

Outline Business Case for non-EA Risk Management Authorities

External form: LIT 55372

Published: 24/09/2020

Herefordshire Council

Herefordshire Natural Flood Management project



Figure 1 - Project partners working together to build leaky dams at Croft Castle

Recommendation

The project seeks to continue and extend the previously successful Defra funded Natural Flood Management pilot project through Contributions of Flood Defence Grant in Aid (FDGIA) of £1,273,600 over a six year period, 2021/22 to 2026/27 towards the estimated total project cost of £1,618,496.

We recommend that this scheme should be approved as it will reduce flood risk to many communities within Herefordshire and complement other engineered solutions within the county by reducing the scale of engineered interventions required. In addition, the scheme has a vision to fully integrate water management techniques into land management practices by working closely with landowners and the local community.

Version Control

Version 6, Updated submission to NPAS, 04/01/2022

Version History

Version History	Submission Date	Modifications
V1	18/06/2021	Initial version shared with EA for feedback and guidance.
V2	22/06/2021	Documentation updated following EA guidance from other NFM business cases.
V3	13/07/2021	Documentation updated following EA guidance. Additional information included.
V4	01/09/2021	Documentation updated based on initial feedback from local PSO area team.
V5	01/10/2021	Documentation updated following secondary review by the Environment Agency.
V6	04/01/2022	Document updated to include additional information requested by NPAS.

Assurance and Approval Record

RMA reference number: N/A

EA reference number: SNC501E/000A/271A

Date of submission to EA: 04/10/21

Assurance from Risk Management Authority

I confirm that this Outline Business Case meets our guidelines, quality assurance requirements, environmental obligations and Defra investment appraisal conditions. All

internal approvals, including member approval, have been completed. I apply to the Environment Agency for capital grant and local levy in the sum of £1,273,600 (Grant Claim Value).

Name of RMA Project Executive: Steve Hodges/Andrew Lovegrove

From: Lovegrove, Andrew <Andrew.Lovegrove@herefordshire.gov.uk>

Sent: 02 October 2021 18:02

To: Steve Hodges <StHodges@herefordshire.gov.uk>

Cc: Morris, Sonya <Sonya.Morris@herefordshire.gov.uk>

Subject: RE: Herefordshire Natural Flood Management project

Many thanks for this

I am happy to sign this, Son, could you add my signature ?

Many thanks

Andrew

Herefordshire.gov.uk

Andrew Lovegrove

Finance, Legal and Democratic Services

Chief Finance Officer and S151 officer

Plough Lane Offices

Tel | 01432 383519

Hereford

Email: andrew.lovegrove@herefordshire.gov.uk

HR4 0LE

Approval from Risk Management Authority Council

Version approved: V5, V6

Date: 01/10/21, 04/01/22

Endorsement from Environment Agency Area Flood and Coastal Risk Manager

I confirm that the Outline Business Case is ready for assurance.

Applications less than £1million - I have consulted with the Area Director and Senior Finance Business Partner External Funding & Grants.

Applications up to £10million - I have consulted with the Director of Operations and the Deputy Director of Finance.

Applications up to £20million - I have consulted with the Executive Director of Operations and the Director of Finance.

Applications over £20million - I have consulted with the Executive Director of Operations, the Executive Director of FCRM and the Director of Finance.

Name of Area Flood and Coastal Risk Manager: Charlie Chandler

Date: 06/10/2021

From: Chandler, Charles <charles.chandler@environment-agency.gov.uk>
Sent: 06 October 2021 14:55
To: Moore, Stacey <stacey.moore@environment-agency.gov.uk>
Cc: Chinyere, Pio <pio.chinyere@environment-agency.gov.uk>
Subject: RE: OBC Submission - Herefordshire Natural Flood Management project

Thank you Stacey for working with Herefordshire to complete this OBC.

I can confirm that I have reviewed the OBC and I am happy for the document to progress for assurance by NPAS prior to seeking FSOD approval.

I have also reviewed the FCRM2 and I am happy to approve. Please take this email as my formal approval of the FCRM2 as WMD AFCRM.

Many thanks,

Charlie

Charlie Chandler

Area Flood and Coastal Risk Manager – Delivery Manager | West Midlands

Environment Agency | Riversmeet House, Tewkesbury, GL20 8JG

Environment Agency Assurance and Technical Approval

I recommend that the application is granted technical approval

Name of AFCRM or Lead Assurance Reviewer: Helen Proffitt

(Note: assured by the AFCRM as the project value is less than £500k.)

Date: 25 January 2022

Final Recommendation	Successful delivery appears feasible but significant issues already exist requiring management attention. These appear resolvable at this stage and, if addressed promptly, should not present a cost/schedule overrun.
Submission to NPAS required at OBC Stage	
Items for attention	This submission only assesses the preferred option in relation to the whole life costs and does not cost out any of the other options, which we would have expected at OBC. This business case does signify a change in direction, ie. NFM (catchment scale land options) ahead of hard
Specific points to note on signing	
	1 Only one option has been fully appraised
	2 Difficult to fit NFM to the current business case template
	3
	4

Financial Approval **£1,273,600**

[See Section A4 of the Financial Scheme of Delegation.]

Name of Approving Officer: Mark Sitton-Kent, Director

Date: 16/02/2022

Name of Consulting Officer: Paul Lambert, Deputy Director, Finance

Date: 21/02/2022

FSoD reference: **F/2122/1027**

Date:

Financial Scheme of Delegation Co-ordinator

From: Sitton - Kent, Mark

Sent: 16 February 2022 16:55

To: FSoD <FSOD@environment-agency.gov.uk>

Subject: RE: For FSoD approval F/2122/1027 Herefordshire NFM OBC

Approved.

From: Lambert, Paul

Sent: 21 February 2022 11:38

To: FSoD <FSOD@environment-agency.gov.uk>

Subject: RE: Resend: For FSoD approval F/2122/1027 Herefordshire NFM OBC

Morning Claire

Sorry for the delay. I approve.

Paul

Paul Lambert ACMA CGMA| Deputy Director | Finance Business Partnering | Defra group
Finance – EA team | Department for Environment, Food and Rural Affairs

Contents

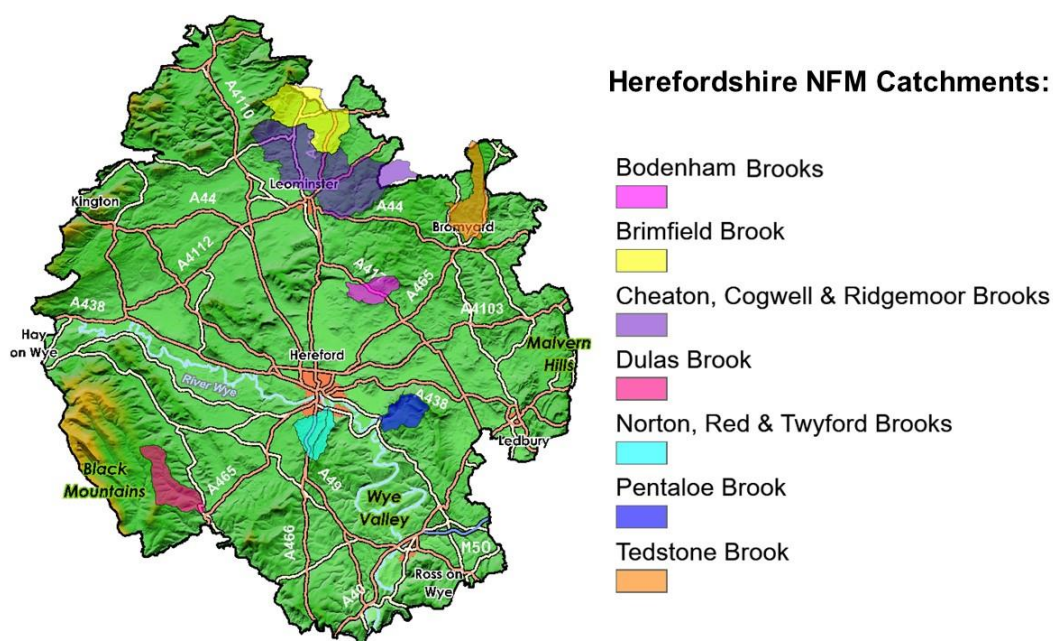
1.0	Project Summary	8
2.0	Strategic Case.....	15
2.1	Introduction.....	15
2.2	Strategic context.....	17
2.3	Environmental and other considerations	17
2.4	The case for change	18
2.5	Objectives.....	25
2.6	Current arrangements.....	27
2.7	Main benefits	28
2.8	Strategic risks, assumptions, constraints and dependencies.....	30
3.0	Economic Case	30
3.1	Critical success factors (CSF).....	30
3.2	Long List of Options.....	30
3.3	Technical and environmental appraisal.....	35
3.4	Economic appraisal	36
3.5	Option Selection	36
4.0	Commercial Case.....	37
4.1	Procurement strategy and timescales	37
4.2	Efficiencies and commercial arrangements.....	38
5.0	Financial Case	38
5.1	Summary of financial appraisal	38
5.2	Funding sources	39
5.3	Expenditure and income profile.....	40
6.0	Management Case	40
6.1	Project management.....	41
6.2	Schedule.....	42
6.3	Outcomes	42
6.4	Risk, assumptions, issues and dependencies management	43
6.5	Assurance.....	44
6.6	Engagement with Stakeholders and compliance with the Equality Act 2010	45
7.0	List of Appendices	45
8.0	References.....	46

1.0 Project Summary

This business case is seeking approval for the allocation of £1,273,600 combined Flood Defence Grant in Aid (FDGiA) and Local Levy funding over a six year period, 2021/22 to 2026/27, for the delivery of Natural Flood Management (NFM) measures in Herefordshire. The total Net Present Value (NPV) project cost is £1,273,600 providing £7,261,987 in benefits over the next 25 years.

The project seeks to continue and expand our previously successful Defra funded [River Wye and Lugg NFM Pilot Project](#). The project aims to reduce flood risk in catchments identified in Figure 2. Other benefits will include: improving the failing WFD status of watercourses within the catchments; helping to create and improve habitats for wildlife; helping capture carbon and reduce the impacts of climate change; helping reduce nutrient runoff and soil loss into watercourses which will help tackle the current phosphate issue in the River Wye SAC (currently failing to meet its conservation targets for phosphate); and provide further evidence to demonstrate the benefits of NFM. It will be delivered through partnerships that bring together organisations, landowners, businesses and communities, which will greatly assist in its long-term sustainability.

Figure 2 River Wye and Lugg NFM Project - Catchments in the Defra funded pilot project



Source: Herefordshire Council (2021) © Crown copyright and database rights (2021) Ordnance Survey (100024168)

Herefordshire Council (HC) are the lead organisation for this project, which will be delivered in partnership with the Environment Agency and other delivery partners (see Section 6.1). Using project funds, HC will provide an NFM Project Officer, procurement and budget management. Project Executive and Project Manager would be with the council. Following an open procurement process, a contract(s) will be awarded for the provision of Catchment Advisors who will be responsible for engaging with landowners and providing them with tailored advice about the NFM opportunities on their land and the financial support available to help enable them to deliver NFM.

Flood risk type: Fluvial & Pluvial

Numbers of households at flood and/or erosion risk

- **Households at very significant risk now** – 98 properties (see Appendix F)
- **Non-residential properties at very significant risk now** – The project aims to reduce the flood risk to properties, especially those at ‘very significant’ risk (<5% AEP). It is not possible to confidentially predict, at this stage, the level of flood risk benefit that can be achieved through NFM however the continuation and expansion of this pilot project will contribute towards the LLFA and EA’s understanding of NFM measures and the benefits offered to flood risk.

Existing Defences

Table 1 details the existing Environment Agency flood defences within NFM catchments. Note there is also a River Lugg Internal Drainage Board flood defence scheme on the Paradise brook, located at the bottom of the Dulas brook catchment. This scheme helps protect the Westwood industrial estate from flooding and involves flood waters being diverted down the road, back into the River Dore.

Table 1 Existing Environment Agency flood defences

Name of defence	Type	Condition	Residual life	Notes
Cheaton, Cogwell and Ridgemoor brooks catchment				
Leominster Town Schemes: River Lugg Earth embankment	Earth embankment, 1:100 year + climate change defence level	New	100 year design life with 99 years remaining	Protects around 400 properties
Leominster Town schemes: Kentwater	Flood wall and earth embankment	Poor – repairs ongoing and due for completion 2021/22	25 year design life remaining	Built in response to a flood in 1970 (flood height + 1 foot). No defined Standard of Protection (SOP) as model is poor and inaccurate. Protects c.90 properties
Lugg weirs and embankment, upstream of Leominster	Weirs and embankment	Fair but degrading	No defined SOP, no defined design life	Protecting agricultural land. Flows linked to Leominster Town schemes.
Dulas brook catchment				
Ewyas Harold Earth embankment, Dulas brook	Earth embankment	Poor due to natural morphological processes in Dulas brook	40-50 years	Protecting properties in Ewyas Harold
Pontrilas Earth embankment, River Dore	Earth embankment	Poor – exceeding fair post repairs	10-20 years but undergoing repair works which will return it back to 50 years	Protecting properties in Pontrilas

Environmental Designations

Table 2 details the environmental designations in place within the NFM catchment areas. All relevant permissions will be obtained before NFM measures are implemented within these designated areas.

Table 2 Summary of Environmental designations¹

Designation	Name
Sites of Special Scientific Interest (SSSI)	River Lugg (CCR, BRIM, BOD, PEN), River Wye (All), River Teme (BRIM), Fishpool Valley (CCR), Berrington Pool (CCR), Little Hill (PEN), Haugh Wood (PEN), Sharpnag Wood (PEN), Woodshuts Wood (PEN), Scutterdine Quarry (PEN), Perton Roadside Section and Quarry (PEN)
Area of Outstanding Natural Beauty (AONB)	Wye Valley (PEN)
Special Area of Conservation (SAC)	River Wye
Local Nature Reserve (LNR)	Broadmoor Common (PEN)
Local Wildlife Site (LWS)	Haugh Wood (PEN), River Wye and several other smaller LWS's in other catchments
Traditional Orchard	Numerous sites in all catchments
Ancient Woodland	Numerous sites in all catchments

How is flood and erosion risk managed?

Landowners

There is no general right to be protected from flooding or the effects of flooding, and no right to be protected to any particular standard where flood risk management action is taken. There is no general duty on any public body to carry out works to reduce flood risk, or to maintain flood defences once these have been built. In common law, the owners of land are responsible for safeguarding their own land and property.

Landowners normally own, and have responsibilities for, the stretch of watercourse that runs on or under their land or on the boundary of their land, up to its centre. Guidance on owning a watercourse; landowner responsibilities and rules to follow; and permissions needed to do work around watercourses can be accessed via [Owning a watercourse - GOV.UK](#) or www.herefordshire.gov.uk/roads-1/flooding/6.

Environment Agency

The Environment Agency is an executive non-departmental public body, established in 1996 to protect and improve the environment. The Environment Agency manages risk of flooding from rivers designated as 'main rivers', reservoirs, estuaries, and the sea and has a general supervisory role for all sources of flooding and coastal erosion.

The Environment Agency have permissive legal powers to undertake certain flood risk management activities in relation to main rivers and the sea². Works are carried out at public expense, to reduce flood risk. It is not technically, economically or environmentally feasible to prevent flooding altogether.

Lead Local Flood Authority - Herefordshire Council

All of the proposed NFM catchment areas are defined as ordinary watercourses (any watercourse that is not designated as a [main river](#)) and fall under the jurisdiction of the Lead Local Flood Authority (LLFA, Herefordshire Council). In accordance with the Flood and Water Management Act 2010, the LLFA is 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. They also have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses.

As the local highways authority, Herefordshire Council are also responsible for managing flood risk associated with highways assets in the Council's ownership. In this role the Council must develop, maintain and monitor a [local flood risk management strategy](#). During and after a flood event, the Council also plays a lead role in emergency planning and recovery.

As the main Land Drainage Authority in the county, Herefordshire Council is also "responsible for issuing consents for altering, removing or replacing certain structures or features on ordinary watercourses that are not under the responsibility of the relevant Internal Drainage Board" (HC, 2017).

Internal Drainage Boards

In Herefordshire there are two Internal Drainage Boards (IDB); the [River Lugg IDB](#) (responsible for maintaining the land drainage assets within the low lying catchments of River Lugg, Arrow, Frome and Worm brook) and the [Lower Severn IDB](#) (responsible for maintaining the land drainage assets within the low lying catchments of the Rivers Leaddon (Herefordshire), Severn, Cam, Frome, Leaddon and Little Avon).

Summarise the case for change

Whilst each of the 7 individual projects included within this business case (Figure 2, Appendix L) have unique and distinct justifications for interventions and project development, all catchments have been badly affected by flooding. Herefordshire has suffered a number of significant flood events during the past 18 months; October 2019; February 2020; August 2020; December 2020; and January 2021. Sadly several hundred properties were flooded, including a number of properties within the current NFM catchment areas (see Section 2.4.1). Whilst the pilot projects have begun to implement a wide variety of NFM measures within these catchments, it is evident that more measures need to be implemented to help further reduce the flood risk to these vulnerable communities. Without this Herefordshire NFM

² Others can also carry out works to manage flood risk from main rivers and the sea. This is subject to the impacts being assessed and such works being in accordance with any relevant statutory requirements. These include communities, individuals, voluntary groups, and private and other public sector organisations. The Environment Agency offers supports where it can to do this.

project, communities will continue to experience frequent flooding, which is only expected to get worse with climate change.

Selected option

The option selected, supported by all partners and local stakeholders is 'Option 3, Continuation and expansion of Natural Flood Management pilot project'. The project will focus on reducing flood risk to properties in the current NFM catchment areas shown in Figure 2, as well as investigating and incorporating a number of additional catchments across Herefordshire where residents, businesses and infrastructure could benefit from NFM.

It will build on NFM opportunities identified through; pilot project Catchment Advisor landowner engagements and NFM advisory reports, NFM effectiveness review (Appendix M) and through the outputs of the Environment Agency's Catchment Based Group analysis report (due end financial year 2021/22). The project will aim to not only implement NFM measures that help reduce flood risk, but also achieve multiple benefits such as improved habitat and water quality. The project will also seek to promote and adopt good land management practices such as maintaining healthy soils.

Economic cost and benefit of selected option

- Present Value Benefits - £2,940,825
 - Present Value Costs - £1,618,496
 - Benefit to Cost Ratio – 1.6 to 1
-

Affordability of selected option

- Raw Partnership Funding score is 86%
 - Adjusted Partnership Funding score is 112%
 - Funding from FD Grant in Aid is £1,193,600
 - Funding from the Regional Flood and Coastal Committee is £80,000
-

Risk

- The project is a fixed budget project, hence no funding has been allocated to risk. In the event of a shortfall, it will be the responsibility of the project partners to generate additional funds. The Environment Agency have no liability to cover these costs.
-

Permissions and consents

The following permissions and consents may be required to deliver this project. Further detail is provided in Section 2.3 and Appendix H. By working in partnership with key environmental organisations (e.g. Environment Agency, Natural England), the project will be able to address and overcome any environmental issues.

- Planning Permission
- Ordinary Watercourse Flood Defence Consents (FDC)
- SSSI consent
- Forestry England (Fe) consents
- Public Rights of Way (PROW) permissions

Outcomes

Pilot project outcomes:

Table 3 details the environmental outcome measures that were delivered by the pilot project over a period of approximately 2 years. The table shows that the project created/enhanced 622.91 ha of habitat (OM4a) and enhanced 8.2 km of river (OM4b). A summary of the NFM measure implemented through the pilot project is included in Appendix A. All NFM assets are also mapped on the [AGOL tool website](#).

The Environment Agency have commissioned their Catchment Based Group to analyse the impacts and benefits of the pilot project and determine the amount of additional NFM work that would maximise flood risk benefits to property. This study is will inform future NFM delivery within the catchments and is due to be completed within financial year 2021/22.

As part of the opportunity mapping work package, Atkins Ltd. conducted an NFM effectiveness review (Appendix M). Modelling estimated the combined runoff reduction potential of all implemented NFM measures in a 1:2 year and 1:100 year flood event for each catchment. The report estimated that the flood peak had potentially been reduced by; 2-5% in the Bodenham brooks catchment, 1% in the Tedstone brook catchment, <1-1% in the Cheaton, Cogwell and Ridgemoor brooks catchment and <1% in all other catchments. Whilst this potential combined reduction in runoff attenuation is low, it should be noted that to date only a small percentage of the proposed NFM measures have been implemented on a small percentage of the identified catchment. Published research indicates that NFM on average can reduce the peak flow by 20% during a flood event (see Appendix C).

Continued monitoring and evaluation will improve our understanding and confidence of the flood risk benefits provided by NFM measures (see Section 2.4.5).

Table 3 Outcome measures delivered through NFM pilot project

DELIVERED BY NFM PILOT PROJECT (March 2021: end of pilot project)								
Catchment	OM4 (a) Habitat created/enhanced (ha)							OM4 (b) km of river enhanced
	Inter-tidal habitats	Wood-land and wet woodland	Wetlands and wet grassland	Grass-land	Heath-lands	Ponds and lakes	Arable land	
Bodenham brooks	-	1.5	0	0	-	0.103	94.4	0.81
Brimfield brook	-	0	0	0	-	0.026	87.6	0.33
Cheaton, Cogwell & Ridgemoor brooks	-	1.18	0.037	0	-	0.430	214.26	4.43

Dulas brook	-	2.1	0.012	0.81	-	0.036	31.5	0.85
Pentaloe brook	-	0	0	0	-	0.000	0	0.20
Red, Norton & Twyford brooks	-	0	0	0	-	0.030	40.5	0.00
Tedstone brook	-	0	0	0	-	0.026	148.36	1.59
TOTAL:	N/A	4.78	0.049	0.81	N/A	0.65	616.62	8.20
			622.91					

Estimated Outcomes of this project:

Outcomes delivered through the pilot project (Table 3) have been used to estimate the outcome measures that the future project expects to achieve over the 6 year period. Further detail about the methodology used to calculate these outcomes is detailed in **Error! Reference source not found.** This project aims to deliver the following outcomes:

- **OM2** – There are currently at least 98 properties at very significant risk of flooding within the current NFM catchments (Figure 2, Appendix F). Through continuation and expansion of the NFM pilot project and following the methodology detailed in Appendix C, 5 non-residential properties will move to a lower flood risk band, moving from very significant to significant flood risk (OM2).
- **OM4a** – 2,030.5 ha of habitat created or enhanced (Appendix B)
- **OM4b** – 30 km river habitat enhanced (Appendix B)

The monitoring strategy outlined in Section 2.4.5 will be used to gather the evidence needed to demonstrate these benefits. The project will also deliver additional benefits such as storing and sequestering carbon through the delivery of NFM measures such as a tree and hedge planting and soil improvement works. This will help in our efforts to mitigate against climate change. The delivery of NFM measure will also contribute to the collective efforts of returning the River Wye SAC back into favourable condition (see Section 2.4.4).

Benefits that we are able to quantify have been included within the PF calculator, thus demonstrating the project's eligibility for funding. Note that it is likely that other unquantifiable benefits will be achieved through the project. As the project will be implementing measures that will help reduce flood risk, the project will also be helping to better prepare people for the impacts of climate change which include the increased likelihood of flooding.

Carbon:

This OBC is a submission outlining a strategic programme of work over the next 6 years. This programme initially covers 7 small individual project locations. At this stage of the project there is inadequate information available to support a formal carbon assessment as opportunity mapping is being undertaken to understand the exact NFM measures which need to be implemented. In the mean-time, negotiations with potential landowners will be on going in preparation for NFM instalment. Discussions will also be undertaken to understand the changes the landowners need to make through land management (a deliverable of NFM).

This has been discussed in detail with a carbon manager, Neil Guthrie, within the Environment Agency’s Carbon Planning Team.

The ambition of the project is that through the use of nature based solutions we expect to have a carbon 0 net gain (or better) at the end of the 6 years. We are therefore setting a target of net 0 whole life carbon or better for the whole programme of works.

Upon delivery of opportunity mapping through the project, we will be assessing each project individually in its own merit to understand the carbon implications. Additionally, PSO teams are seeking the support from the area portfolio board and area delivery managers to obtain support of this delivery approach and a way of ensuring the actions are completed by the project teams at appropriate times.

The Environment Agency will also be working very closely with colleagues in the carbon planning team to help feed their understanding and modelling of nature based solutions in order to help develop future carbon estimation tools to support future OBC submissions.

We will be more than happy to share the individual assessments with NPAS for information once available.

Schedule of critical milestone dates.

Table 4 Schedule of critical milestone dates

Event	Date and notes
OBC submission to the EA	December 2021
HC key decision to accept funding	February 2022
Procurement for Catchment Advisor contract	March 2022 (informed by Catchment Based Group study outputs)
Continuation of NFM Project Steering Group	May 2022 (then meet quarterly)
Catchment Advisors re-engage with NFM communities	June 2022 onwards
Re-launch NFM Construction Grant Scheme	June 2022 onwards
Implementation of NFM measures	June 2022 onwards
NFM monitoring	Continuous throughout the life cycle of the project (June 2022 onwards)

2.0 Strategic Case

2.1 Introduction

This Business Case is seeking approval for the allocation of £1,273,600 over a six year period, 2021/22 – 2026/27, to build on the successful delivery of the Defra funded River Wye and Lugg NFM pilot project. The project will continue delivery and implementation of NFM measures in the pilot project areas (Figure 2) and expand into additional catchment areas in Herefordshire.

As detailed in Section 2.4.1, Herefordshire has a long history of flooding. Over the past 18 months several hundred properties across the county were flooded, including a number of properties within the current NFM catchment areas. As well as the flooding of residential properties, businesses and infrastructure have also been significantly affected.

This project aims to reduce the flood risk to these communities by taking into account the good practice/lessons learnt from the [pilot project](#) and delivering more NFM measures within Herefordshire (see Appendix G). It will build upon the successful project delivery model adopted in the pilot project, i.e. an inclusive approach which works in partnership with organisations, communities, landowners, businesses and community groups.

The pilot project demonstrated that Catchment Advisors are integral to the successful delivery of NFM (see governance structure shown in Figure 6). They helped engage/support over 145 landowners and numerous communities within seven catchment areas, helping deliver a wide variety of NFM measures over a relatively short period of time (**Error! Reference source not found.**). By conducting free soil tests as part of their visits, the advisors not only offered more detailed recommendations to landowners about how they could help reduce flood risk and achieve multiple benefits, but also produced a baseline soil dataset for the catchments which will be further developed through this project, enabling us to develop our understanding of NFM. This project will also incorporate other elements of the pilot project's monitoring programme, such as river and rainfall monitoring (see Section 2.4.5).

The [NFM Construction Grant Scheme](#) was also an integral delivery mechanism of the pilot project. It provided financial support to landowners to enable them to implement NFM on their land and received 73 applications. In total the grant scheme cost the project £88,459.02 to run (£83,459.02 payments made to applicants, £5,000 covering the cost of administrative fees), however by running this scheme an additional £48,684.64 was contributed towards the project by landowners and £15,270.74 was contributed by the Woodland Trust, who supported tree and hedge planting applications. This project aims to include an updated version of the grant scheme, incorporating lessons learnt from the pilot project (Appendix G). It is our expectation that by implementing the same scheme it is likely to attract approximately 50% in additional external funding (estimated based on pilot project contribution rate).

The project will deliver benefits and improvements to the wider water environment. Presently, all of the waterbodies within the pilot project catchment areas are failing to achieve 'good' status under Water Framework Directive (WFD) targets (**Error! Reference source not found.****Error! Reference source not found.**). This project will help to improve the WFD status of the waterbodies and will also contribute to efforts being made to return the River Wye Special Area of Conservation (SAC) back to favourable status (see Section 2.4.4), thus providing significant benefits to local communities and businesses who are currently under a moratorium for development due to the condition of the SAC. Additional benefits beyond flood risk, include nature recovery through habitat creation, associated landscape benefits, and improving carbon sequestration in the catchment, both restoring and enhancing the ecosystem services that each catchment provides.

The project's delivery will be managed by Herefordshire Council (Project Officer), who will work in partnership with the Environment Agency, Local Flood Action Groups, local communities and other key delivery partners. Existing project partners to date have included: Severn Rivers Trust; Wye & Usk Foundation; Natural England; National Trust; National Farmers Union; Farm Herefordshire; River Lugg Internal Drainage Board; Herefordshire Wildlife Trust; Woodland Trust; Herefordshire Meadows; and Forestry England. This project will seek to put similar arrangements in place in order to enable and maximise any partnership working benefits.

As a result of the engagements made to date through the pilot project (see Section 2.4.4), several landowners have expressed an interest in delivering more NFM measures on their land, which will be key to the project's successful implementation. These interventions include

features such as attenuation areas, leaky dams and under-sowing maize. With the support of these landowners, the project will be able to deliver NFM measures at pace once funding is secured. Other potential additional funding opportunities will be actively explored and will be captured as part of the approach to demonstrating its long-term sustainability.

This business case is seeking approval for the allocation of £1,273,600 over a six year period, 2021/22 – 2026/27 to the Herefordshire Natural Flood Management Project. Where possible we will align delivery of NFM with other FCERM and environmental projects, seeking opportunities to deliver enhanced benefits with partners through engagement with Catchment Based Groups to help coordinate and agree priorities.

2.2 Strategic context

In November 2016, the Environment Food and Rural Affairs Committee (EFRA) published a report on 'Future Flood Prevention'. This stated that, "The Department for Environment, Food and Rural Affairs (Defra) should commission by July 2017 a large-catchment trial of the effectiveness of natural flood risk management approaches such as installation of leaky dams, tree planting and improved soil management, alongside other measures".

In November 2016, the Secretary of State for Defra asked the Environment Agency to initiate a pilot programme worth £15m to invest in flood risk reduction projects employing natural flood management techniques, slowing the flow and looking at ways to work with the contours of our environment to improve protection. The first pilot projects in Herefordshire started in 2017. The River Wye and Lugg Integrated NFM pilot project was a Defra funded Catchment Scale project, led by Herefordshire Council which worked in the seven catchments mapped in Figure 2. A community NFM project was also awarded to the Wye & Usk Foundation and Herefordshire Wildlife Trust for the delivery of NFM measures within the Yazor brook catchment in Hereford ([Yazor brook NFM project](#)). Countywide experience has been developed through these projects as to the best/most effective methods of delivering NFM.

As well as reducing flood risk, we want to better understand the techniques/benefits by trialling a range of solutions with communities. We also aim to support the outcomes of the 25-year environment plan by considering integrated outcomes to be delivered by projects in the natural environment. Further details about the strategic context of this project are contained within Appendix D.

2.3 Environmental and other considerations

By working in partnership with key environmental organisations (e.g. Environment Agency, Natural England), the project will be able to address and overcome any environmental issues and ensure all relevant permissions will be obtained. Further details about potential permissions and consents that could be required are detailed in **Error! Reference source not found.** Further information about OM4s can be found in Appendix B and the project's monitoring plan is included within Appendix K.

The project will work closely with experts in the council's and Environment Agency's ecology and conservation teams to ensure best practice is adopted and environmental risks are managed appropriately.

Table 2 details the Environmental designations within the NFM catchments e.g. SSSI, AONB, SAC, LRN, LWS etc. An overview of the WFD status of each NFM catchment, including reasons for not achieving good status is included within Appendix J. The project will use this information to ensure environmental risks are evaluated and managed appropriately.

In the pilot project, through consultation with relevant experts, method statements and guidance documents were produced on the different NFM measures. These documents helped identify consents and permits that would be required for implementing the work as well as identifying best practice to ensure environmental risks were managed appropriately. This process enabled low risk works to be screened out at an early stage and more complex works to receive additional guidance and support. This project will update and improve these documents to ensure the environment is protected.

2.4 The case for change

Whilst each of the project catchments is unique and has distinct justifications for intervention and project development, all the catchments have common flood risk characteristics in that they are small, dispersed rural communities with steep upper catchments and are located in predominantly agricultural communities. Communities within the priority catchments live with an on-going and, in line with climate change predictions, an increasing level of flood risk. More detail pertaining to each individual location can be found within 'Case Studies', as presented in Appendix L **Error! Reference source not found.**

2.4.1 Historical flooding

Herefordshire has a long history of flooding, with records of notable historic flood events dating back to May 1931 (WSP, 2019, Table 5.3.1, Pg.42). Some of the largest recorded flood events in Herefordshire occurred in 2007, 2012 and 2014 when approximately 309, 260 and 120 properties were flooded (values detailed respectively, WSP, 2019).

During the past 18 months, Herefordshire has experienced a number of significant flood events; October 2019, February 2020, August 2020, December 2020 and January 2021. Sadly several hundred properties within the county were flooded, including a number of properties within the current NFM catchment areas (Figure 3, Figure 4, Figure 5).

In response to this recent flooding, Community Flood Resilience Grants (CFRG) and Business Flood Resilience Grants (BFRG) were awarded to residents who experienced internal flooding and to businesses that were impacted by the flooding. Table 5 details the number of CFRG and BFRG grants that were awarded within and immediately downstream of the NFM project catchment areas (Figure 2). In total 11 CFRG and 4 BFRG grants were awarded to residents and businesses within the NFM catchments as a result of the October 2019 floods. A further 48 CFRG and 10 BFRG were awarded after the February 2020 floods, with several impacted by both events. Although this table gives an indication of the impact of flooding within the catchments, we are aware that not all flooded properties came forward and therefore the impact of these flood events likely to be much higher.

Herefordshire Council and the Environment Agency are continuing to support and work closely with affected communities, flood action groups, Parish Councils and ward members to assist their recovery, improve resilience and develop a collaborative approach to reducing flood risk.

Table 5 Summary of Community and Business Flood Resilience Grants awarded in NFM catchments

Catchment	Flood: Oct/Nov 2019		Flood: Feb 2020		Downstream impact
	CFRG	BFRG	CFRG	BFRG	
Bodenham brooks	0	0	2	0	Bodenham (just outside of catchment): 3 CFRG, 1 BFRG in Feb 2020
Brimfield brook	1	0	5	1	Little Hereford: 5 CFRG, 1 BFRG in Feb 2020
Cheaton, Cogwell & Ridgemoor brooks	0	0	15	0	Leominster: 10 CFRG, 23 BFRG in Feb 2020
Dulas brook	2	4	3	3	Pontrilas: 1 CFRG in Oct/Nov 2019, 8 CFRG, 2 BFRG in Feb 2020
Pentaloe brook	0	0	3	0	No CFRG or BFRG immediately downstream
Red, Norton & Twyford brooks	8	0	20	6	Lower Bullingham: 4 CFRG in Oct/Nov 2019, 8 CFRG, 7 BFRG in Feb 2020
Tedstone brook	0	0	0	0	Bromyard: 2 CFRG in Feb 2020
TOTAL:	11	4	48	10	Oct/Nov 2019: 5 CFRG, Feb 2020: 36 CFRG, 34 BFRG

Figure 3 Flooding in Ewyas Harold - October 2019



Source: Local resident

Figure 4 2007 flood in Brimfield, taken from Field View Cottages on Wyson Lane



Source: Local resident

Figure 5 Flooding in Brimfield - October 2019 flooding



Source: Photographs provided by residents of Wyson Lane

2.4.2 Current flood risk

Herefordshire's sparse and scattered population, coupled with more erratic weather patterns expected as a result of climate change, presents many challenges for flood alleviation options. Whilst the area has low permeability and therefore limited drainage, there are significant local variations influenced by a range of soil types. A variety of flood mechanisms exist within the NFM catchment areas, including: overland flow pathways and ordinary watercourses overtopping their banks; drainage issues (blockages, poor maintenance); and main river flooding in the lower reaches of the catchment. **Error! Reference source not found.** summarises the numbers of properties which are at greatest risk of flooding within the NFM catchment locations.

Table 6 Properties at risk of flooding within NFM catchment areas

Catchment	Community	No. Properties within each risk band (OM2)		
		Very significant ≥5% AEP	Significant <5% to >1.33% AEP	Moderate ≤ 1.33% but >0.5% AEP
Bodenham brooks	Bodenham	29*	0	0
Brimfield brook	Brimfield, Orleton	29	8	2
Cheaton, Cogwell and Ridgemoor brooks	Yarpole, catchment dispersed, Leominster	7	2	0
Dulas brook	Ewyas Harold	3	7	7
Red, Norton and Twyford brooks	Lower Bullingham, Rotherwas (Hereford)	15	32	42
Pentaloe brook	Mordiford	14*	0	0
Tedstone brook	Bromyard, catchment dispersed	1	1	1
TOTAL		98	50	52

*Surface water – showing at 1 in 30 **full details given in Appendix F

2.4.3 NFM approach

Whilst the pilot project has implemented a wide variety of NFM measures within these catchments (**Error! Reference source not found.**) which are starting to help reduce the flood peak (Appendix M), it is evident that more measures need to be implemented to help further reduce the flood risk to these vulnerable communities (Atkins modelling predicts that NFM could help reduce the flood peak significantly within the catchments, Appendix M). This project will provide the opportunity to further investigate and develop techniques and approaches that will reduce flood risk and mitigate for predicted impacts of climate change on dispersed communities throughout the catchments. The pilot project demonstrated that an NFM project not only enables communities to engage in and take ownership of their flooding, but that it is also an effective means of integrating environmental enhancements in catchments of high ecological and amenity value, especially in areas which are currently failing WFD targets (Appendix J).

The Herefordshire Strategic Flood Risk Assessment recognises that flooding arises from excessive runoff within catchments and so the runoff speed, quantity and peak is determined by the catchment's characteristics. For a true understanding of flood risk we must consider

catchments as the fundamental 'management unit', not rivers. It is for these reasons (as well as the presence of reduced impermeable soils) which dictate the need for NFM to be an integral part of the sustainable management and reduction of flood risk within Herefordshire.

Using the right combination of measures in the right places can help to slow flood peaks and reduce the depth and duration of flooding. Other benefits can also be realised at the same time. For example, we can reduce soil erosion and sedimentation of lakes and rivers; increase carbon capture and storage; improve water quality; re-connect rivers with species-rich floodplain wetlands; enhance recreation opportunities; and create new habitat to help restore biological diversity. A better environment can improve human health and well-being, and make a significant contribution to the local economy, as recognised in the Well-being of Future Generations (Wales) Act 2015, which places a well-being duty on public bodies.

2.4.4 Why make the investment now?

Community Engagement:

This project seeks to embody the ethos of the pilot project, ensuring communities are at the heart of the project, empowering them to take ownership of their flood risk and implement actions that help mitigate the risks. During the pilot project, many relationships have been developed and formed with landowners, farmers and communities. The relationships have helped to increase confidence in the project and encourage further involvement with a wider range of landowners. This has proven invaluable and to have to cease the project at this point would be extremely damaging, not only having detrimental impacts on established relationships with communities and project partners, but also creating a reputational risk for both the Environment Agency and Herefordshire Council. If the project were to cease, these damages could hinder our future ability to implement NFM in these catchments.

The project will build on these existing relationships, aiming to strengthen them as well as nurturing new ones. Appendix I contains a community engagement plan which details how the project will engage with communities and landowners.

The momentum generated by the success of the pilot project is a major impetus to the development of the NFM projects within this proposal.

Since 2010, the West Midlands Area PSO and Environment Programme teams have worked closely with local communities/local councils/partners so as to ensure that these projects deliver effective flood risk benefits. Working in partnership with landowners, local communities and key partners, will enable us to address many of these impacts, deliver catchment wide flood, environmental and socio-economic benefits and ensure sustainability, through local community ownership, of the flood risk solutions and NFM.

Funding Opportunity:

The continuation and expansion of our pilot project will enable us to further develop our existing relationships with landowners, communities and project partners, build on our existing knowledge of the catchments and maximise the instillation and implementation of more NFM measures within these catchments. The pilot project's delivery model, which included Catchment Advisor engagements and an [NFM Construction Grant Scheme](#), successfully demonstrated how additional funding could be brought into the project (see Section 6.1). For example, the grant scheme cost the pilot project £88,459.02 to run (section

2.1), however by running this scheme an additional £48,684.64 was contributed by landowners and £15,270.74 was contributed by the Woodland Trust.

As well as facilitating NFM delivery and enhancing the NFM evidence base, the Catchment Advisors also helped secure a total of £454,002.55 additional funds that enabled NFM delivery within the catchments. They secured £416,824.65 of Mid-Tier Countryside Stewardship, £22,963.00 Environment Programme funding (awarded to Wye and Usk Foundation for NFM delivery) and £14,214.90 Water and Environment Grant funding. By using Catchment Advisors to help deliver the Herefordshire NFM project, it is anticipated that they will be able to secure similar, substantial amounts of additional funding from external sources e.g. Mid-Tier Stewardship and Environmental Land Management schemes (see Section 2.6.2). It should be noted that the stewardship agreements are confidential and therefore the pilot project has not got records of what NFM measures were delivered and where. It is likely that future projects will encounter similar issues unless the landowners agree to share these details with the project.

By adopting the same delivery model, this project will be able to draw in additional funding and build on the initial investment of Flood Defence Grant in Aid. This investment will not only enable the continuation of NFM delivery in the current catchment areas, but also facilitate its expansion into new catchments, as determined through Steering Group discussions.

Land and soil management:

Funding allocated to this project will also contribute towards the development of sustainable land management practices within Herefordshire, a county where a large proportion of it is agricultural.

The county has some of the most important river habitats within Europe, with sections of the River Wye and River Lugg being designated as a [Special Areas of Conservation \(SAC\)](#). The importance of protecting these habitats for nature conservation is illustrated by the legal requirement to ensure the rivers maintain a high water quality (referred to as “favourable condition”).

The River Lugg is currently exceeding its conservation targets for phosphate (0.05mg/l) and is therefore failing to achieve ‘favourable condition’. As a result of this and following advice from Natural England, Herefordshire Council is currently unable to approve any new development in the Lugg catchment which has the potential to have a further detrimental impact upon nutrient levels within the River Lugg and River Wye SAC.

To address this issue, organisations are working together to develop an effective [Nutrient Management Plan \(NMP\)](#) which will provide the necessary levels of certainty to enable development to continue within the River Lugg catchment. Whilst a final version of the action plan is still being developed, the NMP includes NFM within its long list of options for as a method for reducing diffuse nutrient pollution from agriculture. This is important as approximately 50% of the phosphate that enters the Wye Catchment is as a result of overland and subsurface flows where phosphate, attached to soil, washes into the drainage and river systems. By increasing infiltration rates on agricultural land, overland flows and soil loss will be reduced with improved water quality and reduced flood risk. This project will therefore not only help reduce flood risk to Herefordshire communities, but will also contribute to the collective efforts of returning the River Wye SAC back into favourable condition.

The [Herefordshire Core strategy](#) for growth relies on the successful delivery of the Wye Nutrient Management Plan. This project seeks to address these issues through an innovative approach to Farm Regulations, working with stakeholders within the Wye Catchment Partnership. The Environment Agency will provide data and evidence to help target the effective use of resources, which is key to effective partner working.

Water Framework Directive (WFD):

As shown in Appendix J **Error! Reference source not found.**, all of the NFM waterbodies are currently failing to meet 'good' overall WFD status. One of the main reasons for this failure is linked to diffuse source pollution related to agriculture and rural land management practices, specifically poor livestock, nutrient and soil management. Delivering NFM measures, especially in the upper catchments should help deliver significant environmental and habitat enhancement and increase the likelihood of reaching Good Ecological Status in the 2027 assessment.

All the watercourses within these catchments are recognised as low, small (or extra small) and calcareous and none are designated as being Heavily Modified (HMWB).

In all aspects of this project we will account for the importance of the local, natural environment and look to restore and enhance it wherever possible. By taking a catchment based approach, we will consider the effects and potential opportunities at both a landscape scale and along the lengths of watercourses. This will allow us to maximise the benefits from NFM and will include the following techniques (where appropriate):

- Identify high risk areas of the catchment where both overland and sub-surface flows are exacerbated as a result of degraded soils and poor land management. Ensure that suitable interventions are put in place to mitigate this.
- Identify where banks could be re-profiled to improve channel diversity, channel capacity and/or re-connect rivers with their floodplains.
- Introduce woody debris and leaky dams to slow the flow and create in-channel habitat, morphological and hydrological variability.
- Introduce wetlands, ponds and scrapes as design features in the floodplain to provide for a range of habitats (both permanent and semi-permanent) as well as providing water storage on the floodplain.
- Introduce reed-bed features at outfalls to achieve a benefit in terms of improving water quality.
- Re-meander and plant marginal vegetation drainage ditches to trap silt as well as to provide new improved stream habitat.

2.4.5 Monitoring and Evaluation

The project aims to demonstrate how NFM can be tailored to a range of unique landscapes in Herefordshire and to test several very different and innovative approaches and delivery mechanisms. It will build on the existing monitoring programme that was delivered through the pilot project in order to provide a better, longer term understanding as to how the catchments are responding to the NFM measures that have been implemented. The monitoring programme, detailed in Appendix K, will enable the project to demonstrate the benefits of outcome measures that have been delivered as a result of this funding. The plan contains the following key elements (see Appendix K for further details):

- River and rainfall monitoring
- Soil monitoring
- Outcome measures monitoring
- Citizen science monitoring: River MoRPh surveys and fixed-point photography
- Fixed video cameras on NFM measures
- Leaky dam surveys
- WFD monitoring

Community engagement in both the flood risk and environmental outcome monitoring is key to developing a sustainable long term monitoring programme and in ensuring the continued delivery and maintenance of NFM measures. All data will be accessible to the local community to enable them to engage with the project, understand the benefits being delivered and as a basis for long-term monitoring beyond the anticipated lifespan of current funding. The project will build on the [NFM Volunteer scheme](#) and NFM community groups that were set up during the pilot project.

2.4.6 The impact of not doing the project

Please see Section 3.2.

2.5 Objectives

We will use NFM in conjunction with traditionally constructed hard defences where necessary to increase the resilience of communities to extreme flooding e.g. NFM upstream of the Leominster Flood Schemes (see Table 1). However, in small communities where a more 'traditional' scheme would not be financially viable, the most suitable option would be NFM. Small, rural communities in Herefordshire suffer from the effects of road closures during times of flood, many residents also find their properties and businesses at flood risk. We envisage that this NFM project will deliver a wide range of integrated benefits, including; new and improved habitats, socio-economic benefits, improved water quality and flood risk reduction to residential properties, businesses and infrastructure.

By utilising our extensive local knowledge and experience, it will be possible to introduce NFM schemes that offer flood resilience to both residential and commercial properties. In addition, there will be opportunities to create additional habitat, reduce nutrient inputs and to

work towards achieving WFD phosphate targets of the River Wye's Special Area of Conservation. This will enable greater opportunities for growth and development in an area which requires additional housing to meet with a fast-expanding population.

Table 7 Project objectives

No.	Objective	Measurable outcome	How will we evidence this?	Time Frame
1	Contribute towards further alleviating flood risk in seven distinct catchments, as well as identifying opportunities within other areas of Herefordshire.	Reduced flood risk to properties. Following the methodology detailed in Appendix C, 5 non-residential properties will move to a lower flood risk band, moving from very significant to significant flood risk (OM2).	Gauged river data and evidence of homes and business not being so impacted as before interventions are installed. Continued investigations into the effectiveness of delivered NFM which will help to develop our understanding of the benefits delivered as well as providing evidence alongside continued ground observations (e.g. EA's Catchment Based Group study).	2027
2	Contribute towards improvements to WFD Status in all the catchments.	WFD Status improved	WFD Monitoring	2027
3	Establish and sustain effective community partnerships and engagement, which enable communities to lead and manage ongoing NFM management and monitoring beyond the lifespan of project funding.	Self-managing and active community partnerships. NFM Community groups maintained. Support provided to flood groups.	On-going partnership engagement	2027
4	Enhance the evidence base of natural flood management schemes through effective monitoring and evaluation.	Production of monitoring studies.	Effective, long term, community based, monitoring and assessment of the NFM measures implemented and the hydrological and geomorphological changes that occur.	2027
5	The project will continue to draw in investment where possible from external partners to maximise delivery potential.	Additional funding contributions from local sources and partnership initiatives including HLF and ESIF and NEIRF.	Periodic feedback to the project partners of additional funding, and contributions in kind, received or bid for.	2027
6	The authority or partners promoting the scheme can secure the measures for which they are requesting funding. (This is likely to involve gaining the agreement and cooperation of landowners and the consent of any relevant authorities).	Number of agreements reached and projects undertaken on private land.	Annual Project and Data Reports	2027
7	To collect and openly publish data, monitor and report on the impact of the work undertaken on reducing flood risk and any other benefits.	Annual Project and Data Reports. Website data access provision for all projects. Contribute to AGOL tool.	Annual Project and Data Reports. Website data access provision for all projects.	2027

2.6 Current arrangements

Whilst each of the project catchments are unique and have distinct justifications for interventions and project development, all the project catchments have common flood risk characteristics. The delivery of the collective project relies on the partnership between different stakeholders who already have some involvement in Herefordshire NFM projects.

2.6.1 Herefordshire Council

As Lead Local Flood Authority, Herefordshire Council is already involved in community engagement across the NFM catchments (Figure 2). In recent years, many discussions have been undertaken with flood action groups, NFM Community groups, landowners, residents, Parish Councils and ward members so as to ensure local flooding knowledge is captured and informs project delivery. Discussions are also happening in other catchments which may benefit from NFM. Herefordshire Council's commitment to NFM can be demonstrated by the fact that it has employed a full time NFM Project Officer who has overseen the delivery of the pilot project and who will manage the delivery of this six year project.

2.6.2 Partnership delivery of additional NFM schemes

Partner organisations working within Herefordshire e.g. Wye and Usk Foundation, have secured funding through various sources, including Environment Programme funding (2021/2022) to deliver NFM in the following areas:

- Wellington brook catchment – building on some initial NFM work conducted in 2020/21 by Herefordshire Wildlife Trust and the Wye & Usk Foundation.
- Garren and Gamber brooks catchment
- Yazor brook catchment – building on NFM Community pilot project

The NFM Project Officer will work alongside partner organisations to help maximise the delivery of NFM within Herefordshire. It is anticipated that by working with partner organisation it will be possible to obtain additional sources of funding to implement NFM, for example through the Mid-Tier Stewardship scheme, Environmental Land Management scheme and through the Environment Programme.

2.6.3 Project Steering Group

To oversee and guide the delivery of the pilot project a multi-agency project steering group was set up. This group met quarterly and contained representation from the following organisations: Herefordshire Council; Environment Agency; Severn Rivers Trust; Wye & Usk Foundation; Natural England; National Trust; National Farmers Union; Farm Herefordshire; River Lugg Internal drainage Board; Herefordshire Wildlife Trust; and Woodland Trust. This project will seek to put similar arrangements in place in order to enable and maximise any partnership working benefits

2.7 Main benefits

2.7.1 High confidence in successful delivery of NFM measures

The Environment Agency has already been working with Herefordshire Council and a range of other delivery partners locally. As a result of the work that has been completed to date in Herefordshire, including some NFM measures, a network of local partners is now in place that is experienced in the delivery of such techniques and thus a very high level of confidence in the delivery of such measures, as well as the potential flood risk benefits they can bring.

2.7.2 Contribution towards alleviating flood risk

Due to the infancy of the NFM project and lack of available research and case studies, it is not currently possible to confidently predict the actual flood risk benefit that will be gained in each catchment/individual community. Continued monitoring, evaluation and research (e.g. work with EA's Catchment Based Group) will give greater confidence to the observed outcomes (see Section 2.4.5).

This said, as detailed in Appendix C, published research indicates that NFM on average can reduce the peak flow by 20% during a flood event. With research from Oxford Martin School concluding that 'typical' natural solutions can offer flood risk benefits up to the 1 in 30yr return period (3.3% AEP). Using the outputs of available research, further analysis of one of the NFM catchments has been conducted, finding that a 20% reduction in peak flow would provide a Standard of Protection (SOP) between 5% Annual Exceedance Probability (AEP, 1 in 20 year return period) and 2% AEP (1 in 50 year return period).

Using the communities at risk data provided within Appendix F, and using the scientific evidence referenced above, properties at very significant risk are likely to experience a reduction in risk between the 1 in 30 year and 1 in 50 year return period. Which results in the transition of properties from one risk band (Very Significant) to a lower risk band (Significant) and by definition this represents an outcome measure 2 within the Partnership Funding (PF) Calculator.

Data received from the Environment Agency indicates that at least 98 properties are at very significant flood risk and 59 properties are at significant flood risk (**Error! Reference source not found.**) in the key catchments within the study areas and will potentially benefit from reduced flood risk, longer warning times and improved resilience. Following the methodology detailed in Appendix C, 5 non-residential properties will move to a lower flood risk band, moving from very significant to significant flood risk (OM2). In association with proposed or existing engineering (Table 1) and Property Flood Resilience (PFR) schemes (e.g. Brimfield brook catchment and county wide [PFR grant scheme](#)), NFM will improve flood resilience.

2.7.3 Contribution towards improvements to WFD status

All the watercourses in the project areas are failing WFD Good Status (Appendix J). Slowing flows, reducing sediment and encouraging morphological change will contribute toward the achievement of Good Ecological Status by 2026 and our approach to monitoring is detailed above in Section 2.4.5 and Appendix K.

2.7.4 Community-led NFM partnerships

The pilot project engaged with local communities in a variety of ways (see Section 2.4.4) and has established strong partnerships and positive communication channels with the communities, which is essential to NFM's successful delivery. NFM offers the communities in these locations the opportunity to reduce and manage their flood risk. Whilst the majority of the communities (e.g. Bodenham, Brimfield, Ewyas Harold) are situated in the lower reaches of the catchment, they are impacted by flooding which is generated on steep, fast response, upper reaches of the catchments. A catchment wide approach with landowners, RMAs and local communities to deliver NFM is therefore essential to delivering sustainable flood risk management.

2.7.5 Enhance the evidence base for Natural Flood Management

The pilot project has begun to collect the evidence needed to evaluate the benefits of NFM. As detailed in Section 2.4.5 and Appendix K, this project will build on the existing monitoring plan and will ensure data is readily available to communities, partners, Environment Agency national WwNP R&D Team and external organisations for evaluation.

2.7.6 Additional funding contributions from local sources and partnership initiatives

Specific contributions have not been included in the Business Case at this stage. By adopting the same delivery model as the pilot project, i.e. by working with partner organisations and their Catchment Advisors, we will seek to bring in additional funding through other grant schemes such as Countryside Stewardship and the Environmental Land Management. The NFM Construction Grant scheme also brought in additional funding from landowner contributions and partnership work with organisations such as the Woodland Trust, Environment Agency and Wye & Usk Foundation. At present we are unable to accurately predict the amount of additional funding that will be secured through these alternative funding sources. If in the future, we are able to accurately account for these additional funding sources, the project will seek to re-submit an updated PF Calculator and Business Case and review the project's current Defra investment.

As an indication, during the pilot project, these initiatives successfully brought in an additional £538,307.93 of external funding, almost doubling Defra's initial investment. It's our hope that the continuation and expansion of the NFM project will continue to bring in a similar amount of external funds to help deliver and maintain NFM measures.

2.7.7 Foundations already laid

The opportunity now exists, building upon the work already completed and the partnerships already formed, to expand the scope of the pilot project and to use the £1,273,600 allocation to deliver NFM measures across a wider area with additional flood risk and environmental outcomes for local communities.

2.8 Strategic risks, assumptions, constraints and dependencies

See section 6.4.

3.0 Economic Case

The Herefordshire NFM project builds upon the success and lessons learnt from the initial pilot project (2018- 2021).

3.1 Critical success factors (CSF)

Table 8 Summary of critical success factors

No	Critical Success Factor	Measurement Criteria	Importance (1-5) 1 being the highest
1	Strong partnership agreements in place with relevant LLFAs and RMAs.	Partnership agreements in place with relevant parties before commencement of project.	1
2	Strong levels of Community and Stakeholder engagement.	Communities and Stakeholders feel they are fully engaged and have shared ownership in the process and delivery, that the EA and other RMA partners are influenced and working collaboratively to deliver shared outcomes	1
3	Reliable and comprehensive baseline data to enable monitoring and assessment of impacts and change.	Gauged river and water quality/WFD data providing evidence of homes and business not being so impacted by flooding compared to pre-NFM installation. Via community led and maintained surveys.	1
4	A comprehensive programme of flood risk and environmental monitoring, during and post NFM implementation.	A demonstrable improvement in flood risk and water quality, habitat and biodiversity in the area of interventions.	1
5	Structured programme of strategic and delivery reviews.	Periodic project reviews with all partners to add to the lessons learnt and enable continuous improvement in NFM project delivery.	1

3.2 Long List of Options / Preferred Way Forward

The Herefordshire NFM project, will be a continuation and expansion of the pilot project, where the principle objective was to develop, implement, test and evaluate the opportunities for, and benefits of, a wide range of NFM measures in a diverse array of catchments. The initial DEFRA project was considered an experimental approach to enable the Environment Agency and partners to begin to understand NFM's potential benefits/limitations. This has proven to be a success and has given rise to many more NFM opportunities within Herefordshire.

The Herefordshire NFM Project is engaging with recent, current and proposed Flood Risk Management schemes in many of the catchments throughout Herefordshire (Case for Change, Section 2.4), to improve flood risk sustainability for communities where engineered solutions or PFR cannot deliver the full benefits desired.

Four approaches have been considered:

1. Do Nothing
2. Do minimum
3. Continuation and expansion of Natural Flood Management pilot project
4. Delivery of Property Flood Resilience (PFR) and/or hard-engineered flood defence measures

3.2.1 Option 1 - Do Nothing - Shortlisted

Currently 148 properties are at significant risk of flooding (98 at Very significant risk, 50 at significant risk) in the NFM catchment areas mapped in Figure 2 (**Error! Reference source not found.**). A vastly greater number of properties are at further risk of flooding downstream of these catchments. Significant proportions of the catchments are also shown to be at high risk of sediment erosion, based upon the National Strategic NFM Opportunity Maps.

If we were to proceed with 'Option 1 – Do nothing', all current services (including maintenance) would cease to continue, meaning flood risk would increase due to the increased risk of blockages to channels, culverts and bridges. The impacts of reduced maintenance and climate change would result in properties either remaining at their current level of flood risk or at an increased level of flood risk.

Whilst this option would result in reduced costs associated to any reactive maintenance activities, the financial implications of the increased flood risk to properties/services would greatly outweigh any savings, as well as result in reputational impacts for both Herefordshire Council and the Environment Agency. It will also damage established relationships with communities/project partners, as highlighted in the 'impact of not doing the project' section of the case for change (Section 2.4). Opportunities to achieve the projected environmental improvements and WFD Good Status will also be lost.

Although bringing potential revenue savings to our routine maintenance activities, 'doing nothing' would result, over time, in an increase in flood risk in the catchments. This option also fails to deliver FRM and WFD benefits and would cause reputational damage for the council and the Environment Agency.

3.2.2 Option 2 - Do Minimum - Shortlisted

If we were to go forward with 'Option 2 – Do minimum', existing commitments to river maintenance schedules would not change.

The Environment Agency continues to undertake routine maintenance on designated 'main rivers' in Herefordshire, as well as reactive debris removal works. These works help to maintain the existing level of flood risk in these areas.

Maintaining this level of works would leave communities at increasing levels of flood risk due to the impacts of climate change. This option would see no additional benefits to flood risk, ecology, biodiversity or water quality, resulting in the project's ability to deliver environmental improvements and WFD Good Status being lost. It would have reputational impacts for Herefordshire Council and the Environment Agency, damaging established relationships with communities/project partners, as highlighted in the 'impact of not doing the project' section of the case for change (Section 2.4).

With fluctuations in funding available for these routine practices in the Environment Agency and via other partners (Highways England, Welsh Water etc.), the frequency of these measures may be subject to change.

This approach would maintain current levels of flood risk across the catchments and would not realise the potential benefits of NFM and their consequential flood risk reductions. This option also fails to deliver FRM and WFD benefits and would cause reputational damage for the council and the Environment Agency.

3.2.3 Option 3 – Continuation and expansion of Natural Flood Management pilot project - Shortlisted

If we were to proceed with 'Option 3 - Continuation and expansion of Natural Flood Management pilot project', NFM measures would be delivered via the continuation of the pilot project. Catchment Advisors, the NFM Project Officer and project partners would continue engagement with landowners, farmers and communities within the seven priority catchment areas to enable the delivery of further NFM measures (Community engagement plan – Appendix I). The NFM Construction Grant scheme would be administered by the council and would offer financial support to enable landowners to implement measures on their land. The NFM monitoring programme delivered through the pilot project would continue and develop (Appendix K – Monitoring Plan) along with the NFM Community groups, NFM Steering Group and NFM Volunteer scheme.

The project would continue its efforts to incorporate NFM measures into existing land management practices, to improve flood attenuation in agricultural areas and reduce the impacts of soil run-off. It would build on existing relationships developed through the pilot project and would help to nurture long term behavioural changes in land management practices that would help to reduce flood risk and achieve multiple benefits.

The project would also investigate opportunities to expand NFM into other catchment areas where it is felt that NFM could help reduce flood risk to properties and achieve multiple benefits.

As outlined within Appendix M, this option will reduce the flood peaks in the catchments, with published research indicating that NFM on average can reduce the peak flow by 20% during a flood event (Appendix C). It will potentially reduce the flood risk to 148 properties at significant risk across seven catchments within Herefordshire (98 at Very significant risk, 50 at significant risk, Appendix F). Following the methodology detailed in Appendix C, 5 non-residential properties will move to a lower flood risk band, moving from very significant to significant flood risk (OM2). This option would also deliver additional benefits such as improvements to ecology, biodiversity, water quality and crop productivity. Soil health would be improved, not only helping to reduce the flood risk, but also helping reduce soil erosion and nutrient losses into watercourse. It would also contribute towards improvements to

WFD Status in all the catchments and towards the efforts being made to return the River Wye Special Area of Conservation (SAC) back to favourable status.

NFM measures would potentially support existing FCRM Capital Schemes which are currently not financially viable or those where NFM could complement (i.e. due to the restrictions and costs imposed by formal flood attenuation ponds upstream or in parallel with PFR).

It will demonstrate the appropriateness of the NFM approach in delivering a variety of outcomes and showcase how it can be used elsewhere. It supplements the benefits of NFM with a capital scheme to offer multiple flood risk management benefits and encourages positive relationships with communities for whom PFR is their only option.

Existing FCRM Capital Schemes that could link into NFM:

- Leominster FAS
- Hampton Bishop
- Greyfriars
- Ewyas Harold
- Brimfield, Orleton and Little Hereford PFR

This option may not fully address the risk of flooding within these communities and associated increase of risk with climate change predictions. and So additional work may be required to complement NFM once the residual risk to communities following NFM installation has been understood.

Local, community led, NFM measures offer the most cost-effective means of delivering a successful project which can demonstrate its success. Through the pilot project, delivery partners have been working with local communities and landowners, to identify areas which may benefit from NFM. Landowners have already expressed an interest in delivering more NFM measures on their land and the re-launching of an NFM Construction Grant scheme would help facilitate the delivery of more measures.

Herefordshire Council already have staff and systems in place to commence the project at the earliest opportunity. With this funding, a formal partnership governance structure can be agreed, thus enabling the project to move forward.

This option will help to reduce the flood risk to 148 properties at significant risk (98 at Very significant risk, 50 at significant risk, Appendix F) and builds upon existing relationships between Herefordshire Council, the Environment Agency, project partners, communities, landowners, flood action groups, parish councils, ward members and NFM community groups. It will also achieve multiple benefits including improvements to water quality and biodiversity, habitat creation, carbon sequestration, development of more sustainable agricultural businesses, reduced soil and nutrient losses and socio-economic benefits. Five non-residential properties will move to a lower flood risk band, moving from very significant to significant flood risk (OM2).

3.2.4 Option 4 – Delivery of Property Flood Resilience (PFR) and/or hard-engineered flood defence measures

If we were to proceed with 'Option 4 – Delivery of PFR and/or hard-engineered flood defence measures', communities would be engaged and all suitable properties offered PFR. However, a PFR scheme would require further detailed appraisal work which is outside of this current project and could potentially be progressed as part of a second phase.. Whilst PFR can be an affordable/effective first line of defence in mitigating against internal flooding of a property, there is always a residual risk in that the defences may be overtopped or not deployed in time/correctly. In addition, PFR measures do not address the increasing risk of flooding associated with climate change predictions. It is expected and recommended that once PFR measures are deployed, that properties still proceed to evacuate and this makes PFR unattractive to residents in comparison to a hard engineered scheme.

A traditional, engineered, approach to reducing flood risk to properties could include measures such as flood walls, embankments and flood storage areas. Whilst such measures have the potential to make a large difference in the levels of flood risk, they may not be technically feasible within these locations and/or not cost beneficial. This is because the extent of flooding across the catchments would require the construction of multiple assets needing significant capital investment as well as incurring significant maintenance costs. This would require further detailed appraisal work which is outside of this current project and could potentially be progressed as part of a second phase.

NFM measures will therefore continue to contribute towards reductions in peak flows whilst further appraisal work is undertaken to identify measures that will complement NFM.

. This option also fails to deliver FRM and WFD benefits and is not suitable for all locations or properties.

. Communities within the catchments have also expressed a desire to tackle the sources and flow pathways of flooding. NFM addresses the communities' preferred approach of reducing flood risk, unlike PFR and other hard engineer solutions. We believe that it is for this reason that communities and landowners have been so engaged with the delivery of the NFM pilot project and why they are so eager to see the continued delivery of NFM in Herefordshire. Hard engineered flood defence schemes are yet to have been identified and in any case, due to the numbers of properties impacted by flooding, may not be cost beneficial. Our understanding of residual flood risks will be improved over the next period following the installation of NFM products and techniques and as outputs become available from the opportunity mapping and further investigation work has been undertaken through the Environment Agency's Catchment Based Group. Consequently, the project team will deliver NFM measures as part of the first phase of flood reduction within these locations and look to approach the relevant risk management authority to discuss scoping of said measures and producing revised funding calculators and additional business case submissions to obtain further funding to proceed with the second phase. These measures may include PFR and/or hard engineered flood defences.

3.3 Technical and environmental appraisal

Table 9 Technical and environmental appraisal of options

Option	Description	Benefits delivered	Limitations	Conclusion
1	<i>Do nothing</i>	Reduced maintenance and commitments.	Increase in flood risk as existing maintenance activities halted. No mitigation for impacts of climate change. Reputational impacts for HC and EA. Opportunities to achieve multiple benefits lost.	Shortlist Communities at an increased risk of flooding.
2	<i>Do minimum</i>	No change in current commitments and costs.	Existing level of flood risk maintained as a result of current activities and commitment. No considerations for the impacts of climate change. Reputational impacts for HC and EA. Opportunities to achieve multiple benefits lost.	Shortlist Communities remain at existing risk of flooding
3	<i>Continuation and expansion of Natural Flood Management pilot project</i>	Reduction in flood risk to up to 148 properties at significant risk. Increased resilience to flooding in downstream catchments. Improved water quality. Ecological improvements. Opportunity to build on lessons learnt and relationships developed in pilot project. Offers multiple benefits; reducing the flow in the upstream catchment to reduce frequent flooding and offering built structures that help reduce the flood risk to the lower catchment areas during larger storm events.	Risk of large amount of time elapsing before benefits are realised or benefits not being realised at all. Risk of low levels of stakeholder engagement and uptake. Whilst this is considered to be a low risk, based on the successful delivery of the NFM pilot project, the consequences of this risk are high as the project needs landowner engagement and uptake in order to deliver more NFM successfully.	Shortlist – Preferred Option (Phase 1) Potential to demonstrate the appropriateness of the NFM approach. Reduces flood risk to communities. Achieves multiple benefits alongside flood risk benefits. Helps develop knowledge and gather evidence on the impacts of NFM. Empowers communities and landowners to take ownership of their flood risk and take actions to mitigate their risk. Builds on successful delivery of pilot project.

Option	Description	Benefits delivered	Limitations	Conclusion
4	<i>Delivery of Property Flood Resilience (PFR) and/or hard-engineered flood defence measures;</i>	PFR provides a reduction in flood risk to individual properties (up to 600mm flood depths). Hard engineered flood defence measures would provide a reduced flood risk to properties should a viable option be identified.	Not all properties are suitable for PFR. Limited protection offered. Does not take into account climate change. No benefits by PFR offered to surrounding environment including infrastructure. Unclear for hard engineered flood defence measures whether relevant permissions and consents would be granted Costs of surveys and feasibility work likely to exceed project scope.	Phase 2 We will deliver NFM measures as part of Phase 1 and seek further funding to proceed with Phase 2 upon completion of further appraisal work and monitoring .PFR offers limited property protection, with no benefits offered to the surrounding environment. Hard engineered flood defence measures unlikely to be cost beneficial. No viable solution presented.

3.4 Economic appraisal

3.4.1 Assessment of benefits

The 'Do Minimum' scenario closely represents existing regimes within the NFM catchments (Figure 2), where available costs associated to this regime have been used as a baseline for this projects economic appraisal.

The benefits have been calculated using guidance from the Environment Agency's Environmental Management team to establish benefits to selected habitats and enhancement of river habitat lengths. Further details are contained in Appendix C.

Whilst reduction in risk to properties in the catchment is expected, limited information has been incorporated within the benefits cost ratio calculations due to uncertainties. Further details are available in Appendix C.

The EA's Catchment Based Group study of the pilot project and future NFM potential combined with further monitoring (see Section 2.4.5) will hopefully provide the project with the understanding to confirm the full benefits achieved by the measures installed as part of this project. The project has future aims to establish the scale of flood risk reduction offered to residential properties as a result of the NFM techniques applied.

3.5 Option Selection

Table 10 shows how well each option meets the appraisal criteria. The preferred option is '**Option 3, Continuation and expansion of Natural Flood Management pilot project**' as it delivers flood risk reductions to Herefordshire communities, enables technical data/evidence to be collected and achieves multiple environmental benefits.

Table 10 - Appraisal summary derivation of the selected option.

Criteria	Do Nothing	Do Minimum	Option 3 – Continuation & expansion of NFM project
Question: Meets the Objectives?	No	No	Yes – Objectives 1 to 7 (Section 2.5)
Question: Meets critical success factors?	No	No	Yes – CFSs 1 to 5 (Section 3.1)
Technical	No	No	Yes – Technical data and evidence on NFM will be collected
Environmental	No	No	Yes – Multiple environmental benefits delivered
Economic	No	No - However risk of funding reductions to maintenance budgets.	Yes – Reduced impact of flooding to properties and businesses, resulting in lower recovery costs. More sustainable agricultural businesses.
Operational	No	No – no change to current operations.	Yes – NFM delivery structure in place, opportunity to develop and maintain existing relationships with project partners and communities.
Local preference	No	No	Yes – Communities supportive of NFM approach.
Other appraisal	Reputational impact to HC and EA – damage to existing relationships with communities and project partners.	Reputational impact to HC and EA – damage to existing relationships with communities and project partners.	
Conclusion and selection	3	2	1

4.0 Commercial Case

4.1 Procurement strategy and timescales

4.1.1 Procurement strategy

It is proposed to deliver the project through a partnership with LLFA and RMA partners. The lead for this project is Herefordshire Council who will host a Project Officer and provide procurement and budget management. The council will work in close partnership with a wide range of organisations including the Environment Agency, project partners, Community Flood Action Groups, other Flood Risk Management Authorities, Parish and Town Councils, ward members, NFM Community Groups, landowners and residents. The relationships and partnerships already developed during the course of the pilot project will greatly assist.

This approach places responsibility for procurement of services and materials in the employing authority's procedures and enables greater use of local contractors, with consequent efficiencies and savings to the project. Following on from the successful

delivery model used in the pilot project, an open procurement process will be conducted to award a contract(s) for the provision of Catchment Advisors.

The NFM Construction grant scheme which was delivered through the pilot project proved an effective/efficient way of delivering NFM at pace within the catchments. It also generated additional income from landowner and partner contributions. As demonstrated in the pilot project, this approach has already led to very cost-effective delivery and development of an extensive network of appropriately skilled practitioners. This successful delivery model will be developed within the Herefordshire NFM Project.

4.1.2 Key contractual terms and risk allocation

Herefordshire Council will hold responsibility for ensuring project delivery and monitoring progress, budget and strategic management. Mirroring the successful delivery of the pilot project, this project will be managed through a Strategic Steering Group, comprising the Environment Agency, LLFAs and RMAs, Natural England, Rivers Trusts, Wildlife Trusts, Internal Drainage Boards, relevant charitable organisations and organisations representing the farming community.

The project is a fixed budget project, hence no funding has been allocated to risk. In the event of a shortfall, it will be the responsibility of the project partners, who understand there may not be additional funds available to cover these costs from FD GIA.

4.2 Efficiencies and commercial arrangements

This project will look to deliver efficiencies where it can. For example, through the use of volunteers, landowners and local contractors where appropriate to reduce expenditure on consultants and contractors. As and when opportunities arise, the project will seek to achieve efficiencies by linking into resources such as catchment wide studies. Please note that one of this project's objectives is about collecting evidence/supporting research and this will enable subsequent projects to build on its learning and to deliver efficiencies.

Good practice developed during the pilot project and lessons learned (**Error! Reference source not found.** G) will enable more efficient delivery of this project. For example, continuing to work closely with local partners and Community Flood Action Groups will enable benefits from this project to be replicated across more catchments.

5.0 Financial Case

5.1 Summary of financial appraisal

The project seeks to continue the delivery of NFM within the seven pilot project catchment areas mapped in Figure 2, as well as expand the delivery of NFM into other Herefordshire catchments that would benefit from this approach to flood risk management. Table 11 contains a combined summary of the costs associated with delivering the project in all catchments (existing and new).

Table 11 - Whole life cost of the project

Cost Heading	Whole-life cash cost
Project development costs (excluding staff)	£3,000
HC Staff Costs NFM Project Officer, Management support, Grant team support	£297,000
NFM Construction and Implementation:	
A) Estimated cost of Physical Assets based on the cost of existing implemented NFM	£344,896
B) Advisory work Catchment Advisors – Assist with NFM delivery and community engagement, NFM advice, soil tests, management support, support with grant applications to deliver NFM.	£640,000
C) Community engagement and publicity	£6,600
D) NFM Implementation To help cover the costs of delivering NFM which achieve multiple benefits. Alongside funds issued as part of a NFM construction grant scheme, landowner contributions will also be sought to help with their implementation.	£250,000
E) Research into knowledge gaps	£62,000
River and rainfall monitoring	£15,000
Risk contingency³	£0
Total	£1,618,496

5.2 Funding sources

Table 12 summarises the funding sources for this project, which follows Defra guidance on partnership funding for FCRM projects.

As detailed in Section 2.6.2 and 2.7.6, the project will adopt the same delivery model as the NFM pilot project, working with partner organisations and their Catchment Advisors to bring in additional funding through other grant schemes such as Countryside Stewardship and the Environmental Land Management. The project will also re-launch the NFM Construction Grant scheme which has the potential to bring in additional funding through landowner contributions and partnerships with other organisations, e.g. Woodland Trust. Given it is presently unknown as to how much additional funding can be secured through these alternative funding sources, these contributions have not been included within the Business Case. However, based upon our experiences from the NFM pilot, we assume a similar attitude and have been able to calculate a forecasted cost of measures implemented. It's our expectation that this cost will be subsidised by grants and this estimated value has been provided in Table 12. If in the future, we are able to accurately account for these additional funding sources, the project will seek to re-submit an updated PF Calculator and Business Case, in the process reviewing the project's GiA claims.

Table 12 - Sources of funding

Source of Funding	£
Flood Defence Grant in Aid	£1,193,600
Local Levy	£80,000

3

The project is a fixed budget project, hence no funding has been allocated to risk. In the event of a shortfall, it will be the responsibility of the project partners, not the Environment Agency to cover these costs

Source of Funding	£
Estimated value of grants that will subsidise forecasted cost of measures (see above)	£344,896
Total funding	£1,618,496 (£1,273,600)

Table 13 - Partnership Funding Score

Source of Funding	%
Raw Partnership Funding score	117
Adjusted Partnership Funding score	123

5.3 Expenditure and income profile

Table 14 shows the estimated annual breakdown of expenditure. The 'estimated cost of physical assets' has been deduced based on assumptions and the cost of measures already installed to date as part of the initial pilot project. Appendix P contains further detail about the estimates cost of physical assets. Further costs will be refined upon the delivery of the opportunity mapping study amongst other work. The PF calculator is a living document which will be updated regularly over the next 6 years as and when better information becomes available.

Table 14 - Income and Expenditure profile

Project Summary (£k)	Y0 21/22	Y1 22/23	Y2 23/24	Y3 24/25	Y4 25/26	Y5 26/27	Total (£k)
Project development costs (excluding staff)	1.5	1.5					3
HC Staff Costs	49.5	49.5	49.5	49.5	49.5	49.5	297
NFM Construction & Implementation							
A) Estimated cost of Physical Assets based on the cost of existing implemented NFM		68.982	68.981	68.981	68.981	68.971	344.896
B) Advisory work		140	160	160	120	60	640
C) Community engagement and publicity	0.8	1.25	1.25	1.25	1.25	0.8	6.6
D) Implementation	30	50	50	50	50	20	250
E) Research into knowledge gaps		28	3	3	3	25	62
Monitoring				5	5	5	15
Risk contingency							0
TOTAL project costs - WLC:	81.8	339.232	332.731	337.731	297.731	229.271	1618.496

6.0 Management Case

6.1 Project management

As an area, our ambition is to continue to lead on all things associated with NFM. We have had fantastic support from our RFCC and LLFA partners. A wider partnership forum has been established as a sub-committee of the English Severn and Wye Regional Flood and Coastal Committee which will be utilised to share experiences between RMAs and partners and to help ensure that the strategic direction and delivery is meeting community expectations.

The lead partner in this instance is Herefordshire Council, who will provide a Project Officer, procurement and budget management. Project Executive and Project Manager would be with the council. This approach is based on the experience gained from the pilot project, and enables maximisation of community engagement, delivery cost efficiencies and flexibility. The contribution would be claimed by the council through the FCRM3 LAIDB Grant claim process.

The Project Officer will oversee delivery and evidence gathering, thus reducing project costs/risks and enabling more money to be spent on NFM whilst facilitating networking and sharing of experience/resources across the West Midlands. The projects will also work together to identify any cross-linking opportunities to improve ecology, geomorphology, heritage, landscape and amenity in the West Midlands area.

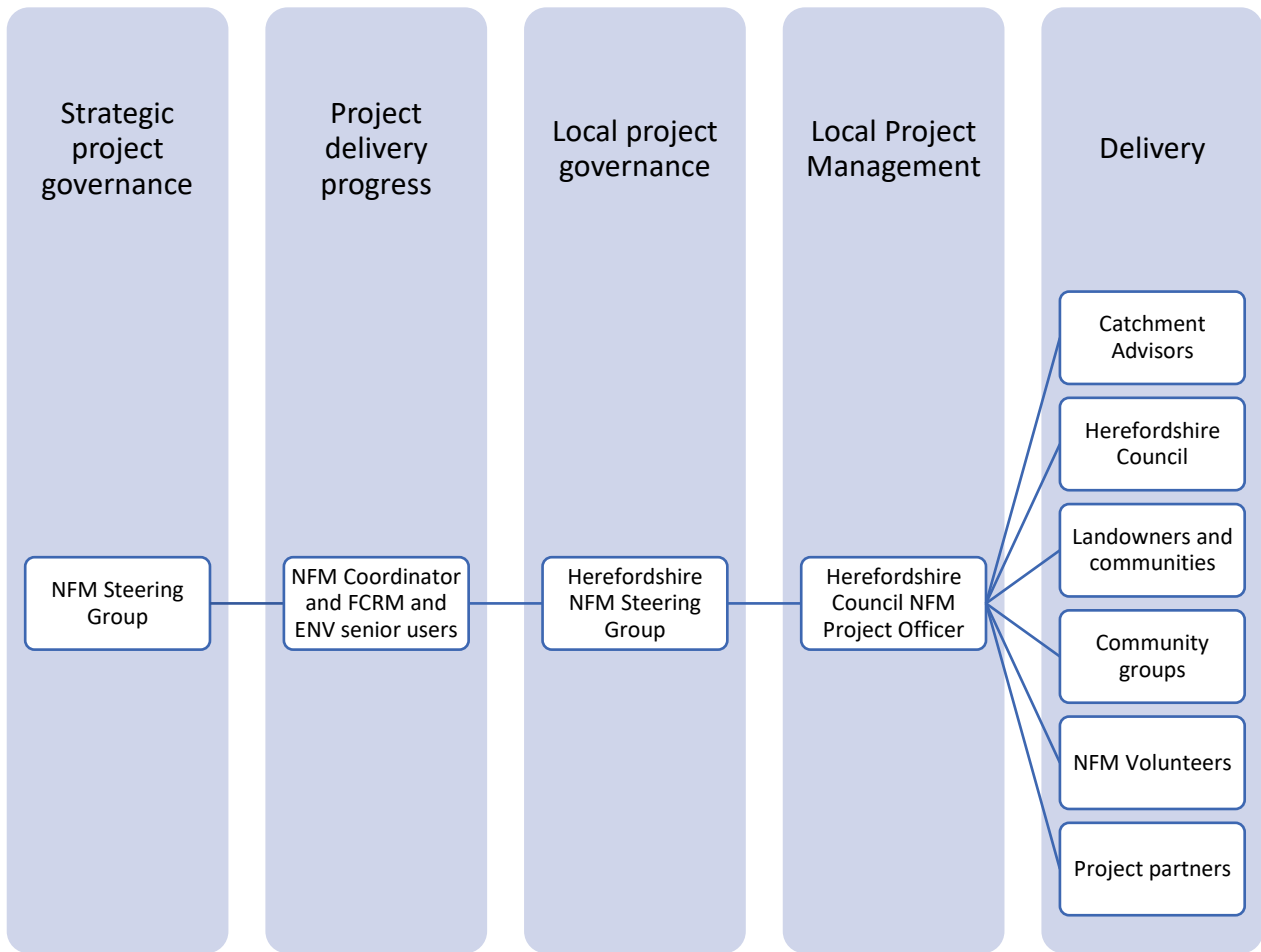
Efficiencies will be created throughout all projects within the West Midlands area due to having project management services delivered through partners and will offer opportunities to use same contractors and service providers.

There will be three key overarching themes which will run through all projects;

- Evidence and Data (through modelling)
- Delivery
- Communications and Engagement

Each of these is fundamental to achieving both our area and national ambition to put NFM at the heart of FCRM.

Figure 6 Diagram outlining project governance



6.2 Schedule

See Table 4.

6.3 Outcomes

Table 15 Outcome measures delivered by the project

Guidance Ref	Outcome Measures	Value
4.1	OM 1 - Ratio of whole-life benefits to whole life costs over the duration of benefits period.	£2,520,345
4.4	OM 1B – Benefits to people that are not associated with avoiding household damages, e.g. less stress/risk to life.	£420,480
4.5	Duration of benefit period (not the appraisal period)	25 years
5.2	OM 2 – Non-residential properties that will move to a lower flood risk band, moving from very significant to significant flood risk (following the methodology detailed in Appendix C).	5
7.2	OM 4A – Habitat created or improved (ha)	2,030.5 ha
7.3	OM 4B – Rivers enhanced – river habitats and natural processes restored and enhanced (km)	30 km

Consideration has also been given to OM3s however this scheme is not eligible to meet the criteria for these outcome measures. Further information about OM2A can be found in Section 2.7.2 and Appendix C.

6.4 Risk, assumptions, issues and dependencies management

Table 16 - Project Risk summary

	Key Risks	Owner & role	Mitigation	Post mitigation Likelihood/impact (H/M/L)
1	Reluctance of partners to sign up to common objectives	HC & Partnership	Maintain open dialogue and use established projects (Stroud/pilot project) to generate confidence and understanding	L
2	Reluctance of landowners to support project activity	HC & Partnership	Project Officer to ensure open dialogue with landowners and use established projects (Stroud/pilot project) to generate confidence and understanding. Previous experience of similar work has shown that landowner interest is generally positive. The risk is further mitigated through the selection of catchments which have a wide range of different landowners across them.	L
3	Monitoring fails to deliver anticipated benefits	HC & Partnership	Continuation from the pilot project in understanding the full potential of NFM – this is a valid outcome. It will enable the project to review monitoring methods and project implementation to improve benefits during life of project (and beyond).	L
4	Failure of NFM features though lack of maintenance/incorrectly installed	HC & Partnership	Project Officer and Catchment Advisors to engage with local landowners to ensure that they understand how the natural flood risk management project works and that maintenance plays a key role. Build skills and understand capacity in local contractors to ensure high quality of build and maintenance. Use established projects (Stroud/pilot project) to generate confidence and understanding.	M
5	Project contributions are not sufficient to support full project delivery.	HC & Partnership	The project will review methods and objectives, to improve understanding of project costs and best utilisation of funding. Utilise best available information to make informed decisions and run annual account to identify any potential shortfalls and take appropriate steps to mitigate.	L

Key Risks		Owner & role	Mitigation	Post mitigation Likelihood/impact (H/M/L)
6	Lack of access to remote sites	HC & Partnership	Sites were chosen in collaboration with local landowners, and NFM measures will subsequently be designed and installed around those specific sites. Access will form a part of this process and thus the risk will be adequately mitigated.	L
7	Inability to secure approvals for works.	HC & Partnership	Measures are designed in partnership with local landowners and communities to ensure they are acceptable in local terms. Experience gained from other similar schemes will also be used when it comes to gaining ordinary watercourse consents for any NFM measures where they are required.	L
8	Changes to staffing which result in loss of NFM and catchment knowledge. Loss of established relationships affecting NFM delivery.	HC & Partnership	Procurement processes must be adhered to and an open tender process will need to be conducted to award contracts for Catchment Advisor work. The procurement process will give weighting to applicants who can demonstrate existing knowledge of the project catchment areas and existing relationships with landowners.	M
9	Covid-19 resulting in reduced levels of community engagement and NFM delivery.	HC & Partnership	National guidelines and laws on preventing the spread of Covid-19 must be adhered to. Where possible safe systems of work will be put in place e.g. socially distanced site visits that will enable project delivery to continue.	M

6.5 Assurance

This project business case (BC) is subject to EA technical review, prior to being financially assured by NPAS. The BC is also subject to Herefordshire Council's governance procedures.

As part of the project's governance arrangements, periodic review meetings will be undertaken with project partners to ensure that efficiencies are identified and to ensure the aims of the project are clear throughout. Project review groups will also be held regularly with key project partners to ensure that all partners, including the community partners, remain engaged. Local steering groups for each project will also share best practice across the West Midlands to ensure that each project is working as efficiently as possible and identifying savings where it can. The project officer will have regular communication with the project board and ensure that monthly updates are disseminated such that the project stays on track and any issues are dealt with efficiently.

Reporting, using anecdotal evidence from local landowners, will ensure that project evaluation can be carried out throughout the project to assess the success of NFM features

within project timescales and then into the future by local community partnerships. Thus ensuring that the benefits of the NFM features on a local/wider catchment scale are captured both from an ecosystem services and flood risk point of view.

On the assumption that business case approval will be given shortly, the project can benefit from the fact that partnerships are already in place and a number of potential NFM measures have already been identified. This will hopefully enable works to be carried out in a much shorter timescale.

6.6 Engagement with Stakeholders and compliance with the Equality Act 2010

The Environment Agency is leading on the engagement process to establish the working partnership with LLFAs, RMAs and other key partners.

The engagement plan for the project delivery will be drawn up by the Project Strategic Steering Group, with the Project Officer, key partners and community groups. This will ensure that the approaches adopted reflect local knowledge and priorities and maximise the potential to engage with landowners and achieve effective delivery and monitoring. It will build on the existing strong partnerships and communication that has enabled the projects to reach this stage.

7.0 List of Appendices

The following appendices are provided as a separate document:

- A Summary of NFM implemented in River Wye and Lugg NFM Pilot Project
- B Outcome measures
- C Economics Assessment
- D Strategic context of project
- E NFM Construction Grant Scheme Guide – Planning Permission guidance
- F Communities at risk
- G Successes and lessons learnt from NFM pilot project
- H Potential permissions and consents
- I Community engagement plan
- J WFD status table
- K Monitoring plan
- L Case studies for NFM pilot project

- M WP2 NFM Opportunity Mapping – Phase 2b: NFM effectiveness review
- N Wye and Usk Foundation: Soil monitoring report
- O Severn Rivers Trust: Brimfield brook catchment, end of project report
- P NFM implementation costs

8.0 References

Herefordshire Council, (2017) *Local Flood Risk Management Strategy*. October 2017. [Online] Herefordshire: Herefordshire Council. [Viewed: 27/08/2021] Available from: https://www.herefordshire.gov.uk/downloads/download/1809/local_flood_risk_management_strategy

WSP, (2019) *Herefordshire Strategic Flood Risk Assessment. Level 1*. [Online]. Bristol: WSP. [Viewed: 27/08/2021] Available from: <https://www.herefordshire.gov.uk/downloads/file/18104/strategic-flood-risk-assessment-april-2019>