Appendix (e)

Rotherwas Access Road

Alternative Options to Avoid Archaeology

Issue 1

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1 Introduction

1.1 Herefordshire Council requested a preliminary assessment of options for the realignment of the Rotherwas Access Road to avoid the archaeological feature found near Watery Lane.

1.2 The options we have been requested to consider are:

Option A - Re-align the road further south at the feature
Option B - Re-align the road north at the feature
Option C - Bridge over the feature
Option D - Tunnel under the feature

1.3 The report gives only our initial perception of the feasibility of each option without having done any detailed analysis of the risks or constraints.

1.4 An approximate programme for the delivery of the options has been included with assumptions on the success of subsequent planning or statutory processes. No inclusion has been made for the programme implications of funding submissions.

1.5 Outline costs have been provided based on the Termination Clause Report and the Rotherwas Tender submissions. No consultation with the *Contractor* has been undertaken in deriving the figures given in this note. The final costs may therefore differ significantly from those given.

2 Option A – Realignment to the South

2.1 Option Description

2.1.1 An outline alignment design has been considered to the South of the existing route. However the topography as Dinedor Hill rises is such that the alignment is not possible without departures from standard and major cuttings.

2.2 Route Option Comments

2.2.1 The archaeological feature is likely to extend to the south although this cannot be confirmed until further investigation work has been completed in the adjacent field.

2.2.2 The route encroaches upon Woodlands Farm which would require demolition.

2.2.3 The route would require approximately 1.7km of realigned carriageway necessitating the purchase of new land and the re-establishment and sale of the land currently under construction.

2.2.4 A full planning and statutory orders process would be required with objections likely due to the opposition to the road regardless of the archaeological benefits.

2.3 Cost Estimate

2.3.1 Based on the current scheme cost estimates a cost per KM of £3.6M has been assumed. Therefore, the cost of delivering the revised option would be about £9M (including about £1M to demolish and return the road constructed so far to agriculture and £2M for the extensive earthworks necessary).

2.4 Programme

Activity	**Start**	**Finish**
Establish Brief and Feasibility Design	Sep 2007	Nov 2007
Demolish, return to agriculture and demobilise	Dec 2007	Feb 2008
Preliminary Design	Dec 2007	Feb 2008
Environmental Assessment	Feb 2008	May 2008
Planning / CPO Process	May 2008	Sep 2010
Detailed Design	Sep 2009	Sep 2010
Procurement	Sep 2010	Mar 2011
Construction	Mar 2011	Sep 2011

3 Option B – Realignment to the North

3.1 Option Description

3.1.1 An outline alignment design has been tested to the North of the existing alignment. The design moves the road a clear 50m north of the Archaeological Feature found so far. The alignment is designed to the Design Manual for Roads and Bridges single carriageway road with a 60mph speed limit as per the current road design.

3.1.2 The realigned carriageway ties into the current design just east of red brook and at the limits of the existing industrial estate. Due to a sharp turn required at the industrial estate we have assumed that a roundabout junction will be constructed at this point.

3.2 Route Option Comments

3.2.1 The archaeological feature is likely to extend to the north although this cannot be confirmed until further investigation work has been completed in the adjacent field. The ground profiles in the adjacent field also indicate that this may be the case.

3.2.2 The route encroaches upon farm buildings used by Tracy Goodwin. These buildings would need to be demolished and replaced.

3.2.3 The route would require approximately 1.7km of realigned carriageway necessitating the purchase of new land and the re-establishment and sale of the land currently under construction.

3.2.4 A full planning and statutory orders process would be required with objections likely due to the opposition to the road regardless of the archaeological benefits.

3.2.5 The road would encroach onto the area protected by the Defra licences for great crested newts and lesser horseshoe bats.

3.2.6 The road would encroach onto land set aside for development at the industrial estate.

3.3 Cost Estimate

3.3.1 Based on the current scheme cost estimates a cost per KM of £3.6M has been assumed. Therefore the cost of delivering the revised option would be about £7M (including about £1M to demolish and return to the road constructed so far to agriculture).

3.4 Programme

Activity	**Start**	**Finish**
Establish Brief and Feasibility Design	Sep 2007	Nov 2007
Demolish, return to agriculture and demobilise	Dec 2007	Feb 2008
Preliminary Design	Dec 2007	Feb 2008
Environmental Assessment	Feb 2008	May 2008
Planning / CPO Process	May 2008	Sep 2010
Detailed Design	Sep 2009	Sep 2010
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Construction	Mar 2011	Sep 2011

4 Option C – Bridge Over the Feature

4.1 Option Description

4.1.1 A bridge over the feature has been considered requiring the elevation of the road by a further 3m to allow public access to the feature.

4.1.2 The form or design of a structure has not been considered at this stage.

4.2 Route Option Comments

4.2.1 Our understanding of the feature is that it was probable constructed to have a visual presence within the landscape. We do not consider therefore that building a bridge over the feature will be in any way more beneficial to its preservation and appeal to visitors.

4.2.2 The feature would be left exposed to the elements and would deteriorate rapidly leaving little to view or protect in the future. To mitigate against deterioration, the feature would need to be covered with some sort of structure. The feasibility of which could not be considered until the full extents of the feature were discovered.

4.2.3 Although the new alignment would be constructed completely on the line of the existing road the earthworks required to gain the height over the bridge would require additional land. A full planning and statutory orders process would be required with objections likely due to the opposition to the road regardless of the archaeological benefits and the increased visual intrusion of the road.

4.2.4 The extended earthworks for the road would encroach onto the area protected by the Defra licences for great crested newts and lesser horseshoe bats.

4.2.5 The extended earthworks for the road would encroach onto land set aside for development at the industrial estate.

4.2.6 Extensive overhead high voltage electricity diversions may be necessary to facilitate this option.

4.3 Cost Estimate

4.3.1 Based on the current scheme cost estimates a cost of £1M is assumed for the structure. An additional £2M is assumed for the earthworks required. To make this part of the site safe and proceed with the design, planning/statutory processes, procurement, construction and protective structure an additional £7M is assumed. A total cost is therefore estimated to be £10M.

4.4 Programme

Activity	**Start**	**Finish**
Establish Brief and Feasibility Design	Sep 2007	Nov 2007
Demobilise and Make Site Safe	Dec 2007	Feb 2008
Preliminary Design	Dec 2007	Feb 2008
Environmental Assessment	Feb 2008	May 2008
Planning / CPO Process	May 2008	Sep 2010
Detailed Design	Sep 2009	Sep 2010
Procurement	Sep 2010	Mar 2011
Construction	Mar 2011	Sep 2011

5 Option D – Tunnel Beneath the Feature

5.1 Option Description

5.1.1 An outline alignment design has been tested to tunnel beneath the feature at a depth of about 12m. To achieve this the road would not tie into the industrial estate without departures from standard. If departures from standard were required to be introduced to enable the alignment to tie in then either long lengths of tunnel, retaining structure and/or significant earthworks would be required.

5.1.2 A second tunnel option is possible without departures from standards by realigning the carriageway further south and using the rising levels of Dinedor Hill to provide cover to the tunnel. However the length of road in tunnel would be longer, approximately 1km.

5.2 Route Option Comments

5.2.1 Tunneling so shallow beneath the feature is likely to result in surface settlement of a greater amount than the settlement expected by the existing road.

5.2.2 The choice of a tunnel option implies that the feature will be fully exposed and open for public view. The feature would require extensive protection works to preserve it from the elements. Also there may be consideration given to reconstructing the feature due to the extensive damage caused by the Roman ditch and farmers land drains.

5.2.3 Both options would be a significant departure from the existing road and would require access to additional land. Therefore, a full planning and statutory orders process would be required.

5.3 Cost Estimate

5.3.1 The shorter tunnel option to remain on the existing route of the road would require a combination of complicated structures including bored or jacked box tunnel, cut and cover tunnel, extensive retaining wall/reinforced earth structures and significant earthworks. With so many unknowns it is difficult to put any costs to this. However, it is likely to be less than the longer tunnel option.

5.3.2 The Stonehenge Tunnel is currently estimated at £470M for 2.1km of dual carriageway constructed as a twin tunnel, say £235M per drive. The longer of the two tunnel options would need about 1km of tunnel, so on this basis this could cost £110M.

5.4 Programme

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6 Conclusions

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6.1 All options described will require considerable redesign work, a new planning and statutory orders process and procurement for a new construction contract. Therefore all options would be unlikely to be completed on site before September 2011.

6.2 The Cost estimates within the report can be summarised as follows:

Option A - Re-Align the road further south at the feature	£9M
Option B - Re-Align the road north at the feature	£7M
Option C - Bridge over the feature	£10M
Option D - Tunnel under the feature	£110M