrastructure.	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.	625dw	N/A	2024	CS	LB2	More than Likely	Planning application in for 625dw	Should avoid any flood risks.		
D080	Employment	Ledbury	Land north of the Viaduct	Land north of the Viaduct	Located along the northern and eastern boundary adjoining existing businesses.	No over 2kms	No over 2kms	3ha	Restricted to B1? Assumed to be use class B1 (General). Restricted by policy LB2 of emerging local plan.	2024	CS	LB2	More than Likely	planning with 625 dw (D080)	Should avoid any flood risks.		
D081	Employment	Ledbury			Land between Little Marcle Road and Ross Road	Adjoins existing employment land, for smaller based businesses.	No over 2kms	No over 2kms	12ha	N/A	2031	CS	LB2	Reasonably Foreseeable		Should avoid any flood risks.	
D083	Employment	Leominster	Leominster Enterprise Park	Leominster Enterprise Park	Leominster Enterprise Park	Existing employment land at Leominster	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=130271&search=leominster%20enterprise%20park https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=101393&search=leominster%20enterprise%20park	No over 2kms	4ha	1.7	B1, B2, B8. Development will be land use type B2. Land has most capacity for B2 according to Employment Land Study 2012.	2022	CS/ELS	E1	Near Certain	Current site is 33ha. In size. Much already developed. Approx. 1.7 available as per 2012 Employment Land Study	
D083.1	Employment	Leominster	Leominster Urban Extension	Leominster Urban Extension	Integrated with housing component of urban extension	Opportunity to provide additional smaller B1 class live/work units. Possible small scale convenience retail for residents of new development.	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.	2ha	B1, live work units, convenience retail	2032	CS	LO1	Reasonably Foreseeable			
D085.1	Housing	Leominster			Barons Cross Camp, Choldrey Road, HR6 8RT	Erection of 425 dwellings, community building, vehicular access foul pumping station, association works.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=172135&search=leominster%20172135	No over 2kms	same	425dw	N/A	2020	CS	LO1	Near Certain	Reserved matters application submitted (172135). S106 signed in May 2017. Approx 170 completions 2011-17. About 220 outstanding planning permissions in April 2017	
D085.2	Housing	Leominster	TBC		100 every year from opening	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.	375dw	N/A	2032	CS	LO1	Reasonably Foreseeable				
D086	Employment	Leominster			South of Leominster Enterprise Park	Proposals for new retail, leisure and office development outside the town centre will need to be supported by an impact assessment if over 500m2 GFS. Convenience and comparison retail floorspace needs to increase over the plan period, creating an opportunity for food store development in the town centre. Emerging local plan states that Leominster will require an extension of the Leominster Enterprise Park to the south, which will provide up to 10ha of employment land. There is also the opportunity to provide additional smaller B1 class live/work units which could be integrated into the urban extension.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=140700&search=south%20of%20leominster%20enterprise%20park	No over 2kms	same	10ha (max)	Assumed to be mixture of B1(a), B2 and B8 General, as per Emerging local plan.	2032	CS	LO1	Reasonably Foreseeable	Dependent on land at existing Enterprise Park being taken up first.	
D087	Housing	Leominster	Leominster Urban Extension	Leominster Urban Extension	Average density of 35 dwellings per hectare, mix of market and affordable (25% target) house sizes and types, including those for older persons. Series of neighbourhoods integrated with the town.	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.	1500dw	N/A	2032	CS	LO2	Reasonably Foreseeable		Proposed route for southern link road needs full assessment before any works take place on the urban extension.		
D088	Employment	Leominster	Leominster Urban Extension	Leominster Urban Extension - Leominster Enterprise Park	Reasonable supply of land available at Leominster Enterprise Park and Southern Ave (D83) but envisaged to be taken up in the Enterprise Park in the latter stages of the plan period.	During the second half of the plan period an additional 5-10 ha of employment land will be required by extending to the south.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=063434&search=Leominster%20broad%20street%20gr%20park	No over 2kms	same	10ha (max)	B1(a), B2, B8	2032	CS	LO1	Reasonably Foreseeable		
D089	Employment	Leominster			Redevelopment opportunity to accommodate retail development at Broad Street Car Park at Arkwright Close.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/?search-term=broad+street+car+park+&search-service_search&search-source_the_keywords&search-item_%20%23039%3Bbroad%26%23039%3B%2C+%20%23039%3Bstreet%20%23039%3B%2C+%20%23039%3Bcar%20%23039%3B%2C+%20%23039%3Bpark%26%23039%3B+and+%20%23039%3B%26%23039%3B	No over 2kms	same	0.63ha	Unknown	2031	CS	LO1	Hypothetical	Broad Street Car Park (D089) in Leominster is approximately 0.63ha in size.	Not to exacerbate air pollution levels within the designated air quality management area at Bargates and does not undermine the achievement of water quality targets (SD3 and SD4). Proposed route for southern link road needs full assessment before any works take place on the urban extension.	
D091	Schools	Leominster	Leominster Urban Extension	Leominster Urban Extension	New infant and junior school (630 places) to replace existing provision.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=130940&search=Leominster%20schools	No over 2kms		630 places	N/A	2031	CS	LO2	Reasonably Foreseeable	3 form entry - in the plan	Proposed route for southern link road needs full assessment before any works take place on the urban extension.	
D092	Schools	Leominster	Leominster Urban Extension	Leominster Urban Extension	Capacity at Earl Mortimer College to cover new growth of town.	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.	Unknown	N/A	2032	CS	LO2	Hypothetical	not in the plan	Proposed route for southern link road needs full assessment before any works take place on the urban extension.		
D093	Employment	Ross-on-Wye			Focused in town	Proposals for new retail, leisure or office development outside the town centre will need to be supported by an impact assessment if over 500m2 GFS. Developments to be located within walking and cycling distance of new and existing facilities. In addition to existing planning applications, no need for further convenience or comparison retail capacity of plan period. The need for retail provision will be reviewed. Necessary to co-ordinate developments if housing developments are adjacent. This may include restriction of these employment areas to use class B1 or suitable live/work units.	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=101358&search=ross%20on%20wy%20employment https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id=130948&search=ross%20on%20wy%20employment	No over 2kms	same	10ha	Assumed potential use-class restriction to B1 (a) General, as per local plan for sites over 500 sq metres.	2032	CS	RW1	Reasonably Foreseeable	Policy position rather than proposals	

D094	Housing	Ross-on-Wye	Hildersley	Hildersley	Average density of 35 dwellings per hectare, mix of market and affordable (40% target) house sizes and types, including for older persons. 30 starting year, 50 every year until final, final year 20 (SHLAA)	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_150930&search=Hildersley%20housing	No over 2kms	same	200dw	N/A	2022	CS	RW2	Near Certain	has planning permission	
D097	Housing	Golden Valley	Rural Villages	HMA	HMA target 304 Completions 2011-17 32 Commitments as at 1 April 2017 100 Remaining 179	No relevant development identified on the Herefordshire council website.	No relevant development identified on the Herefordshire council website.		100dw	N/A	2032	CS	RA1	More than Likely		
D098	Housing	Bromyard	Rural Villages	HMA	HMA target 364 Completions 2011-17 80 Commitments as at 1 April 2017 149 Remaining 128	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_163001&search=bromyard%20housing	No over 2kms	same	149dw	N/A	2032	CS	RA1	More than Likely		
D099	Housing	Hereford	Rural Villages	HMA				same	1351dw		2032	CS	RA2	More than Likely		
D099		Hereford	Rural Villages	HMA	HMA target 1870 Completions 2011-17 647 Commitments as at 1 April 2017 1351 Remaining 155	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_180948&search=hereford%20housing	No over 2kms				2032	CS	RA4			
D099		Hereford	Rural Villages	HMA	Land east of the A40 ross on wye hereford	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_180155&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	Yes	yes			2032	CS	RA5			
D099		Hereford	Rural Villages	HMA		https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_172501&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	No over 2kms	same			2032	CS	RA6			
D099		Hereford	Rural Villages	HMA		https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_150478&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	Yes	yes			2032	CS	RA7			
D099		Hereford	Rural Villages	HMA		https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_140684&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	Yes	yes			2032	CS	RA8		Target in the plan, coming through the development plan. Don't know what the proportions of uncertainties are as are some applications in in some locations (Bromyard) but other locations not so much. KS and SR to give updates on permissions	
D099		Hereford	Rural Villages	HMA		https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_131301&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	Yes	yes			2032	CS	RA9			
D099		Hereford	Rural Villages	HMA		https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_121750&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	Yes	yes			2032	CS	RA10			
D099		Hereford	Rural Villages	HMA		https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_071455&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	Yes	yes			2032	CS	RA11			
D099		Hereford	Rural Villages	HMA	Lower bullingham	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_012892&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	Yes	yes			2032	CS	RA12			
D099		Hereford	Rural Villages	HMA	Lower bullingham	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_012888&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	Yes	yes			2032	CS	RA13			
D099		Hereford	Rural Villages	HMA	Ledbury Cattle Market Bye Street/Market Street	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_891458&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	Yes	yes			2032	CS	RA14			
D099		Hereford	Rural Villages	HMA		https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_892513&search-term=hereford%20housing&search-service_search&search-source_the_keywords&search-item_hereford_and_housing%20	2.82ha Doesn't fall within the cumulative impact assessment criteria.	same			2032	CS	RA15			
D100	Housing	Kington	Rural Villages	HMA	HMA target 317 Completions 2011-17 106 Commitments as at 1 April 2017 181 Remaining 71	Various developments	No over 2kms	same	181dw	N/A	2032	CS	RA1	More than Likely		
D101	Housing	Ledbury	Rural Villages	HMA	HMA target 565 Completions 2011-17 143 Commitments as at 1 April 2017 167 Remaining 208	Various developments	No over 2kms	same	167dw	N/A	2032	CS	RA1	More than Likely		
D102	Housing	Leominster	Rural Villages	HMA	HMA target 730 Completions 2011-17 126 Commitments as at 1 April 2017 388 Remaining 266	Various developments	No over 2kms	same	388dw	N/A	2032	CS	RA1	More than Likely		
D103	Housing	Ross-on-Wye	Rural Villages	HMA	HMA target 1150 Completions 2011-17 214 Commitments as at 1 April 2017 572 Remaining 304	Various developments	No over 2kms	same	572dw	N/A	2032	CS	RA1	More than Likely		
D097.2	Housing	Golden Valley	Rural Villages	HMA	HMA target 304 Completions 2011-17 32 Commitments as at 1 April 2017 100 Remaining 179	Various developments	No over 2kms	same	179dw	N/A	2032	CS	RA1	Reasonably Foreseeable		
D098.2	Housing	Bromyard	Rural Villages	HMA	HMA target 364 Completions 2011-17 80 Commitments as at 1 April 2017 149 Remaining 128	Various developments	No over 2kms	same	128dw	N/A	2032	CS	RA1	Reasonably Foreseeable		
D099.2	Housing	Hereford	Rural Villages	HMA	HMA target 1870 Completions 2011-17 647 Commitments as at 1 April 2017 1351 Remaining 155	Outlined within previous row.	Outlined within previous row.	same	155dw	N/A	2032	CS	RA1	Reasonably Foreseeable	Target in the plan, coming through the development plan. Don't know what the proportions of uncertainties are as are some applications in in some locations (Bromyard) but other locations not so much. KS and SR to give updates on permissions	
D100.2	Housing	Kington	Rural Villages	HMA	HMA target 317 Completions 2011-17 106 Commitments as at 1 April 2017 181 Remaining 71	No over 2kms	No over 2kms	same	71dw	N/A	2032	CS	RA1	Reasonably Foreseeable		
D101.2	Housing	Ledbury	Rural Villages	HMA	HMA target 565 Completions 2011-17 143 Commitments as at 1 April 2017 167 Remaining 208	No over 2kms	No over 2kms	same	208dw	N/A	2032	CS	RA1	Reasonably Foreseeable		
D102.2	Housing	Leominster	Rural Villages	HMA	HMA target 730 Completions 2011-17 126 Commitments as at 1 April 2017 388 Remaining 266	No over 2kms	No over 2kms	same	266dw	N/A	2032	CS	RA1	Reasonably Foreseeable		
D103.2	Housing	Ross-on-Wye	Rural Villages	HMA	HMA target 1150 Completions 2011-17 214 Commitments as at 1 April 2017 572 Remaining 304	No over 2kms	No over 2kms	same	304dw	N/A	2032	CS	RA1	Reasonably Foreseeable		
D104	Housing	Hereford	Cleghonger	Cleghonger	Land between Gosmore Road and The Seven Stars PH	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_142349&search=P142349	No the development does not fall within the cumulative impact criteria		80dw	N/A	2018	Kevin Bishop	Near Certain	Planning application P142349/O - part of D99		
D105	Housing	Hereford	Hereford Northern Urban Expansion (Holmer West)	Hereford Northern Urban Expansion (Holmer West)	Land to the north of the Roman Road west of the A49 Holmer West	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_150478&search=P150478	Yes	Yes	460dw	N/A	2022	Kevin Bishop	HD4	Near Certain	Planning Application submitted P150478/O - planning permission	
D106	Housing	Hereford			Land at Faraday Road, HR4 9NZ	https://www.herefordshire.gov.uk/info/200142/planning_services/planning_application_search/details?id_131709&search=land%20at%20faraday%20road	No the development does not fall within the cumulative impact criteria	No	100dw	N/A	2020	H-HMA		Near Certain	Replacement of extant planning application 092932/O for the construction of a total care facility to include 100 assisted living units (use class C2 and C3). Planning Application P131709/O. Approved with conditions.	

Site Code	Dev Type	Area	Location	Associated Package	Location Details	Input / Details	Size	Employment Type	Forecast Year	Primary Source	Policy	Uncertainty Assumption	Status	Dependencies	Delivery Lead	Public Investment	Developer Contributions
1006/1023	Transport	Hereford	Hereford City Centre	Hereford City Centre Transport Package		Hereford City Link Road. Connecting the A49 Edgar Street with the A465 Commercial Road, reducing traffic on the existing inner ring road and enabling expansion of the city centre. Link Road, forming part of the urban village, connecting Edgar Street to the west and Commercial Road to the east (with a spur linking Blackfriars Street to the south). Improved pedestrian links between historic core and old livestock market area, improved accessibility within northern section of Edgar Street regeneration area.	N/A	N/A	2017	IDP		Near Certain			HC	£16m LGF secured. Balanced secured from Capital Programme.	None
D063	Transport	Hereford	Hereford Southern Urban Expansion (Lower Bullingham)	Hereford Southern Urban Expansion (Lower Bullingham)		Package of sustainable transport measures.	N/A	N/A	by 2031	CS	HD6	Reasonably Foreseeable					
1007/1024	Transport	Hereford	Hereford City Centre	Hereford City Centre Transport Package		Regeneration and expansion. To include upgrading Blueschool Street, Commercial Street. Re-design of Newmarket Street, Blueschool Street and Commercial Square for pedestrian and cyclists, improved public transport facilities and connectivity between the historic city centre and regeneration area.	N/A	N/A	2019	IDP		Near Certain			HC	£16m LGF secured. Balanced secured from Capital Programme.	CIL / Sec106
1003	Transport	Hereford		SWTP	WRR - SLR	A49 Ross Road to A465 Abergavenny Road	N/A	N/A	2020	IDP	N/A	Near Certain			HC	LGF indicative for £2.76m	CIL / Sec106
1004/1005	Transport	Hereford		SWTP		Sustainable mode measures and public realm improvements to encourage walking, cycling and public transport, particularly to and from Enterprise Zone.	N/A	N/A	2020	IDP	N/A	Near Certain			HC	LGF indicative for £2.76m	CIL / Sec106
1011	Transport	Hereford	Historic Core	Hereford City Centre Transport Package		20mph zone, flexible cycle access in one way streets, public transport access and off site lay over, de-cluttering of street signs, refurbishment in key locations.	N/A	N/A	2020	IDP	N/A	Near Certain	20mph and 'de-cluttering' completed		HC	LGF (or subsequent programmes) / Other contributions	CIL / Sec106
1037	Transport	Hereford	Western Urban Expansion (Three Elms)	Western Urban Expansion (Three Elms)		Park and Choose site with land or infrastructure for a transport interchange (walking, cycling, public transport) or around 150 spaces. Ancillary infrastructure. Possible overlap with I19. Short - medium term: Park and Share/Park and Cycle hub, Long term: Park and Ride.	Unknown	N/A	2020	CS	HD5	More than Likely			HC	LGF (or subsequent programmes) / Other contributions	CIL / Sec106
1038	Transport	Hereford	South Wye	South Wye Transport Package		Low cost alternative	N/A	N/A	2020	IDP	N/A	More than Likely			HC		
1008	Transport	Hereford		HTP		Wye / Three Elms Link - A465 Abergavenny Road, river crossing, A438 Brecon Road, A4013 Roman Road (west).	N/A	N/A	2025	IDP		Reasonably foreseeable			HC	LGF (or subsequent programmes) / Other contributions	CIL / Sec106
1009	Transport	Hereford		HTP		Holmer Link, West - A4103 Roman Road (West), A49 Leominster Road	N/A	N/A	2025	IDP		Reasonably foreseeable			HC	LGF (or subsequent programmes) / Other contributions	CIL / Sec106
1010	Transport	Hereford		HTP		Holmer Link, East - A49 Leominster Road, A4103 Roman Road (East).	N/A	N/A	by 2031	IDP		Hypothetical			HC	LGF (or subsequent programmes) / Other contributions	CIL / Sec106
D105	Transport	Hereford	Hereford Northern Urban Expansion (Holmer West)	Hereford Northern Urban Expansion (Holmer West)	Land to the north of the Roman Road west of the A49 Holmer West	Park and choose site as part of the Holmer West Application P150478/O. Planning application submitted.	150 spaces	N/A	2032	Kevin Bishop	HD4	More than Likely					
1014	Transport	Hereford		Hereford City Centre Transport Package		On the A49 and other A roads, and an urban traffic control system - SCOOT	N/A	N/A	by 2031	IDP	N/A	Hypothetical			HC	LGF (or subsequent programmes) / Other contributions	CIL / Sec106
1019	Transport	Hereford			Proximity of A49/Rotherwas Road	Park and choose	Unknown	N/A	2032	IDP	N/A	More than Likely		Park and choose site wanted, but size depends on developer. Park and choose site tied to Lower Bullingham Development.	HC	LGF (or subsequent programmes) / Other contributions	CIL / Sec106
D057	Transport	Hereford	Hereford Western Urban Expansion (Three Elms)	Hereford Western Urban Expansion (Three Elms)		Package of transport measures to complement the sustainable infrastructure and development.	N/A	N/A	by 2031	CS	HD5	More than Likely		Location dependent on expanded capacity of A49 and local highway network, by the provision of sustainable transport measures and/or the construction of the Hereford Relief Road.			
1020	Transport	Leominster				Leominster Link Road. Southern road linking Worcester Road roundabout directly to A44 at Baron's Cross. 200 yds needed to complete the link. Likely to require new roundabout junctions on the B4361 and A44 and the extension of the highway infrastructure in the south west corner of the Enterprise Park.	N/A	N/A	2032	IDP	L02	Hypothetical		Proposed route for southern link road needs full assessment before any works take place on the urban extension.	HC	N/A	CIL / Sec106
1025 1032	Transport Transport	Hereford Hereford	Hereford City Centre	WRR		New public car parking facilities. Bus priority measures	Unknown N/A	N/A N/A	by 2031 2032	CS CS	HD2 HD3	Hypothetical Hypothetical					
1035	Transport	Hereford	Northern Urban Expansion (Holmer West)	Northern Urban Expansion (Holmer West)		Walking/cycle routes and green infrastructure corridors linking Park and Ride, existing public right of way network and existing education and community facilities and employment sites in the locality.	N/A	N/A	by 2031	CS	HD4	Unknown		Access dependent on expanded capacity of A49			
1036	Transport	Hereford	Northern Urban Expansion (Holmer West)	Northern Urban Expansion (Holmer West)		Green buffers and linear green routes, notably along Ayles Brook	N/A	N/A	by 2031	CS	HD4	Unknown					
1002	Transport	Hereford	Southern Urban Expansion (Lower Bullingham)	Southern Urban Expansion (Lower Bullingham)		Footpaths incorporated in the Country Park (D12) and linking with the existing Public Right of Way network.	N/A	N/A	by 2031	IDP	N/A	More than Likely			HC	HC	CIL / Sec106

Site Code	Dev Type	Area	Location	Associated Package	Location Details	Input / Details	Size	Employment Type	Forecast Year	Primary Source	Policy	Uncertainty Assumption	Status	Dependencies	Delivery Lead	Public Investment	Developer Contributions
I015/I016	Transport	Hereford		Historic Core		Reduce parking to reduce traffic and support re-development. Introduce on-street parking charges to provide greater control of traffic seeking to access that area.	Unknown	N/A	by 2031	IDP	N/A	Near Certain			HC	LGF (or subsequent programmes) / Other contributions	CIL / Sec106
I038/I039	Transport	Hereford	Western Urban Expansion (Three Elms)	Western Urban Expansion (Three Elms)		Series of new green infrastructure connections serving as pedestrian and cycle links throught the development, including optimising the use of the disused railway line to connect with the transport interchange, schools, community facilities, employment land and the remainder of the city. Opportunities to link heritage assets will be explored. New and upgraded bus links and introduction of bus priority measures within the development and on the existing highway network.	N/A	N/A	by 2031	CS	HD5	More than Likely		Location dependent on expanded capacity of A49 and local highway network, by the provision of sustainable transport measures and/or the construction of the Hereford Relief Road.			
I041/I046	Transport	Hereford	Southern Urban Expansion (Lower Bullingham)	Southern Urban Expansion (Lower Bullingham)		Vehicluar access to the site principally from B4399. Roundabout constructed where the principal access will be via Rotherwas Access Road.	N/A	N/A	by 2031	CS	HD6	Unknown	Duplicated	Location dependent on expanded capacity of A49 and local highway network, by the provision of sustainable transport measures and/or the construction of the Hereford Relief Road.			
I043/I044/I045/I047/I048	Transport	Hereford	Southern Urban Expansion (Lower Bullingham)	Southern Urban Expansion (Lower Bullingham)		Green infrastructure corridors through the area, including along Norton Brook and links with Withy Brook and connecting new homes with the new country park. Opportunities to link heritage assets.. New direct walking, cycling and bus links from the urban extension to the Park and Ride to the west, HEZ to the east and existing communities and the city centre to the north. Also sustainable transport links to Dinedor Hill, the historic Hill Fort and Rotherwas Park. New footpaths linking the new country park (D12) with the existing public right of way network in the locality. New cycle ways and footpaths to link development with existing and new employment areas, community facilities, local schools and the city centre. Will include a link to the Connect 2 Greenway cycle route. Access to North will be restricted to and/or prioritised for buses, walking and cycling.	N/A	N/A	by 2031	CS	HD6	Unknown	Duplicated	Location dependent on expanded capacity of A49 and local highway network, by the provision of sustainable transport measures and/or the construction of the Hereford Relief Road.			
I049	Transport	Hereford	Southern Urban Expansion (Lower Bullingham).	Southern Urban Expansion (Lower Bullingham).		Expansion of the existing bus network into the site.	N/A	N/A	2032	CS	HD6	Reasonably Foreseeable	Duplicated				
I050	Transport	Hereford	Southern Urban Expansion (Lower Bullingham).	Southern Urban Expansion (Lower Bullingham).	Country Park - Location dependent on expanded capacity of A49 and local highway network, by the provision of sustainable transport measures and/or the construction of the Hereford Relief Road.	Provision for parking area for the new country park	Unknown	N/A	2032	CS	HD6	Reasonably Foreseeable	Duplicated				
I051/I053/I054	Transport	Bromyard	Land at Hardwick Bank	Land at Hardwick Bank		Public transport links from Hardwick Bank to Bromyard town centre. Development areas linked by a roundabout onto the A44. Development areas serviced by a residential road with opportunity to extend development beyond plan period and serve as a future link road to other parts of the local highway network. Sustainable links to the town using the residential roads leading off Winslow Road. These will connect the town centre, existing employment sites, commuity facilities and the surrounding countryside.	N/A	N/A	2032	CS	BY2	Reasonably Foreseeable	Not within model				
I057/I058/I070/D082	Transport	Ledbury	Land north of the Viaduct	Land north of the Viaduct		Option of a secondary vehicular access from Bromyard Road to the north, where primary access will be from Hereford Road under the viaduct, may then enable the creation a road link. New walking, cycling and bus links from the urban extension to the town trail and riverside walk under the viaduct, the railway station and town centre to create linkages to nearby development and existing community facilities. Improvements to the Hereford Road/Bromyard Road junction. Further improvements to be informed by a traffic assessment. Speed limit reduction along the Bromyard Road.	N/A	N/A	by 2031	CS	LB2/LB3	Unknown	Not within model				
I059	Transport	Ledbury	Land south of Little Marcle Road	Land south of Little Marcle Road		Improving and creating sustainable transport links to the town, including safe crossings of the by-pass.	N/A	N/A	by 2031	CS	LB2	Unknown	Not within model				
I062/I063	Transport	Leominster	Leominster Urban Extension	Leominster Urban Extension		Green infrastructure (walking and cycling links) to the town centre, schools, enterprise park and local public right of way network. New road infrastructure at Bargates area.	N/A	N/A	by 2031	CS	L02	Unknown	Not within model	Proposed route for southern link road needs full assessment before any works take place on the urban extension.			
I064	Transport	Ross-on-Wye	Hildersley	Hildersley		Green infrastructure for residents, bats and other flora and fauna, new pedestrian and cycle links from the area towards the town and to nearby employment sites.	N/A	N/A	by 2031	CS	L02	Unknown	Not within model				
I065	Transport	Ross-on-Wye	Tanyard Lane	Tanyard Lane		Development at Tanyard Lane will provide infrastrcuture upgrades including a new roundabout and traffic calming measures.	N/A	N/A	by 2031	CS	L02	Unknown	Not within model	Allows development at 'Over-Ross' to come forward.			
I066/I067/I068/I069	Transport	Ross-on-Wye				Improving and creating sustainable transport routes and ensuring new developmetns are served by public transport. Possible car parking, as addressed in the Neighbourhood Development Plan. All development sites will require that the local roads are suitable and pedestrian and cycle connections are provided. All development sites will require that the local roads are suitable and pedestrian and cycle connections are provided. Potential for new links between green corridors along the south-eastern boundary of the town and the urban extension.	N/A	N/A	by 2031	CS	L02	Unknown	Duplicated				
I040	Transport	Hereford	Western Urban Expansion (Three Elms)	Western Urban Expansion (Three Elms)		Opportunities exist to connect Roman Road, Three Elms Road and Kings Acre Road as well as the Hereford Relief Road.	N/A	N/A	by 2031	CS	HD5	More than Likely		Location dependent on expanded capacity of A49 and local highway network, by the provision of sustainable transport measures and/or the construction of the Hereford Relief Road. Traffic assesement to be carried out to assess vehicular access options.			
I072	Transport	Hereford	Hereford University to HEZ				N/A	N/A	By 2021	HC		Reasonably Foreseeable					
I078	Transport	Hereford				Grandstand road traffic calming - part of Three Elms			by 2031	CS	HD5	More than Likely					

Site Code	Dev Type	Area	Location	Associated Package	Location Details	Input / Details	Size	Employment Type	Forecast Year	Primary Source	Policy	Uncertainty Assumption	Status	Dependencies	Delivery Lead	Public Investment	Developer Contributions
1074	Transport	Hereford				Bus gates through Lower Bullingham and Three Elms			by 2031	CS	HD6	Reasonably Foreseeable					
1075	Transport	Hereford				Rail service enhancements - Dualling to Leominster			Unknown	HC							
1076	Transport	Hereford				Additional Rail services from Hereford to Birmingham			Unknown	HC							
1077	Transport	Hereford				Car parking - changing of parking fares, expansion of on-street parking											
1071	Transport	Hereford	Holme Lacy Road	Holme Lacy Road Scheme		Weight restrictions, traffic calming, cycle provision	N/A	N/A	Unknown	BBLP		Near Certain	SWTP				

Appendix 17-1

ENVIRONMENTAL CONSTRAINTS PLANS

File name: \\uk.wspgroup.com\central data\Projects\70024065 - Hereford Transport Package\I Models and Drawings\GIS\Wxd\Short List Options\70024065-WSP-XX-XX-DR-EN-00098.mxd
printed on: 14 June 2018 by: DeSouzaJ



Proposed Scheme - Orange Option

Arbicultural Survey Results

- Ancient tree
- Notable tree
- Veteran tree

Ancient Woodland

Category A Tree Groups

Traditional Orchard

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Local Nature Reserve (Eng)

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Grade II*

Bridleway

Byway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Hereford

DRAWING STATUS

FOR INFORMATION ONLY

Kings Orchard, 1 Queen St, Bristol, BS2 0HQ
T +44 (0)1179 306200

CLIENT

Balfour Beatty Herefordshire Council

Working for Herefordshire

SITE/PROJECT

HEREFORD TRANSPORTATION PACKAGE:
HEREFORD BYPASS

TITLE

FIGURE 17-1
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - ORANGE
PAGE 1 OF 5

SCALE @ A3 1:10,000	CHECKED CP	APPROVED MT
PROJECT NO 70024065	DESIGNED CP	DRAWN JdS
DRAWING No 70024065-WSP-XX-XX-DR-EN-00098		REV P01

0 125 250 500 Metres

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printed on: 14 June 2018 by: DeSouzaJ



Proposed Scheme - Orange Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

Group of Trees with TPO

Traditional Orchard

Pippin Trust Orchard

Drovers Wood (Woodland Trust)

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

ereford

DRAWING STATUS

FOR INFORMATION ONLY

Kings Orchard, 1 Queen St, Bristol, BS2 0HQ
T +44 (0)1179 306200

CLIENT

Balfour Beatty Herefordshire Council

Working for Herefordshire

SITE/PROJECT

HEREFORD TRANSPORTATION PACKAGE:
HEREFORD BYPASS

TITLE

FIGURE 17-1
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - ORANGE
PAGE 2 OF 5

SCALE @ A3 1:10,000	CHECKED CP	APPROVED MT
PROJECT NO 70024065	DESIGNED CP	DRAWN JdS
DATE 14/06/2018		REV P01

DRAWING No

70024065-WSP-XX-XX-DR-EN-00098

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printed on: 14 June 2018 by: DeSouzaJ



Proposed Scheme - Orange Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

- Group of Trees with TPO
- Traditional Orchard
- Pippin Trust Orchard
- Drovers Wood (Woodland Trust)
- Hereford Listed Traditional Orchard
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

Hereford

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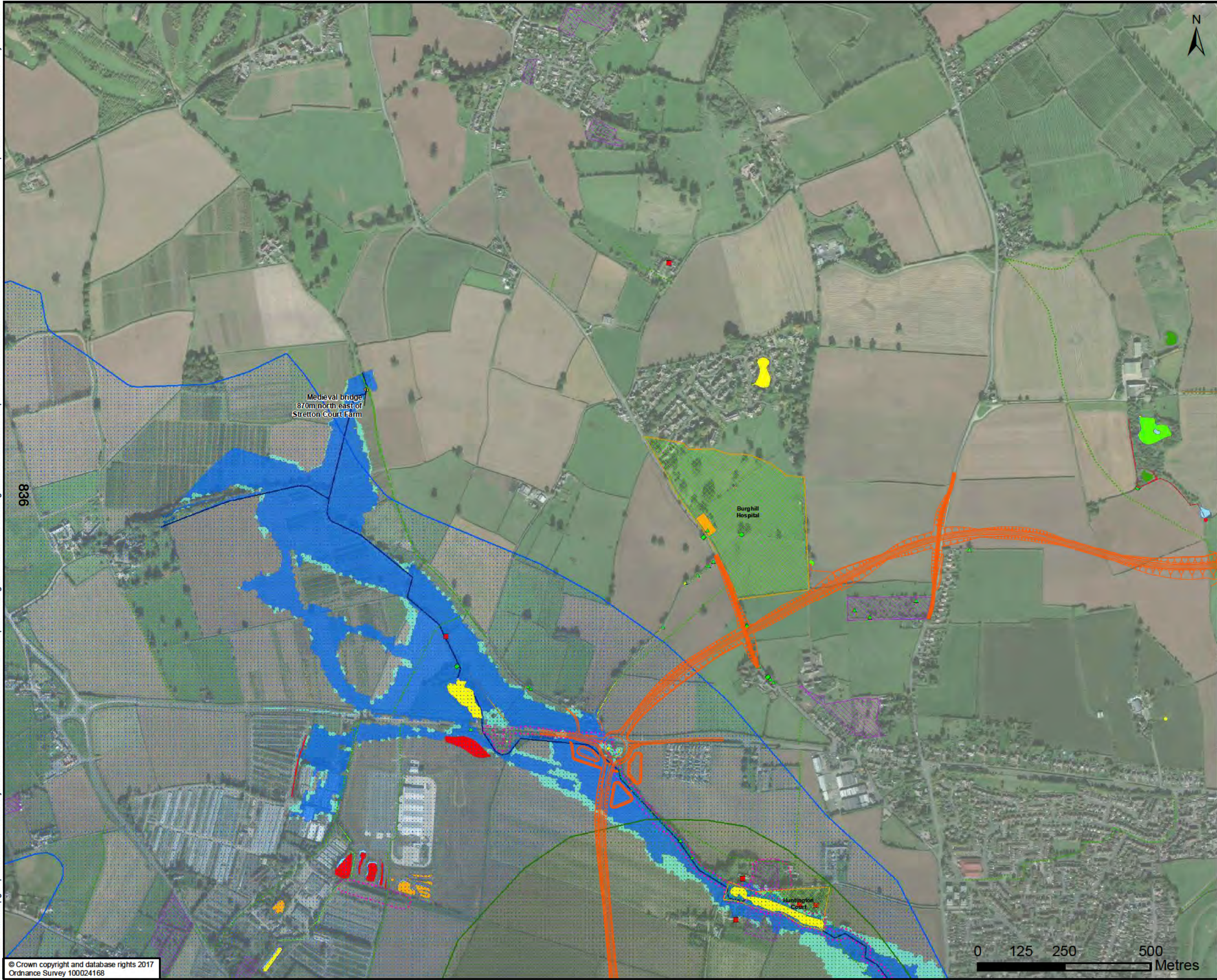
FIGURE 17-1
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - ORANGE
PAGE 3 OF 5

SCALE @ A3 1:10,000	CHECKED CP	APPROVED MT
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Proposed Scheme - Orange Option

Arboricultural Survey Results

- Category A tree
- Notable tree
- Veteran tree
- Group of Trees with TPO
- Traditional Orchard
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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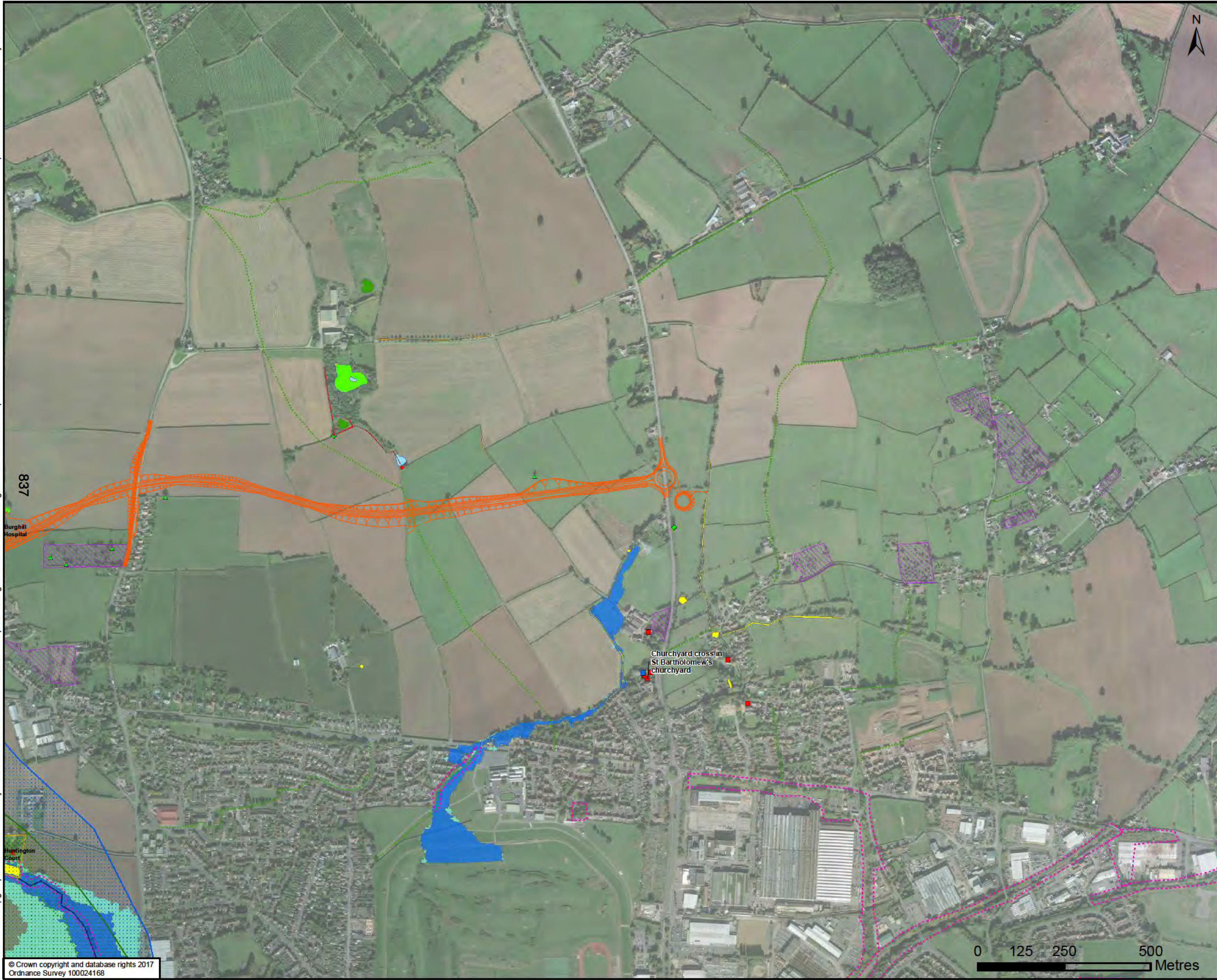
FIGURE 17-1
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - ORANGE
PAGE 4 OF 5

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Proposed Scheme - Orange Option

Arboreal Survey Results

- Notable tree
- Veteran tree
- Traditional Orchard
- Noise Action Planning Areas
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade I
- Grade II
- Scheduled Monument

Byway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-1
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - ORANGE
PAGE 5 OF 5

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Proposed Scheme - Cyan Option

Arboricultural Survey Results

- Ancient tree
- Notable tree
- Veteran tree

Ancient Woodland

Category A Tree Groups

Traditional Orchard

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Local Nature Reserve (Eng)

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Grade II*

Bridleway

Byway

Footpath

Watercourse

Floodzone 3

Floodzone 2

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FIGURE 17-2
ENVIRONMENTAL CONSTRAINTS
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0 125 250 500 Metres

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Proposed Scheme - Cyan Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

Group of Trees with TPO

Traditional Orchard

Pippin Trust Orchard

Drovers Wood (Woodland Trust)

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-2
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - CYAN
PAGE 2 OF 5

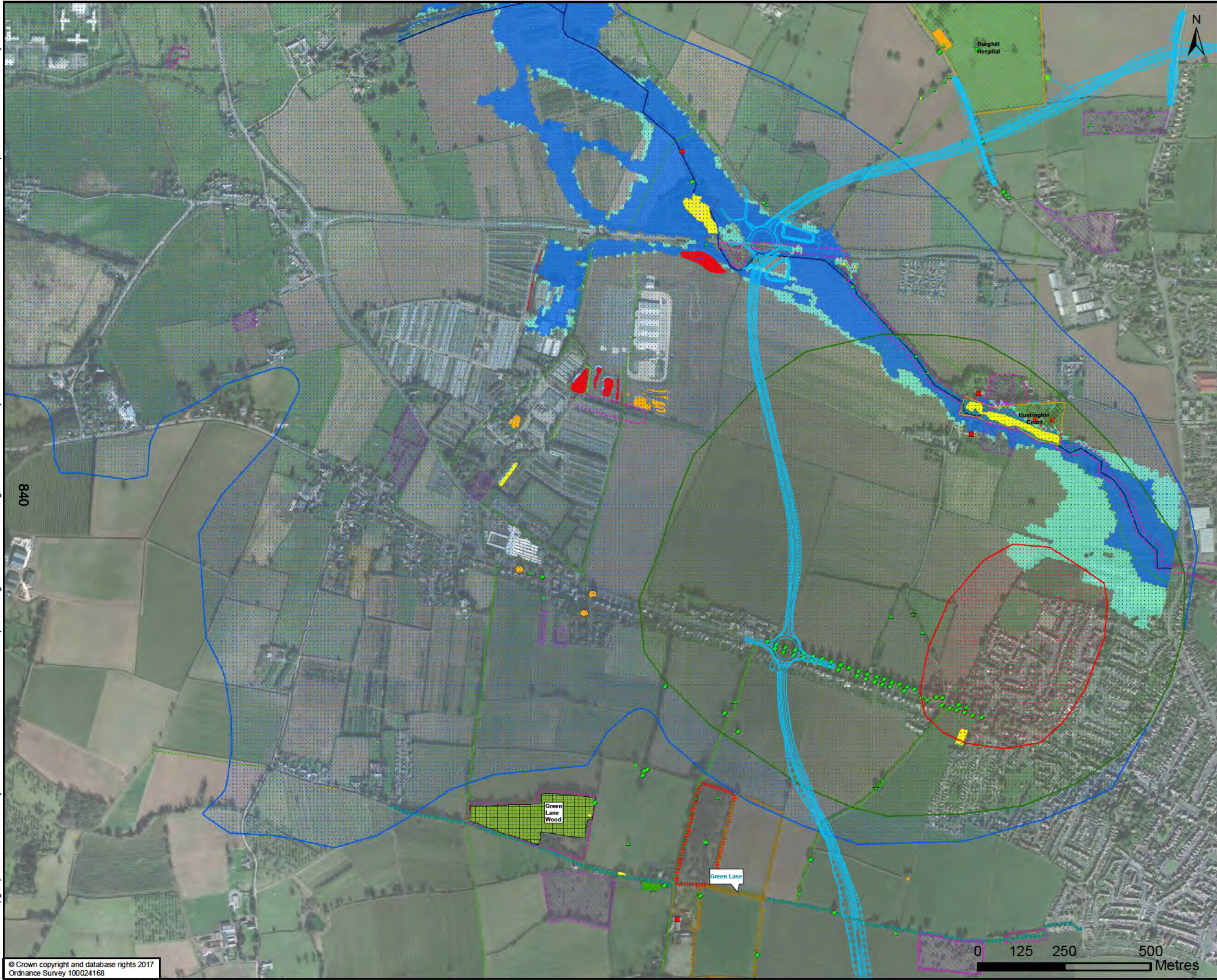
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Proposed Scheme - Cyan Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

- Group of Trees with TPO
- Traditional Orchard
- Pippin Trust Orchard
- Drovers Wood (Woodland Trust)
- Hereford Listed Traditional Orchard
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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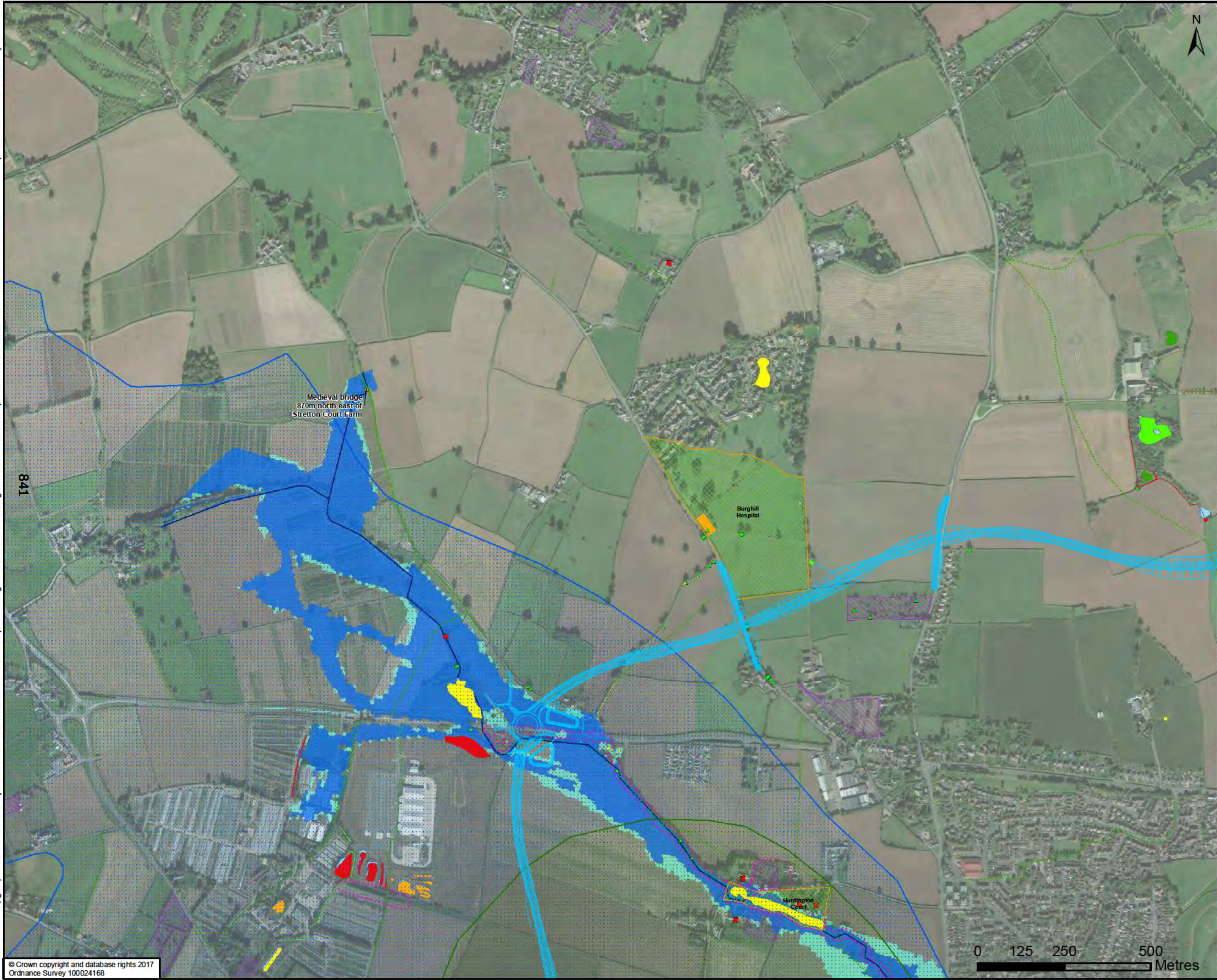
FIGURE 17-2
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - CYAN
PAGE 3 OF 5

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Proposed Scheme - Cyan Option

Arboricultural Survey Results

- Category A tree
- Notable tree
- Veteran tree

Group of Trees with TPO

Traditional Orchard

Unregistered Parks and Gardens

Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument

Bridleway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-2
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - CYAN
PAGE 4 OF 5

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Proposed Scheme - Cyan Option

Arboricultural Survey Results

- Notable tree
- Veteran tree
- Traditional Orchard
- Noise Action Planning Areas
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade I
- Grade II
- Scheduled Monument

Byway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-2
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - CYAN
PAGE 5 OF 5

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Proposed Scheme - Yellow Option

Arboricultural Survey Results

- Ancient tree
- Notable tree
- Veteran tree

Ancient Woodland

Category A Tree Groups

Traditional Orchard

Hereford Listed Traditional Orchard

Noise Action Planning

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Local Nature Reserve (Eng)

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Grade II*

Bridleway

Byway

Footpath

Watercourse

Floodzone 3

Floodzone 2

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FIGURE 17-3
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - YELLOW
PAGE 1 OF 5

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Proposed Scheme - Yellow Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

Group of Trees with TPO

Traditional Orchard

Pippin Trust Orchard

Drovers Wood (Woodland Trust)

Hereford Listed Traditional Orchard

Noise Action Planning

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Greenbank Meadow

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-3
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - YELLOW
PAGE 2 OF 5

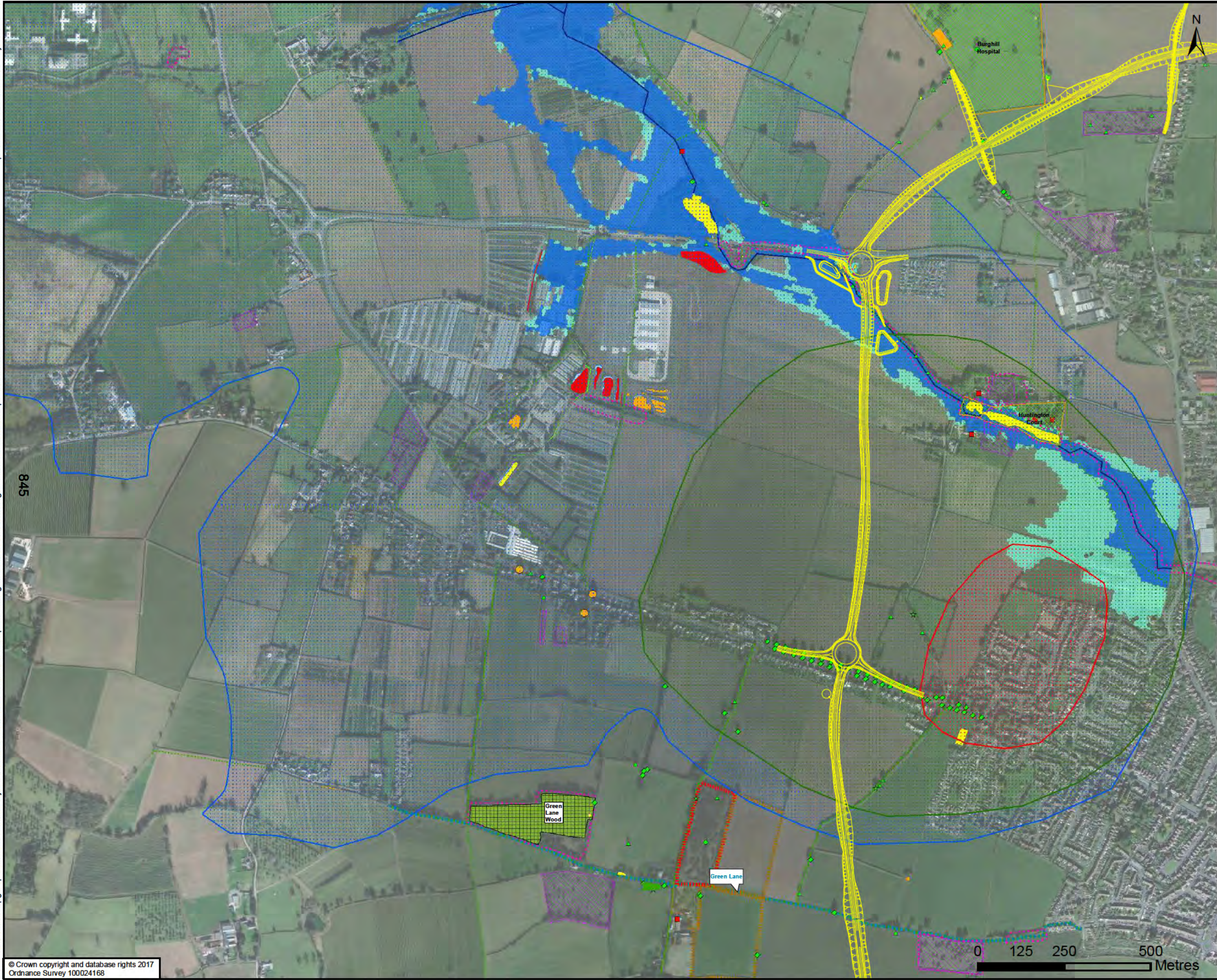
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Proposed Scheme - Yellow Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

- Group of Trees with TPO
- Traditional Orchard
- Pippin Trust Orchard
- Drovers Wood (Woodland Trust)
- Hereford Listed Traditional Orchard
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens

Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Local Green Space
- Bridleway
- Footpath

Watercourse

- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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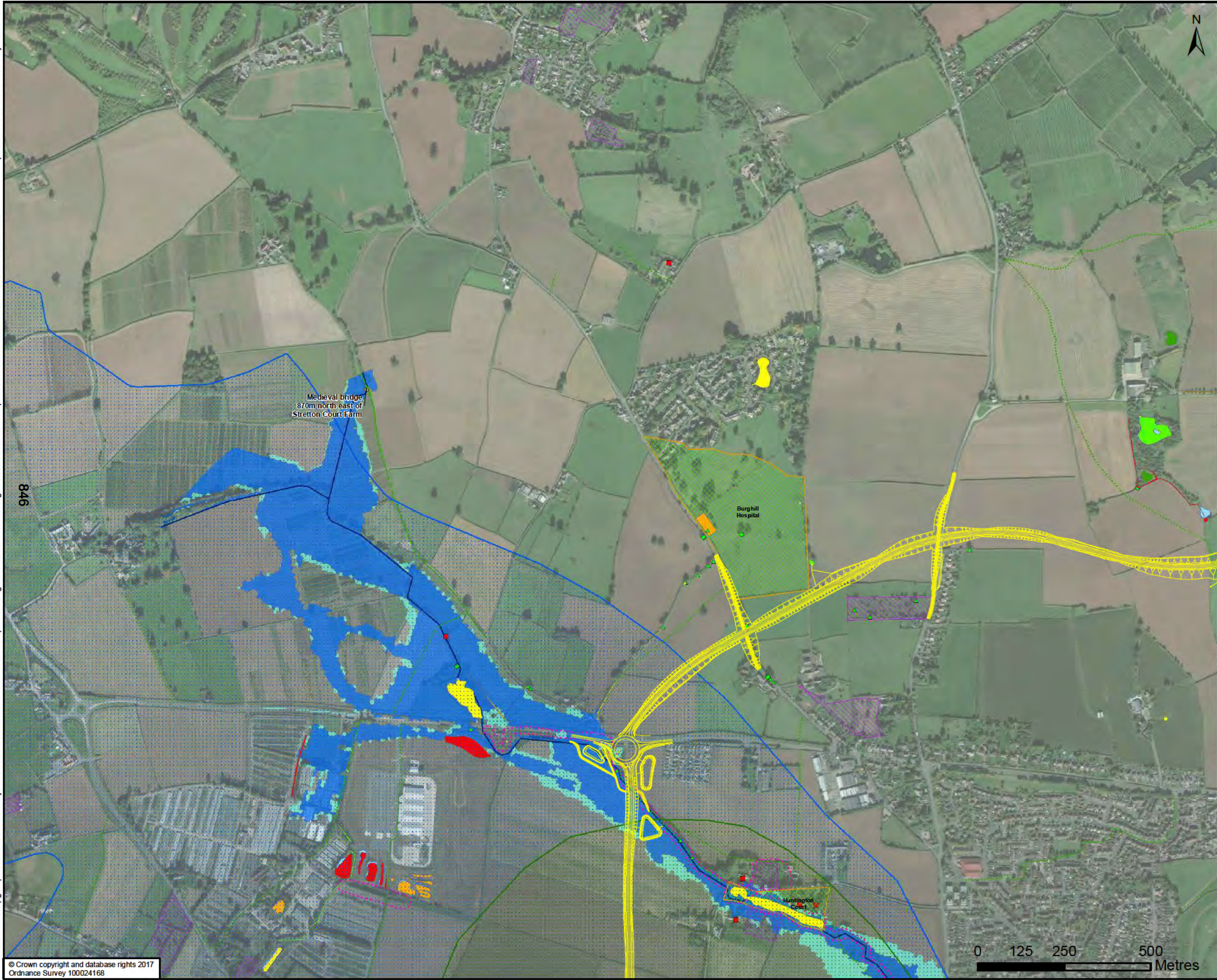
FIGURE 17-3
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - YELLOW
PAGE 3 OF 5

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Proposed Scheme - Yellow Option

Arboricultural Survey Results

- Category A tree
- Notable tree
- Veteran tree
- Group of Trees with TPO
- Traditional Orchard
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Bridleway
- Footpath

Watercourse

- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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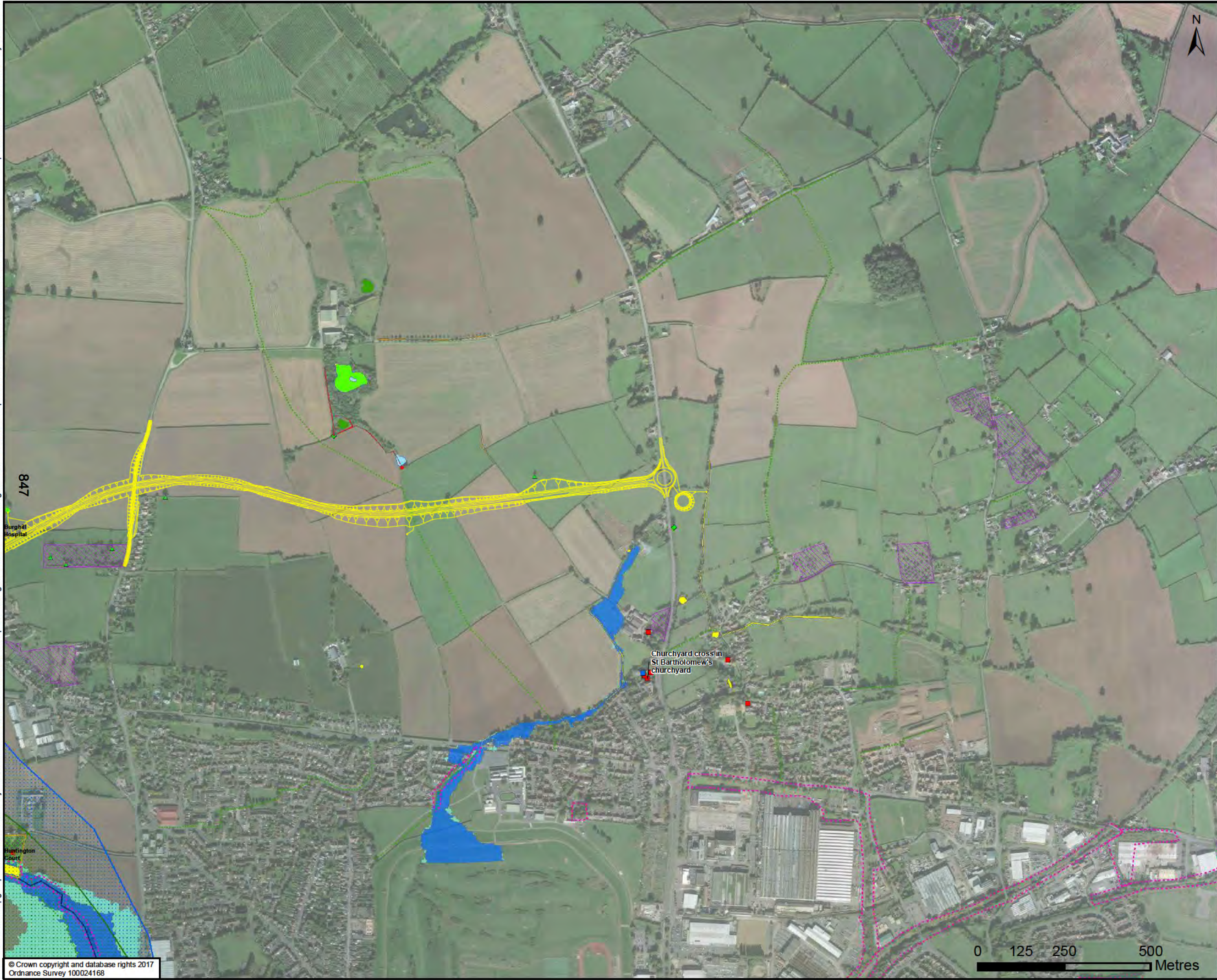
FIGURE 17-3
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - YELLOW
PAGE 4 OF 5

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Proposed Scheme - Yellow Option

Arboricultural Survey Results

- Notable tree
- Veteran tree
- Traditional Orchard
- Noise Action Planning
- Unregistered Parks and Gardens
- Ponds
- GCN Presence/absence
- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade I
- Grade II
- Scheduled Monument
- Byway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-3
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - YELLOW
PAGE 5 OF 5

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Proposed Scheme - Red Option

Arboricultural Survey Results

- Ancient tree
- Notable tree
- Veteran tree

Ancient Woodland

Category A Tree Groups

Traditional Orchard

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Local Nature Reserve (Eng)

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Grade II*

Bridleway

Byway

Footpath

Watercourse

Floodzone 3

Floodzone 2

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FIGURE 17-4
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - RED
PAGE 1 OF 5

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Proposed Scheme - Red Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

Group of Trees with TPO

Traditional Orchard

Pippin Trust Orchard

Drovers Wood (Woodland Trust)

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-4
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - RED
PAGE 2 OF 5

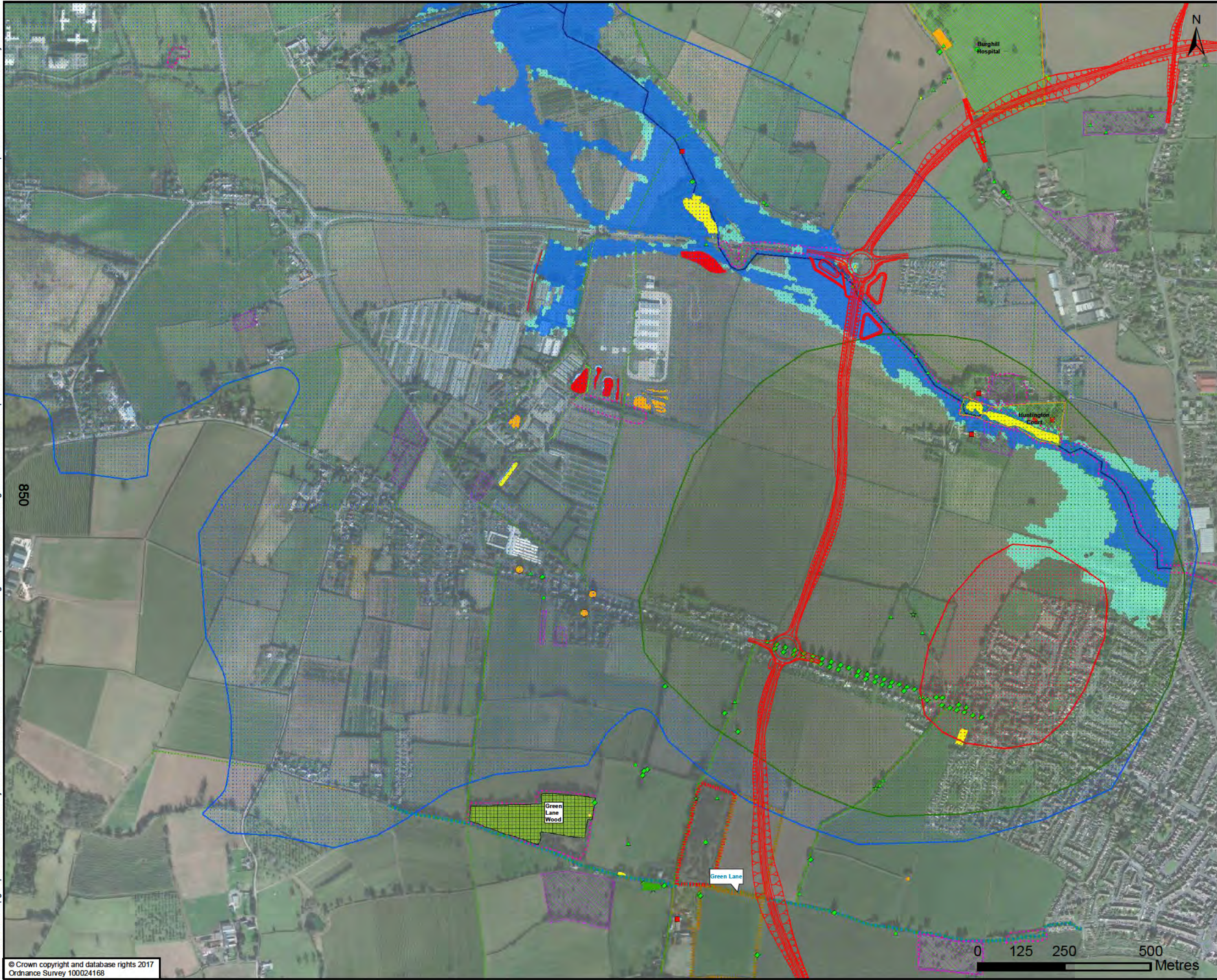
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Proposed Scheme - Red Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

- Group of Trees with TPO
- Traditional Orchard
- Pippin Trust Orchard
- Drovers Wood (Woodland Trust)
- Hereford Listed Traditional Orchard
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens

Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Local Green Space
- Bridleway
- Footpath

Watercourse

- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

Hereford

DRAWING STATUS

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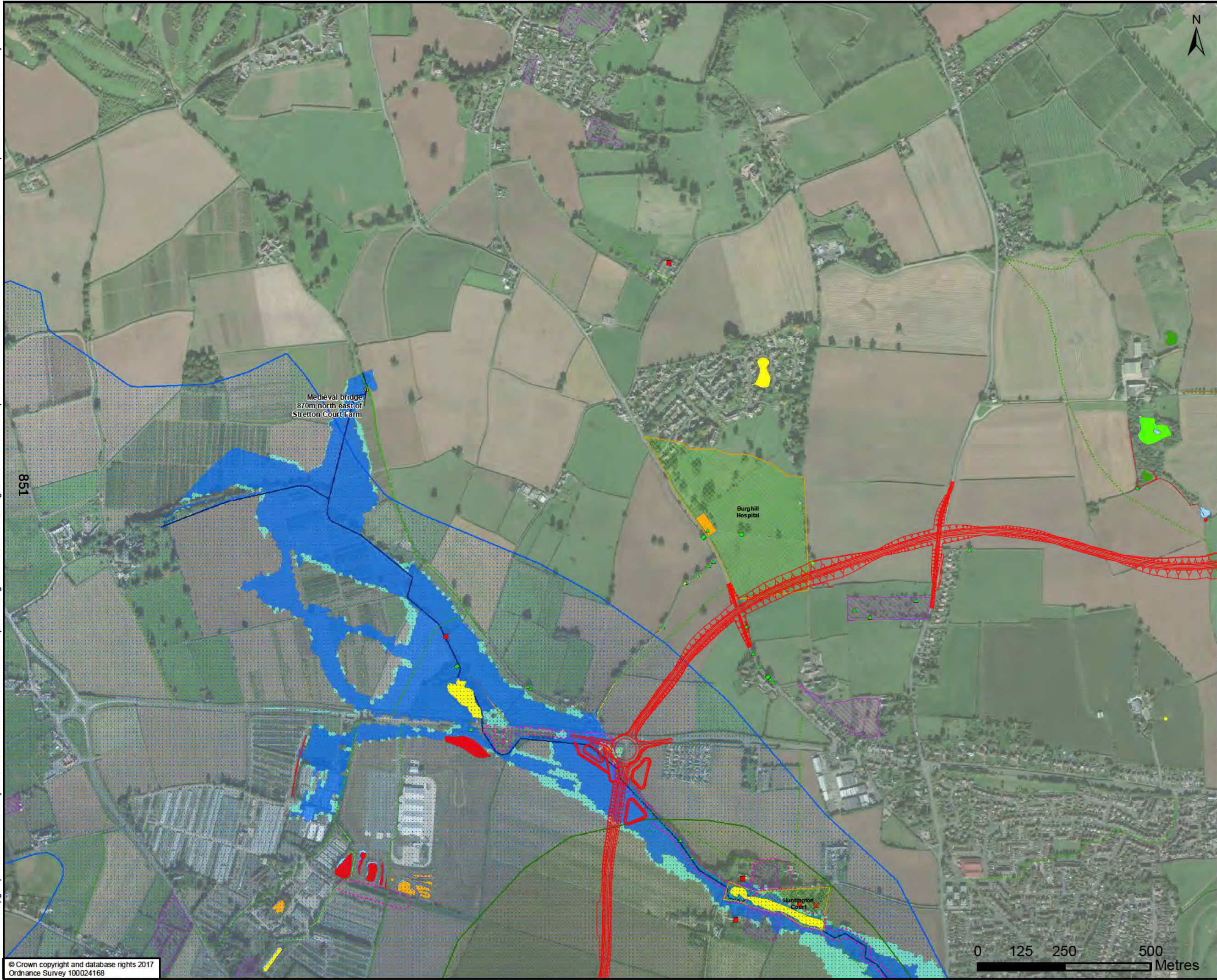
FIGURE 17-4
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - RED
PAGE 3 OF 5

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Proposed Scheme - Red Option

Arboricultural Survey Results

- Category A tree
- Notable tree
- Veteran tree
- Group of Trees with TPO
- Traditional Orchard
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Bridleway
- Footpath

Watercourse

- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-4
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - RED
PAGE 4 OF 5

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— Proposed Scheme - Red Option

Arboricultural Survey Results

- ◆ Notable tree
- ▲ Veteran tree
- ▨ Traditional Orchard
- ▤ Noise Action Planning Areas
- ▧ Unregistered Parks and Gardens
- Ponds
- GCN Presence/absence
- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- ▤ Site of Importance for Nature Conservation
- Listed Buildings
- Grade I
- Grade II
- Scheduled Monument
- ++++ Byway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2
- Source Protection Zone
- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-4
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - RED
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Proposed Scheme - Olive Option

Arboricultural Survey Results

- Ancient tree
- Notable tree
- Veteran tree

Ancient Woodland

Category A Tree Groups

Traditional Orchard

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Local Nature Reserve (Eng)

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Grade II*

Bridleway

Byway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Hereford

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FIGURE 17-5
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - OLIVE
PAGE 1 OF 5

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Proposed Scheme - Olive Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

Group of Trees with TPO

Traditional Orchard

Pippin Trust Orchard

Drovers Wood (Woodland Trust)

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-5
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - OLIVE
PAGE 2 OF 5

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Proposed Scheme - Olive Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

- Group of Trees with TPO
- Traditional Orchard
- Pippin Trust Orchard
- Drovers Wood (Woodland Trust)
- Hereford Listed Traditional Orchard
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens

Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-5
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - OLIVE
PAGE 3 OF 5

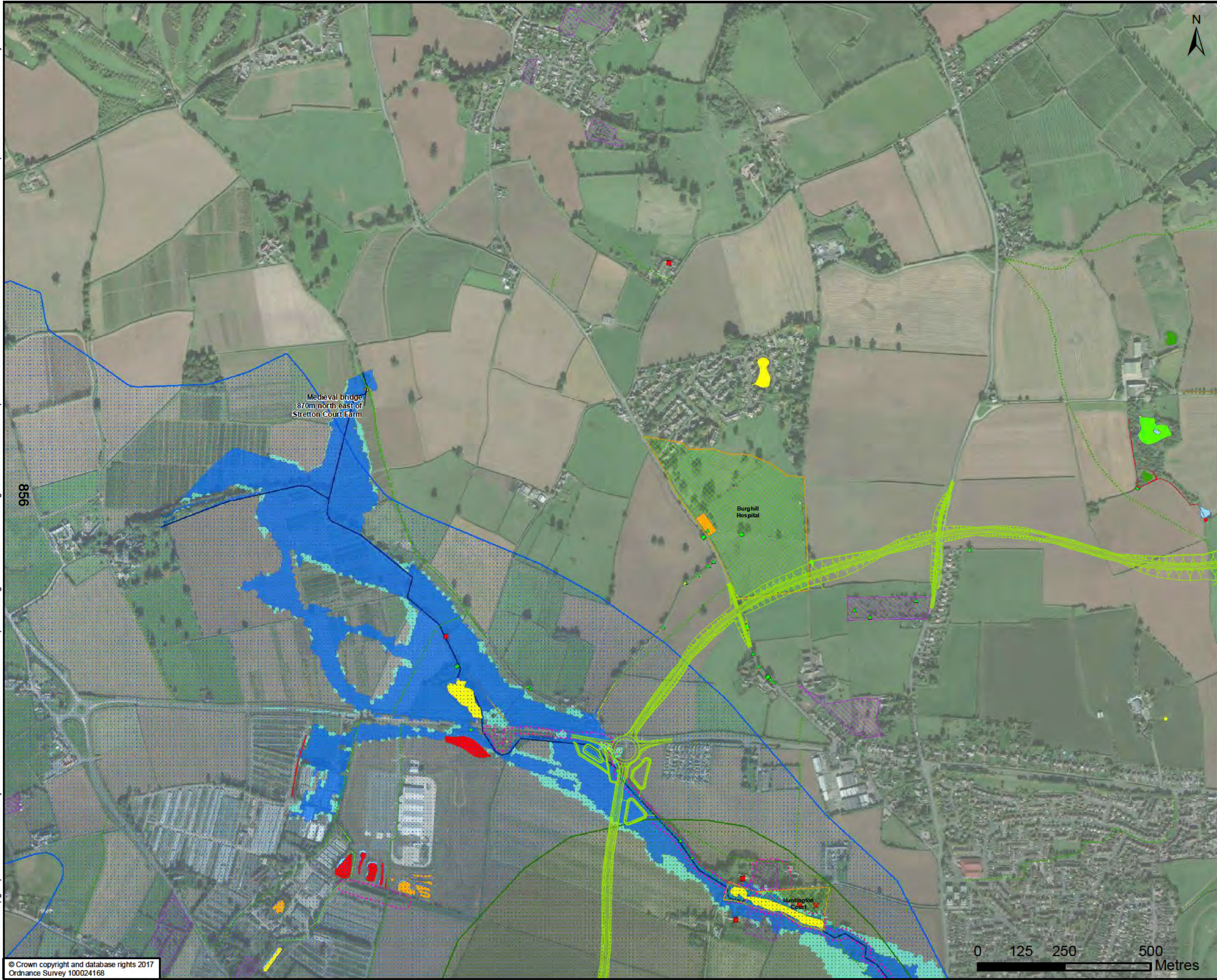
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Proposed Scheme - Olive Option

Arboricultural Survey Results

- Category A tree
- Notable tree
- Veteran tree

Group of Trees with TPO

Traditional Orchard

Unregistered Parks and Gardens

Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument

Bridleway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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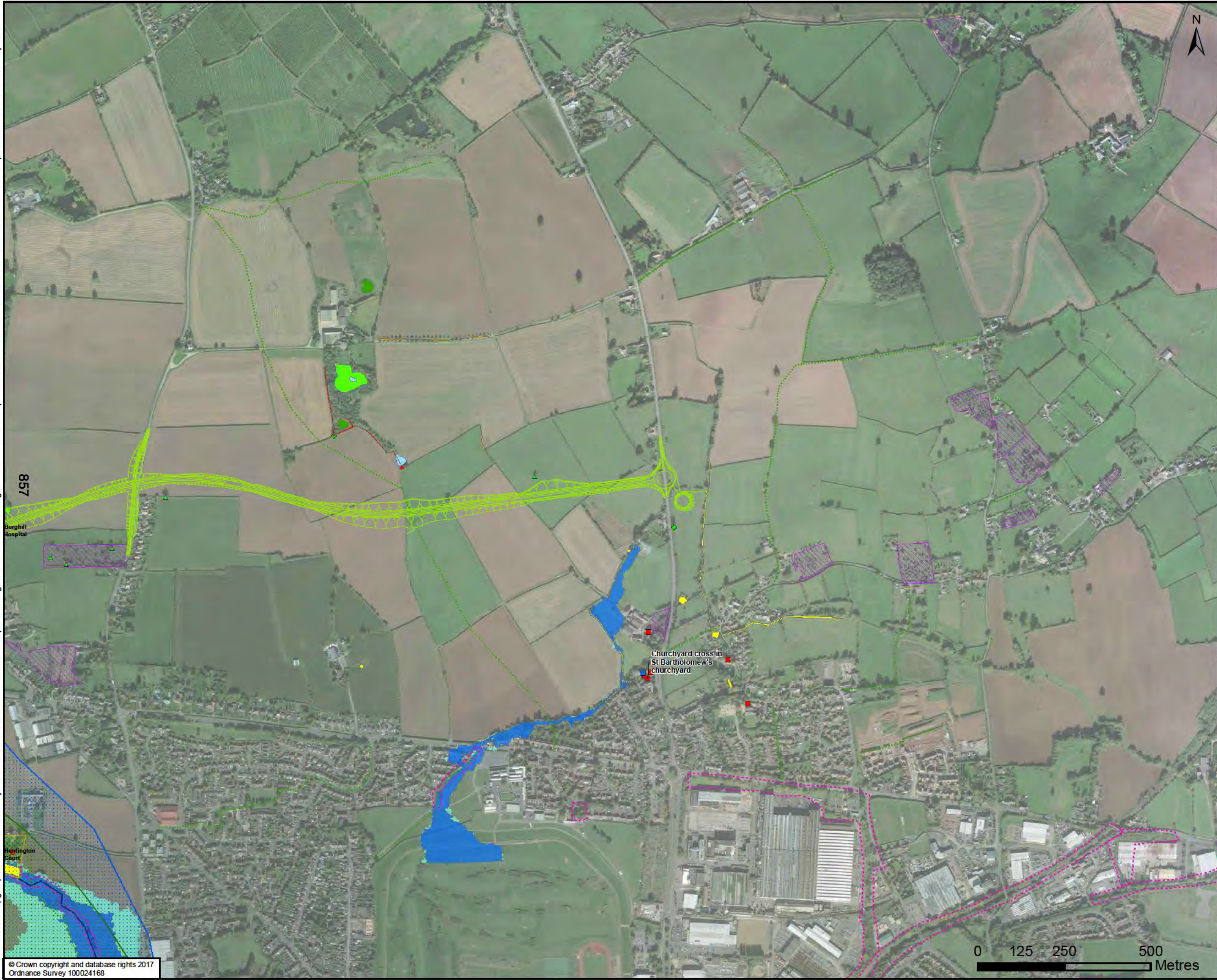
FIGURE 17-5
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - OLIVE
PAGE 4 OF 5

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Proposed Scheme - Olive Option

Arbicultural Survey Results

- Notable tree
- Veteran tree
- Traditional Orchard
- Noise Action Planning Areas
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade I
- Grade II
- Scheduled Monument

++++Byway

- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-5
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - OLIVE
PAGE 5 OF 5

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Proposed Scheme - Black 1 Option

Arboricultural Survey Results

- Ancient tree
- Notable tree
- Veteran tree

Ancient Woodland

Category A Tree Groups

Traditional Orchard

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Local Nature Reserve (Eng)

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Grade II*
- Bridleway
- Byway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

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FIGURE 17-6
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - BLACK 1
PAGE 1 OF 5

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Proposed Scheme - Black 1 Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

Group of Trees with TPO

Traditional Orchard

Pippin Trust Orchard

Drovers Wood (Woodland Trust)

Hereford Listed Traditional Orchard

Noise Action Planning Areas

National Trust Ownership boundary

Ancient Woodland Inventory (AWI)

Unregistered Parks and Gardens

Site of Special Scientific Interest (Eng)

Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-6
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - BLACK 1
PAGE 2 OF 5

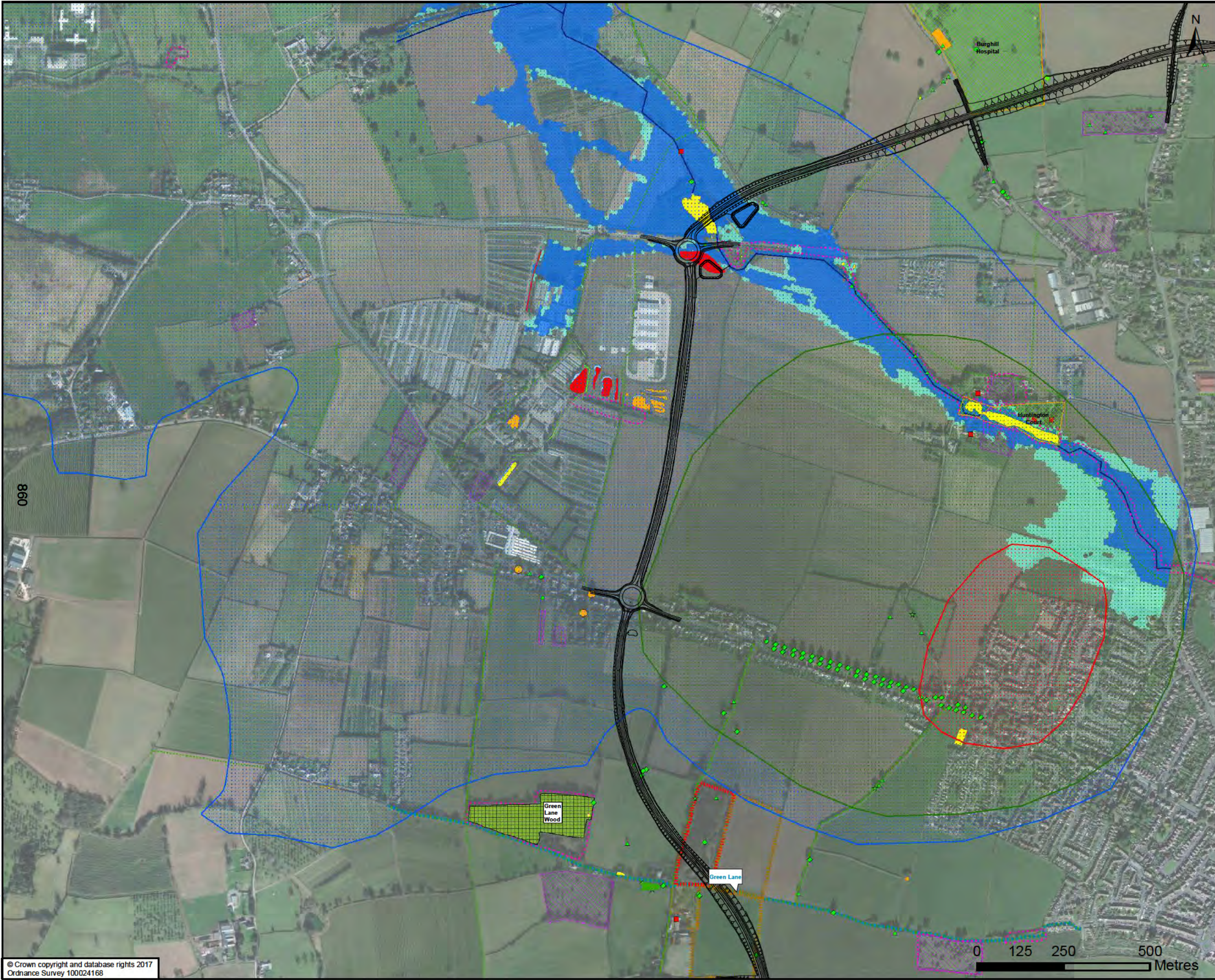
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Proposed Scheme - Black 1 Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

- Group of Trees with TPO
- Traditional Orchard
- Pippin Trust Orchard
- Drovers Wood (Woodland Trust)
- Hereford Listed Traditional Orchard
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens

Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Local Green Space
- Bridleway
- Footpath

Watercourse

- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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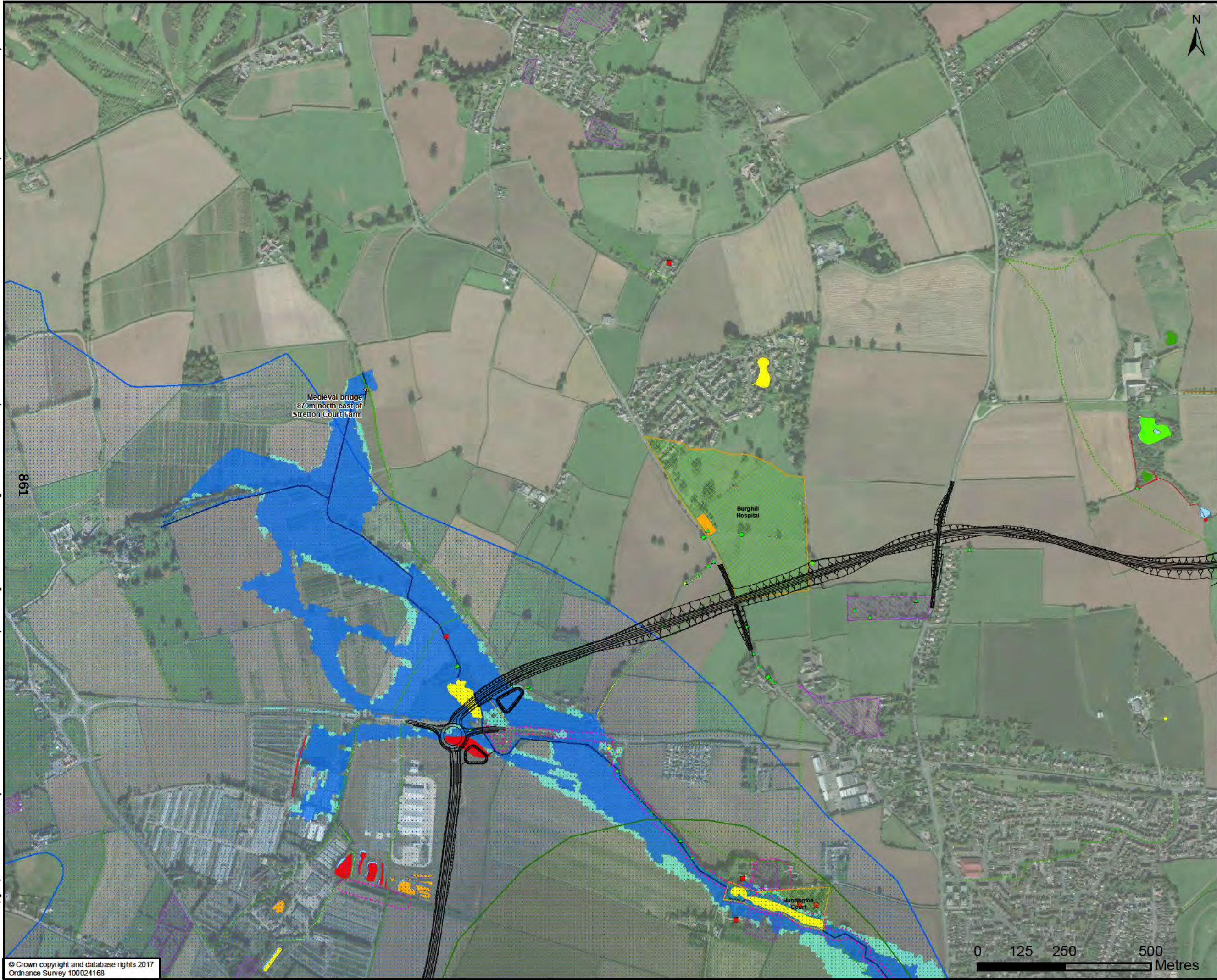
FIGURE 17-6
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - BLACK 1
PAGE 3 OF 5

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Proposed Scheme - Black 1 Option

Arboricultural Survey Results

- Category A tree
- Notable tree
- Veteran tree
- Group of Trees with TPO
- Traditional Orchard
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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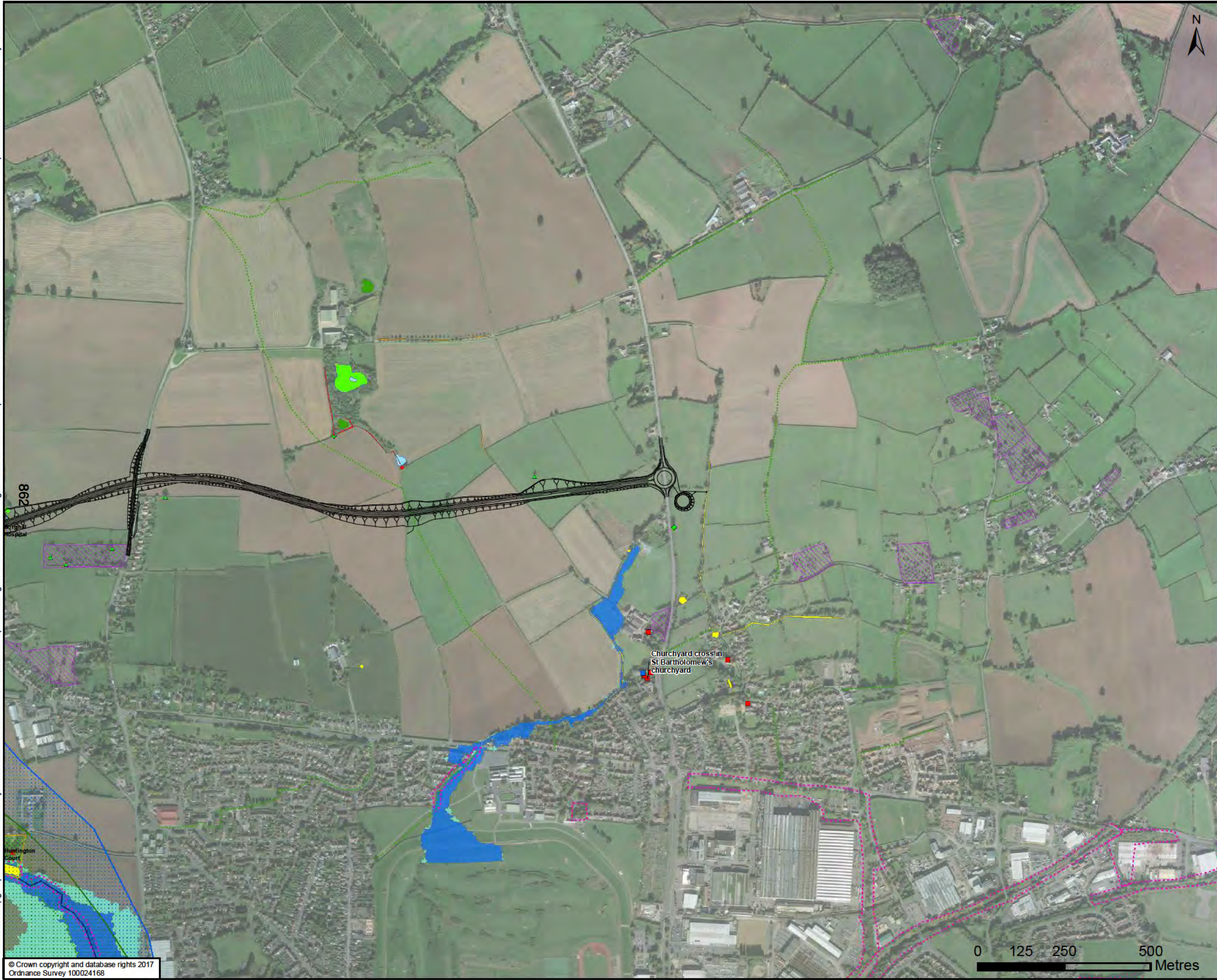
FIGURE 17-6
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - BLACK 1
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Proposed Scheme - Black 1 Option

Arboricultural Survey Results

- Notable tree
- Veteran tree
- Traditional Orchard
- Noise Action Planning Areas
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade I
- Grade II
- Scheduled Monument

Byway

Footpath

Watercourse

Floodzone 3

Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-6
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - BLACK 1
PAGE 5 OF 5

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Proposed Scheme - Black 2 Option

Arboricultural Survey Results

- Ancient tree
- Notable tree
- Veteran tree

Ancient Woodland

- Category A Tree Groups
- Traditional Orchard
- Hereford Listed Traditional Orchard

Noise Action Planning Areas

- National Trust Ownership boundary
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens
- Local Nature Reserve (Eng)
- Site of Special Scientific Interest (Eng)
- Special Area of Conservation (Eng)
- Ponds

GCN Presence/absence

- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Grade II*
- Bridleway
- Byway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Hereford

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FIGURE 17-7
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - BLACK 2
PAGE 1 OF 5

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Proposed Scheme - Black 2 Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

- Group of Trees with TPO
- Traditional Orchard
- Pippin Trust Orchard
- Drovers Wood (Woodland Trust)
- Hereford Listed Traditional Orchard

Noise Action Planning Areas

- National Trust Ownership boundary
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens
- Site of Special Scientific Interest (Eng)
- Special Area of Conservation (Eng)

Ponds

GCN Presence/absence

- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Greenbank Meadow
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

DRAWING STATUS

FOR INFORMATION ONLY

Kings Orchard, 1 Queen St, Bristol, BS2 0HQ
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CLIENT

Balfour Beatty Herefordshire Council

Working for Herefordshire

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FIGURE 17-7
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - BLACK 2
PAGE 2 OF 5

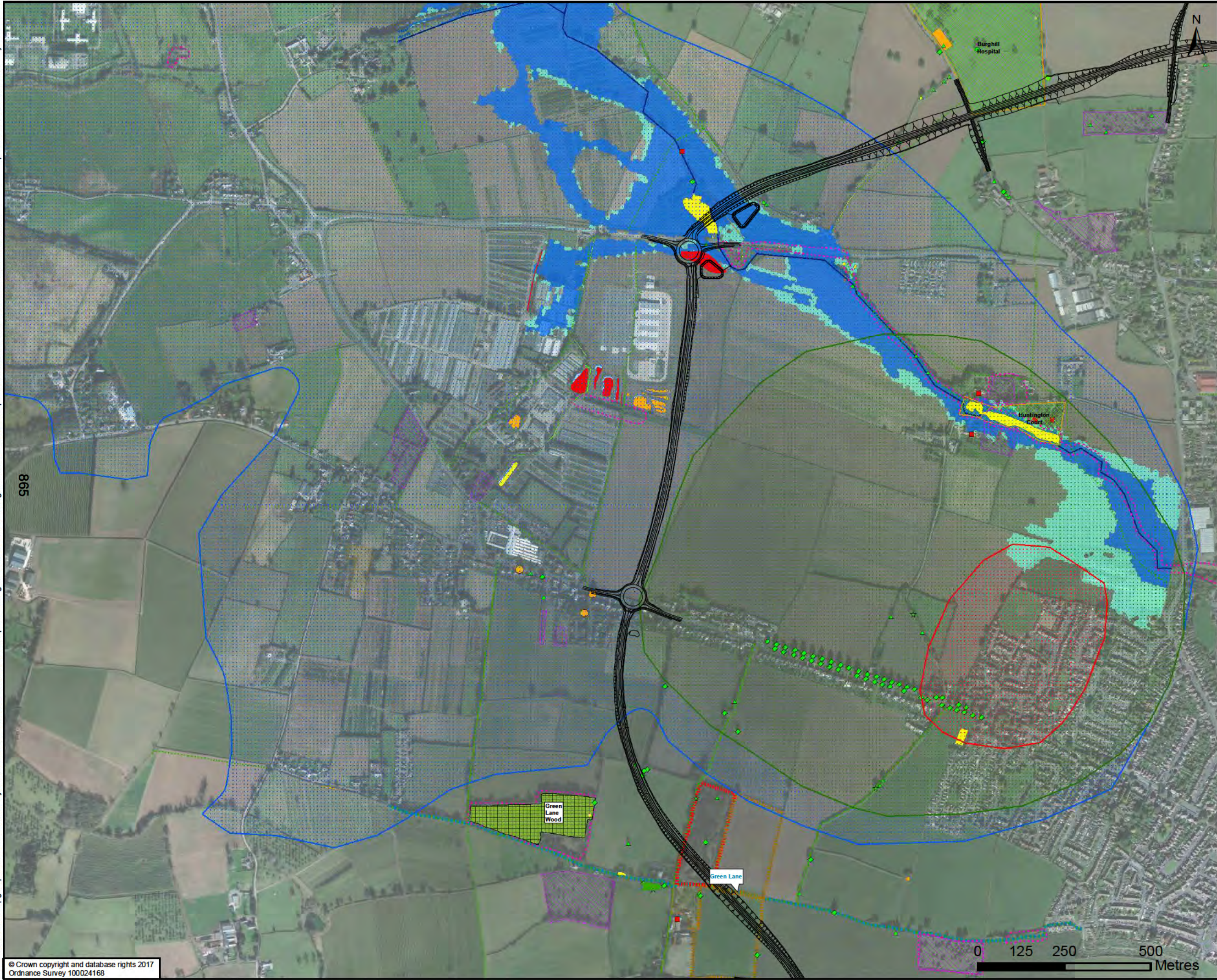
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DATE 14/06/2018		REV P01

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Proposed Scheme - Black 2 Option

Arboricultural Survey Results

- Category A tree
- Ancient tree
- Notable tree
- Veteran tree
- Tree with preservation order

Ancient Woodland

- Group of Trees with TPO
- Traditional Orchard
- Pippin Trust Orchard
- Drovers Wood (Woodland Trust)
- Hereford Listed Traditional Orchard
- Ancient Woodland Inventory (AWI)
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed
- Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Local Green Space
- Bridleway
- Footpath
- Watercourse
- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

Hereford

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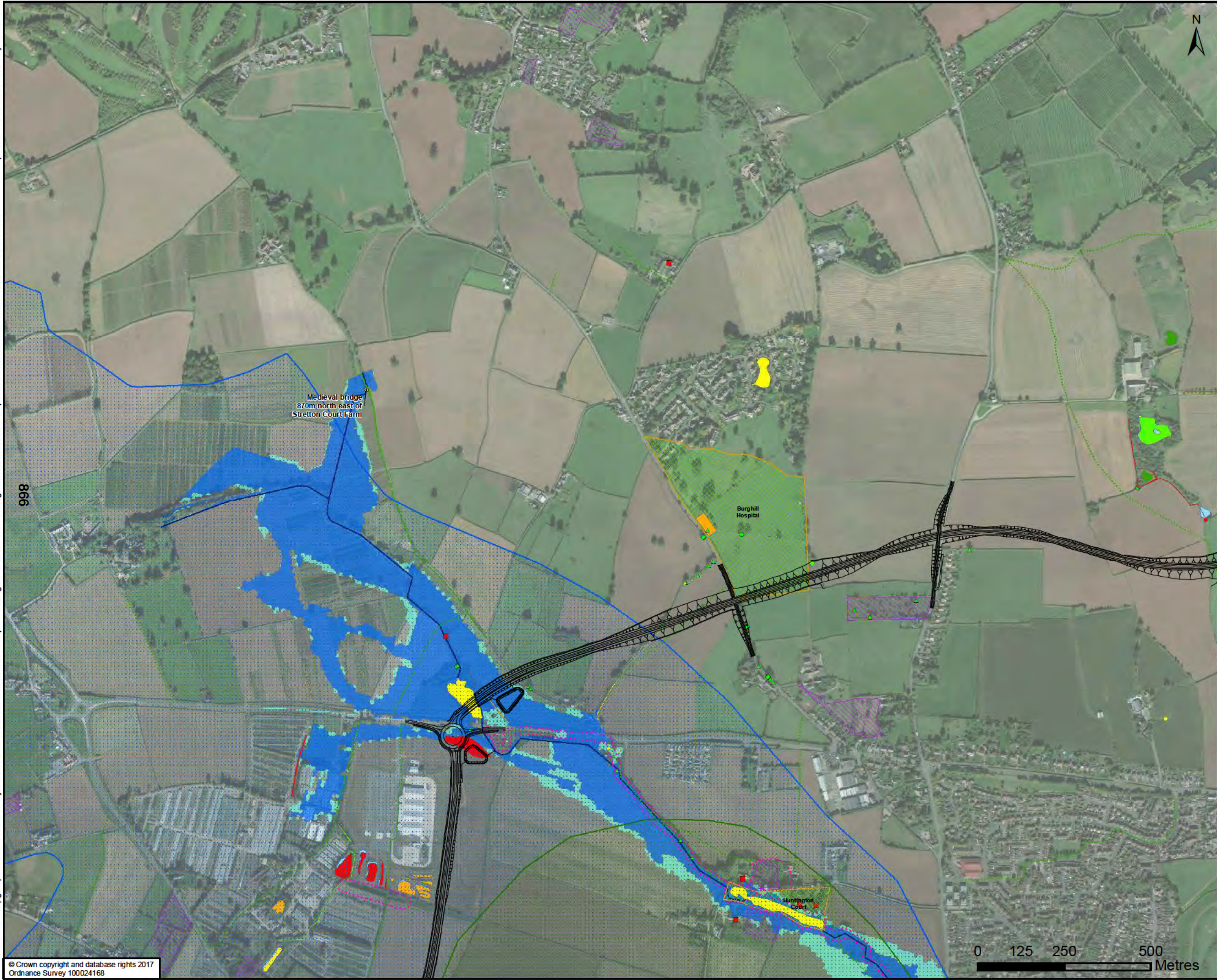
FIGURE 17-7
ENVIRONMENTAL CONSTRAINTS
PROPOSED ROUTE - BLACK 2
PAGE 3 OF 5

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Proposed Scheme - Black 2 Option

Arboricultural Survey Results

- Category A tree
- Notable tree
- Veteran tree
- Group of Trees with TPO
- Traditional Orchard
- Unregistered Parks and Gardens
- Ponds

GCN Presence/absence

- PA - absent
- PSCA - medium population
- PSCA - small population
- Scoped in - presence assumed
- Scoped out - absence assumed

Site of Importance for Nature Conservation

Listed Buildings

- Grade II
- Scheduled Monument
- Bridleway
- Footpath

Watercourse

- Floodzone 3
- Floodzone 2

Source Protection Zone

- Zone II - Outer Protection Zone
- Zone III - Total Catchment

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FIGURE 17-7
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PROPOSED ROUTE - BLACK 2
PAGE 4 OF 5

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— Proposed Scheme - Black 2 Option Arboricultural Survey Results ◆ Notable tree ▲ Veteran tree ▨ Traditional Orchard ▨ Noise Action Planning Areas ▨ Unregistered Parks and Gardens ■ Ponds GCN Presence/absence ■ PA - absent ■ PSCA - medium population ■ PSCA - small population ■ Scoped in - presence assumed ■ Scoped out - absence assumed ▨ Site of Importance for Nature Conservation Listed Buildings ■ Grade I ■ Grade II ■ Scheduled Monument ◆◆◆◆ Byway ◆◆◆◆ Footpath — Watercourse ■ Floodzone 3 ■ Floodzone 2 Source Protection Zone ■ Zone I - Inner Protection Zone ■ Zone II - Outer Protection Zone ■ Zone III - Total Catchment		
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