Item 1

Proposed Decision to be taken by the Deputy Leader on or after 20 February 2015

Addition of Aston Cantlow Flood Alleviation Scheme to the Capital Programme

Recommendation

That the Deputy Leader gives approval to add the Aston Cantlow Flood Alleviation Scheme to the capital programme.

1.0 Key Issues

1.1 Aston Cantlow is prone to flooding from several sources: fluvial flooding from the River Alne and ordinary watercourses, surface water flooding, and groundwater flooding. All three sources have been identified as contributing to the ongoing flood issues faced within the study area. Major flooding incidents have been reported on several occasions: (i) between August 1993 and July 1996; (ii) April 1998; (iii) July 2007; and (iv) November 2012. During the Easter 1998 event, July 2007 event and November 2012 event, internal property flooding was reported. At times of such flooding, field areas adjacent to the road are also flooded to a considerable depth.

1.2 Warwickshire County Council have undertaken options appraisal, including hydrological and hydraulic modelling and benefit-cost analysis, and put together a business case for Local Levy funding (external funding from the English Severn and Wye Regional Flood and Coastal Committee) – see the Background Paper for a copy of this report.

1.3 It was confirmed that Warwickshire County Council have been successful in getting £99,000 Local Levy funding for this scheme on 21st January 2015.

1.4 The works will be fully funded from this £99,000 capital grant.

2.0 Options and Proposal

2.1 A full synopsis of options which were considered is given in the attached appendix.

2.2 The proposal is for Property Level Protection for 19 properties in Aston Cantlow in order to mitigate flooding from a number of potential sources. This was the preferred economic option, and the only viable one.

3.0 Timescales associated with the decision and next steps

3.1 The works need to commence before the end of March 2015. We currently have a procurement process under way to appoint a contractor in case approval for the scheme is given.

Background papers

None

Appendix

The business case for a flood alleviation scheme in Aston Cantlow approved by the Environment Agency.

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Project Appraisal Report

Authority Scheme Reference	insert
National Project Number	insert
Promoting Authority	Warwickshire County Council
Scheme Name	Aston Cantlow PLP Scheme

View looking up Chapel Lane from Bearley Road (20 July 2007)

Date	4 August 2014
Version	4

PAR for *Aston Cantlow*

Version	Status	Signed off by:	Date signed	Date issued
2014-08-4	Final	Michael Green	17th Oct 2014	17th Oct 2014

PAR Template – August 2010

CONTENTS

TABLES

APPENDICES

Approval History Sheet

APPROVAL HISTORY SHEET (AHS)			
1. Review (to be completed by promoting Authority)			
Project Title: Aston Cantlow PLP Scheme			
Authority Project Code:		**Date of PAR: 04/08/2014**	
Lead Authority: Warwickshire County Council			
Consultant: Halcrow Group Ltd		**Version No: 4**	
Position	**Name**	**Signature**	**Date**
"I have reviewed this document and confirm that this project meets our quality assurance requirements, satisfies all the required environmental obligations and meets Defra investment appraisal criteria. I confirm that all internal approvals including member approval have been completed for this project and recommend submission to the Environment Agency for eligible capital grant approval in the sum of £99.83k"			
Authority Project Executive	Michael Green	Michael Green	17th Oct 2014
"I have reviewed this document and confirm that it complies with the current PAR guidelines for Local Authority and IDB submissions"			
PAR Reviewer	Lucy Freeman		
"I confirm that I have consulted with the Head of FCRM & Business Finance and that the project is ready for submission to PAB/NRG"			
Area Flood Risk Manager	Emma Roberts		
PAB – Project Assessment Board ☐ **(Projects less than £10million)** (Check box to indicate which is appropriate)		LPRG – National Review Group ☐ (Projects greater than £10 million)	
Date of Meeting(s):		**Chairman:**	
Recommended for approval: In the capital grant eligible sum of £:		**Date:**	**Version No:**
3. Project approval Officers in accordance with the FSoD: Specified Officer; Regional Director; Director of Operations; Chief Executive or Director of Finance: Agency Board			
Version No:		**Date:**	
Capital Grant sum Approval	**By:** In the sum of: £ *(if different from above)*	**Date:**	
Breakdown of approved costs			
4. Defra approval			
Not Applicable		Date:	
Version No. (if different):			
Defra Approval: or Not applicable (as appropriate)		Date:	
Comments:			

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1 Executive Summary

1.1 Introduction and Background

Location and Background

1.1.1 Aston Cantlow is a village and civil parish in the Stratford District of Warwickshire, England, on the River Alne.

1.1.2 Following discussions between Warwickshire County Council and local residents, Halcrow Group Ltd were procured to investigate options for reducing flood risk within Aston Cantlow.

History of Flooding

1.1.3 Based on information received from Aston Cantlow Parish Council, the study area suffers from flooding from surface water, groundwater and fluvial sources with the most regular flooding resulting from surface water – especially local roads and farmland.

1.1.4 Major flooding incidents have been reported on several occasions: 1) between August 1993 and July 1996 (date not ascertained); 2) April 1998; and 3) July 2007.

1.1.5 A flood incident report has been compiled by Aston Cantlow Parish Council which contains full details of the flood history within the study area.

1.2 Problem

1.2.1 Aston Cantlow is prone to flooding from several sources: fluvial flooding from the River Alne and ordinary watercourses, surface water flooding, and groundwater flooding. All three sources have been identified as contributing to the ongoing flood issues faced within the study area.

1.2.2 Frequent flooding occurs in the area to the south of Aston Cantlow village, specifically the road surfaces of Brook Road, and Wilmcote Lane and Mill Lane near their junction with Brook Road. During more extreme events the flooding extends out from the road surfaces to threaten adjacent residential and commercial property, and the village is effectively cut off when Mill Lane, Wilmcote Lane, Bearley Road and Whitehouse Hill all become flooded.

1.2.3 During the Easter 1998 event, July 2007 event and November 2012 event, internal property flooding was reported. At times of such flooding, field areas adjacent to the road are also flooded to a considerable depth.

1.2.4 In 2007, a severe flood event occurred in Aston Cantlow, during the period when parts of western and south western England were subjected to an extreme level of rainfall. This followed earlier periods of heavy rain and smaller flooding in June which had left the water table high.

1.3 Options Considered

1.3.1 The potential options were developed having taken into account the targets and actions in the Severn Catchment Flood Management Plan. Considerations of land uptake and disruption to the environment were recognised as being key factors in the options development phase.

1.3.2 Hard engineering and soft engineering solutions were investigated and various alternatives have also been considered. The listed measures considered for reducing flood risk in Aston Cantlow fall into five main categories: (i) storage; (ii) improved conveyance; (iii) improving the drainage network; and (iv) other alternatives, and (v) 'Do Nothing'. Through hydraulic modelling, the first three categories (i) to (iii) above were screened out at the preliminary stage. The complexity and multiplicity of flooding sources and mechanisms ruled out the viability of source control and meant that focussing on receptors of flooding, and pathways to those receptors (that is, property level protection), became the only viable option.

1.4 Preferred Option

Description

1.4.1 The preferred option (Property Level Protection Measures) comprises of flood resistance measures for all 19 properties currently deemed to be at risk from a combination of fluvial, groundwater and surface water flooding. This consists of fully waterproofed property doors and automatic airbricks. The preferred option also assumes that the 'do minimum' maintenance regime is also maintained.

1.4.2 The standard of protection of the PLP measures is 1 in 100 years.

1.4.3 Once the measures are installed the individual property owners will be responsible for maintenance and deployment in the event of a flood.

1.4.4 No significant social, recreational, amenity or environmental enhancements are proposed as part of the scheme; the scheme option will be aimed directly at those homes perceived to be at risk from flooding. The option measures will not be imposed on people and their consent will be required prior to implementation.

1.4.5 A detailed property level survey has been carried out by JBA which has confirmed the detail and practicality of installing the proposed measures on each of the individual properties

Environmental Considerations

1.4.6 The preferred option does not require completion of an Environmental Impact Assessment (EIA) or Strategic Environmental Assessment (SEA).

1.4.7 The preferred option measures proposed in this PAR do not require support from Natural England or planning application. Consultation with a Conservation Officer from Stratford District Council may be required to ensure the proposed measures are acceptable and do not adversely affect the special character of the village.

Benefits

1.4.8 An economic assessment has been undertaken in order to ascertain the benefits of delivering the preferred option following FCERM-AG. The proposed measures deliver £0.57 M of PV benefits

1.4.9 Whilst the proposed scheme delivers monetary benefits, the nineteen individual properties identified for property level protection will not be moved to a lower Flood Zone.

Costs

1.4.10 Project delivery costs have been developed through the use of market rates for both provision and installation of flood protection products and through consultation with Warwickshire County Council.

1.4.11 Property surveys and product recommendation has already been undertaken and is therefore excluded from the approval amount sought.

1.4.12 A full breakdown of costs is provided in Appendix E.

Table 1.1 Project Costs (£k)

	Economic appraisal	Whole Life Cash Cost (Design Life)**	Approval
Costs to PAR (outline design)	24.5 (sunk costs)	24.5	
Costs post PAR			
Existing Staff costs	6	6	6
Additional Staff costs	0	0	0
Consultant fees	0	0	0
Cost consultant fees	0	0	0
Site investigation & survey*	16	16	16
Construction	59.9	59.9	59.9
Environmental mitigation	0	0	0
Environmental enhancement	0	0	0
Site supervision & CDM-C	2	2	2
Compensation	0	0	0
Risk contingency			
95%ile (maximum foreseable risk)			13.72
50%ile (most likely risk)	6.83	6.83	
Inflation @2.5%	N/A	N/A	2.21
Future costs (const. + maintenance)	0	0	N/A
Other	0	0	0
Contributions	24.5	24.5	0
TOTAL	90.73	90.73	99.83

* Property surveys have been undertaken as part of the PAR development

Economic Summary, Outcome Measures and Priority

1.4.13 A summary of the Defra Outcome Measures and Score is presented in Table 1.2. Benefits developed for the PLP measures have been capped at £30k per property.

Table 1.2 Defra Outcome Measures and Score

Contributions to Outcome Measures	
OM1 Ratio of whole life benefits to costs Present Value Benefits (£k) Present Value Costs (£k) Benefit/Cost ratio	 570 115.23 4.95
OM2 Households at reduced risk (nr) 2b – Households moved from v.significant or significant risk to moderate or low (nr) 2c – Proportion of households in 2b that are in the 20% most deprived areas (nr)	19 0 0
OM3 Households with reduced risk of erosion (nr) 3b – Proportion of those in 3 protected from loss within 20years (nr) 3c - Proportion of households in 3b that are in the 20% most deprived areas (nr)	n/a
OM4 Water Framework Directive 4a – Hectares of water-dependant habitat created or improved (ha) 4b – Hectares of intertidal habitat created (ha) 4c – Kilometres of river protected (km)	 0 0 0
Scheme Design Standard of Protection (minimum)	1% AEP
Partnership Raw Funding Score (%)	28%
Non-FDGiA contributions towards the scheme whole life costs	£ 124.5k
Partnership Funding Adjusted Score (%)	136%

Funding and Contributions

1.4.14 It is proposed that this project is funded by Local Levy , and public contributions.

1.4.15 If individual property owner(s) wish to upgrade the proposed flood resistance measures to achieve a higher Standard of Protection then it is proposed that any additional costs associated with these upgrades will be met by the property owner(s).

Key Delivery Risks

1.4.16 A risk register has been developed for the implementation phase of the projects. The 50%ile risk allowance (derived using Monte Carlo simulation) has been applied for economic appraisal and whole life costs. The 95%ile risk value has been added to the financial approval limit.

1.4.17 The key delivery risks are presented in Table 1.3.

Table 1.3 Risks and Mitigation

Key Delivery Risk	Mitigation
Political – A high level of effort is required to address public concern about the project, which impacts on the final project cost.	Stakeholder engagement session has been carried out and residents assured that appraisal is based on best available information.
Obtaining agreement on proposed measures from nineteen individual property owners.	Continued engagement with property owners. A drop-in session to be arranged in order to display the proposed products so that each owner can review the products prior to procurement and installation.
Technical – problems with fitting doors to buildings, objections on grounds of property character. Listed building status of 4 properties may limit the scope of works and create delays in project delivery whilst awaiting approvals.	Early consultation with a Conservation Officer and selected contractor.
Success of the scheme will depend on adjacent properties taking up the scheme (especially terraced properties)	Develop flood action plan in conjunction with Parish Council
Economic – inaccurate estimation of scheme costs.	Product costs including installation have been derived from quotes from suppliers. Consultants cost taken from previous studies by consultant preparing the business case.

1.5 Recommendation

1.5.1 The Aston Cantlow Flood Risk Management Scheme appraisal concludes that Property Level Protection Measures is the preferred option which reduces flood risk from both fluvial, groundwater and surface water sources.

1.5.2 The works for which approval is sought comprise flood proof replacement external doors and automatic airbricks for nineteen residential properties. Where groundwater flooding is known to be a flood source an allowance has been made for the inclusion of a pump and sump to evacuate water from properties although this may not fully resolve all flood risk and will be communicated with the property owners prior to project delivery. The degree or rate of groundwater flooding has not been assessed

1.5.3 The capital cost of the scheme for which approval is sought is £99.83K (including a risk allowance of £13.72K at 95%tile) which will be funded through Local Levy contributions.

1.6 Briefing Paper

Authority:	Warwickshire County Council		**Project Executive:**	Michael Green	
Project Title:	Aston Cantlow PLP Scheme		**Code:**		
Consultant:	Halcrow	**Contractor:**	TBC	**Cost Consultant:**	
The Problem:	Aston Cantlow is at risk of flood from fluvial (River Alne), surface water and ground water sources				
Assets at risk from flooding:	19 Properties				
Existing standard of flood protection:	20% AEP		**Proposed standard of flood protection:**	1% AEP	
Description of proposed scheme:	The proposed works are to provide property level flood protection				
Costs (PVc): (20 year life inc. maintenance)	£124.33 k	**Benefits: (PVb)**	£570k	**Ave. B: C ratio: (PVb/PVc)**	4.95
Net Present Value:		**Incremental B: C ratio:**		**Whole life cost (cash value):**	£124.33k
Choice of Preferred Option:	Property Level Protection				
Total eligible cost for which capital grant approval is sought:	**£99.83k (Local Levy)**				
Delivery programme:	Planning Approval: n/a Award Construction Contract: September2014 Construction Start: October 2014 Construction end: January 2015 End of Project: March 2015				
Are funds available for the delivery of this project?	Yes – Local Levy and Public contributions				
External approvals:	None				

1.7 Key Plan – Properties identified for Property Level Protection Measures

2 Introduction and Background

2.1 Purpose of this Report

2.1.1 This Project Appraisal Report (PAR) supports the application for Flood Defence Local Levy funding to undertake works to reduce flood risk within Aston Cantlow Parish.

2.1.2 This PAR summarises the options appraisal undertaken and presents the business case for its implementation and has been produced in accordance with current policies and procedures including the Flood and Coastal Erosion Risk Management Appraisal Guidance (FCERM-AG 2010).

2.2 Background

Strategic and Legislative Framework

2.2.1 The River Alne falls within the River Severn Catchment Flood Management Plan (CFMP). The CFMP shows that this is an area of low to moderate flood risk "where we are generally managing existing flood risk effectively". One of the key messages contained within the CFMP for the study area is "Flooding cannot be entirely eliminated and so residents, owners, and businesses need to manage some risks themselves. For example, registering for the Floodline Warnings Direct (FWD) service and flood warden schemes; being aware of emergency plans; and adapting vulnerable buildings".

2.2.2 The River Alne lies within the Severn River Basin Management Plan (RBMP) under the Water Framework Directive (WFD) and associated regulations. The River Alne water body have an objective of achieving good ecological status by 2027, and any works will need to comply with this requirement.

2.2.3 The proposed project would be carried out under Section 165 of the Water Resources Act 1991.

Previous Studies

2.2.4 The following studies have been undertaken which investigate flooding mechanisms within Aston Cantlow:

2.2.5 Report on Flood at Aston Cantlow (W J Burton, 2003)

2.2.6 Further Report on Flooding at Aston Cantlow (W J Burton, 2004)

2.2.7 Rivers Arrow and Alne – Phase 1 Modelling Technical Report (Halcrow, 2009)

2.2.8 Arrow and Alne SFRA (Halcrow, 2010)

2.2.9 Aston Cantlow Surface Water Flooding – Technical Memo (Royal Haskoning, 2011)

Location and Designations

2.2.10 Aston Cantlow is a village and civil parish in the Stratford District of Warwickshire, England, on the River Alne. It lies 5 miles (8.0 km) north-west of Stratford, and 2 miles (3.2 km) north-east of Wilmcote. The parish stretching across the valley of the Alne includes the villages of Aston Cantlow, Little Alne, Shelfield, and Newnham. The main village, consisting of a single street, lies on the east bank of the River Alne; and behind the hamlet of Little Alne on the opposite bank, about 400m north-west, the Alne Hills rise to over 120m. The valley is bounded on the east and south by a line of low hills, partly wooded, which divide it from the River Avon. Aston Cantlow is in a conservation area and 4 of the properties identified at risk of flooding are listed buildings. The underlying geology within the area is Arden Sandstone Formation and Mercia Mudstone Group with some superficial deposits of alluvium and is susceptible to high ground water levels.

History of Flooding

2.2.11 Based on information received from Aston Cantlow Parish Council and supported by evidence gathered in the 2013 PLP Survey, the study area suffers from flooding from a number of sources including surface water, groundwater and fluvial (main river and ordinary watercourses), with the most regular flooding resulting from surface water – especially on local roads and farmland. As a result of road flooding, some properties experience flooding from bow waves generated by motor vehicle passing through flood waters which can be remedied by the use of PLP measures.

2.2.12 Major flooding incidents have been reported on several occasions: 1) between August 1993 and July 1996 (date not ascertained); 2) April 1998; and 3) July 2007.

2.2.13 A flood incident report has been compiled by Aston Cantlow Parish Council which contains full details of the flood history within the study area. This is located in Appendix L.

2.3 Current Approach to Flood Risk Management

Measures to Manage the Probability of Flood Risk

2.3.1 There are currently no formal flood defences for managing the probability of flood risk.

Measures to Manage the Consequences of Flood Risk

2.3.2 Flood warning system in place – this only takes account of the main river fluvial flooding source and not surface water nor groundwater.

3 Problem Definition and Objectives

3.1 Outline of the Problem

3.1.1 Aston Cantlow is prone to flooding from several sources: fluvial flooding from the River Alne and ordinary watercourses, surface water flooding, and groundwater flooding. All three sources have been identified as contributing to the on-going flood issues faced within the study area.

3.1.2 Frequent flooding occurs in the area to the south of Aston Cantlow village, specifically the road surfaces of Brook Road, and Wilmcote Lane and Mill Lane near their junction with Brook Road. During more extreme events the flooding extends out from the road surfaces to threaten adjacent residential and commercial property, and the village is effectively cut off when Mill Lane, Wilmcote Lane, Bearley Road and Whitehouse Hill all become flooded.

3.1.3 During the Easter 1998 event, July 2007 event and November 2012 event, internal property flooding was reported. At times of such flooding field areas adjacent to the road are also flooded to a considerable depth.

3.1.4 In 2007, a severe flood event occurred in Aston Cantlow, during the period when parts of western and south western England were subjected to an extreme level of rainfall. This followed earlier periods of heavy rain and smaller flooding in June which had left the water table high.

3.2 Consequences of Doing Nothing

3.2.1 Under the 'Do Nothing' scenario, the following numbers of properties have been identified through hydraulic modelling as being at risk from flooding (see Appendix J which details the areas provided in the following table).

Number of Flooded Properties for Do Nothing Option			
Return Period (Year)	**Area 1**	**Area 2**	**Area 3**
5	0	0	15
10	1	1	17
20	3	2	18
50	3	5	21
75	3	5	21
100	3	7	23
200	5	8	24
1000	6	8	49

3.3 Strategic Issues

3.3.1 The study area falls within Sub Region 8 of the River Severn CFMP and as such one of the key strategic approaches to managing flood risk is through adaptation. Given that Aston Cantlow is subject to flooding from both fluvial and surface water flooding, it is unlikely that there will be an over-arching panacea for

reducing flood risk, and therefore adaptation of vulnerable properties through Property Level Protection measures would marry well with the overall strategic approach identified within the Severn CFMP. However, PLP measures are a short-term solution which need to be replaced every 20 years or an alternative flood prevention measure identified as flood risk management techniques develop.

3.4 Key Constraints

3.4.1 Aston Cantlow is prone to both surface water and groundwater flooding mechanisms which imposes a major constraint on the potential solutions for reducing flood risk within the study area. Traditional flood risk management measures are primarily focussed on reducing fluvial flooding and are unlikely to eliminate or reduce flooding from these two sources. Indeed, introducing formal flood defences (without appropriate mitigation measures) may exacerbate the problem by trapping water behind the defences.

3.4.2 PLP relies on the community working effectively together and on an individual basis to act on a flood warning. In addition, where properties have adjoining walls within the flood risk area, then for PLP to be effective, all “adjoined” properties (such as a row of terraced houses) need to take up and install PLP measures at the required time.

3.4.3 It is recommended that the community set up a Flood Action Group and that Individual and Community Flood Action Plans be prepared to support the PLP scheme. This could include a schedule for "dry" practice runs and maintenance programme.

3.5 Objectives

3.5.1 The main objectives of the project are as follows.

Objective 1: Provide an increased level of flood protection against the inundation of residential properties in Aston Cantlow against all sources of flooding (primarily surface and fluvial sources).

Objective 2: Undertake a FCERM-AG (March 2010) Appraisal of the flood risk management options at Aston Cantlow, presenting the preferred option in a PAR (business case) to Midlands Region – Central Area Flood Risk Manager.

Objective 3: Ensure that safe, effective, and sustainable construction, operation, maintenance and decommissioning is fully considered in the assessment of options.

Objective 4: Engage representatives of the local community, ensuring they are kept informed at key stages of the project, and to ensure that the views of the local community are incorporated into the overall delivery of the project.

Objective 5: To assist individuals recognise and take ownership of their local flood risk and to increase the uptake of Flood Warnings Direct in the local community.

4 Options for Managing Flood Risk

4.1 Potential FCRM Measures

4.1.1 The potential options were developed having taken into account the targets and actions in supporting strategy document, the CFMP. Considerations of land uptake and disruption to the environment were recognised as being key factors in the options development phase.

4.1.2 Hard engineering and soft engineering solutions were investigated and various alternatives have also been considered. The listed measures considered for reducing flood risk in Aston Cantlow fall into four main categories: (i) storage; (ii) improved conveyance; (iii) improving the drainage network; and (iv) other alternatives.

4.2 Long List of Options

4.2.1 A long list of options was developed at the project outset by Halcrow, with input from Warwickshire County Council. The options considered were:

- flood storage – two potential sites for providing flood storage were identified: Little Alne and Brook Road Brook (un-named watercourse);
- removal of weirs/sluices – by removing weirs and sluices on the River Alne there would be potential to increase flood conveyance and reduce water levels locally; and
- improvements to the sewer/drainage network – this would provide increased conveyance and reduce surface water flooding.

4.3 Options Rejected at Preliminary Stage

4.3.1 Several options have been modelled for this study but have been eliminated from the study as modelling has shown them not to be a feasible option in terms of their relative cost and benefits. The options considered but screened out at preliminary stage were as follows.

1. **Flood storage on Little Alne:** Model results for Little Alne showed that the majority of flooding for the most frequently flooded properties originated from the main River Alne and as such storage upstream on the Little Alne showed very little benefit to flood levels, even with a large storage area. As a result, this option was no longer considered.

2. **Flood storage on Brook Road Brook:** A similar option on Brook Road brook was also shown to require a significant amount of storage to accommodate even the smallest of events. The total volume of storage required to protect against the 1 in 100 year event was approximately 40,000 m^3. This is vastly in excess of what is considered practicable and cost-effective to protect a small number of properties in this area.

3. **Removal of weirs on the River Alne:** The removal of some weirs on the River Alne was originally considered, in order to lower river levels. However, it was observed from the model that the majority of properties in Aston Cantlow are affected mainly from pluvial (surface water) flooding and are not significantly influenced by a change in water level in the River Alne.

4. **Improvement of drainage network in Aston Cantlow:** The existing drainage network in Aston Cantlow is thought to directly influence the amount of flooding. However, the software and scope of this study are not sufficient to assess the true impact of the sewer network on flooding. Nevertheless, the design standard of any surface water network is only 1 in 30 years and therefore flooding would still be expected for an event such as that in 2007. Sewer flooding at the Bearley Road / Chapel Lane junction may exacerbate surface water flooding in this area. However, by addressing the pathway rather than the source of flooding through Property Level Protection, the preferred option proposed in this report will still protect properties from sewer flooding.

4.4 Options Short-listed for Appraisal

4.4.1 Following the preliminary stage and consideration of the sources of flooding within Aston Cantlow, it was evident that a source management approach to flood alleviation would not be viable, since it would entail excessive cost in relation to the relatively small number of properties to be protected. Therefore, only three options were identified for more detailed appraisal. These options are presented in the following sections.

Option 1 Do Nothing

4.4.2 Under the Do Nothing option, it has been assumed that effective maintenance of the watercourses in and around Aston Cantlow would cease, and therefore blockages of culverts and bridges would ensue.

4.4.3 The Do Nothing option has been created by adding blockages to the model to illustrate how much more flooding could occur without maintenance. At each blockage location the blockage percentage has been set to 90%. This has been simulated by adding blockage units to the ISIS models of Brook Road Brook and Little Alne and removing the sewer network from the model within Aston Cantlow.

Option 2 Do Minimum

4.4.4 Under the Do Minimum option, it has been assumed that effective maintenance of the water courses in and around Aston Cantlow continues and the risk of channel blockage is minimal.

Option 3 Individual Property Protection

4.4.5 Due to the multiple sources of flooding occurring at Aston Cantlow, there is limited scope for a source management approach to flood risk management. Therefore, the installation of individual property protection measures provides an effective means for reducing flood damage without entailing excessive costs. The current standard of protection is approximately 1 in 5 year flood event. Properties were selected for PLP measures based on hydraulic modelling outputs and identification of properties at risk of flood through direct liaison with the residents of Aston Cantlow Parish.

4.4.6 Measures to reduce flood risk include the installation of flood barriers on external doors which require manual intervention or passive flood doors, automatic air

brick covers, water proofing of external walls, and provision of sumps and pumps to alleviate groundwater incursion where necessary.

4.4.7 As well as the installation of flood resistance measures at individual properties, it is assumed that effective maintenance of watercourses continues throughout the appraisal period (as per Option 2 – Do Minimum).

5 Options Appraisal and Comparison

5.1 Technical Issues

5.1.1 As stated in Section 3.4.1, Aston Cantlow is prone to both surface water and groundwater flooding mechanisms (as well as fluvial sources) which imposes a major constraint on the potential solutions for reducing flood risk within the study area. Traditional flood risk management measures are primarily focussed on reducing fluvial flooding and are unlikely to eliminate or reduce flooding from these two sources. Indeed, introducing formal flood defences (without appropriate mitigation measures) may exacerbate the problem by trapping water behind the defences.

5.1.2 Present Value Benefits have been determined for the PLP measures based on a capped £30k per property over the timescale of the appraisal period (20 years). Present Value Costs have been determined through property surveys and product identification in order to develop a benefit-cost assessment (See Appendix G)

5.2 Environmental Assessment

5.2.1 The preferred option does not require completion of an Environmental Impact Assessment (EIA) or Strategic Environmental Assessment (SEA).

5.2.2 The preferred option measures proposed in this PAR do not require support from Natural England or a planning application. Consultation with a Conservation Officer from Stratford District Council may be required to ensure the proposed measures are acceptable and do not adversely affect the special character of the village. Some of the properties are Listed Buildings and will need to be treated sensitively and with consent from the Local Planning Authority.

5.3 Social and Community Impacts

5.3.1 The proposed scheme will deliver £0.57M of present value benefits over the 100 year appraisal period. These benefits are achieved through a reduction in internal property flooding for nineteen properties and associated indirect and intangible effects of flooding (such as temporary accommodation, dehumidifiers and health impacts).

5.3.2 Following project delivery of the PLP measures, local roads and fields will still be liable to flooding so short term disruption to access will remain.

5.4 Option Costs

5.4.1 The costs for the preferred option have been derived based on quotes from flood resistance product suppliers. These costs include an allowance for installation and removal of existing doors. The cost is based on the identified products which are required for each residential property. These costs are a one-off cost for installation with future repairs and replacement of products being borne by the property owner.

5.4.2 A full breakdown of scheme costs is included in Table 5.1.

Table 5.1 Summary of Options Present Value Costs (£k)

	Option 1 (Do Nothing)	Option 2 (Do Minimum)	Option 3 (PLP measures)
Existing Staff costs	0	0	6
Additional Staff costs	0	0	0
Consultant fees	0	0	0
Cost consultant fees	0	0	0
Site investigation & survey	16	16	16
Construction	0	0	59.9
Environmental mitigation	0	0	0
Environmental enhancement	0	0	0
Site supervision & CDM-C	0	0	2
Compensation	0	0	0
Risk contingency (Most likely)	0	0	13.72
Other (Inflation @ 2.5%)	0	0	2.21
Sub Total	0	0	99.83
Future costs Design Life (const. + maintenance)	0	76.1	0
Total PV Cost	0	76.1	99.83

5.5 Options Benefits (Damages Avoided)

5.5.1 A summary of the Present Value (PV) damages and benefits is provided in Table 5.2.

Table 5.2 Summary of Present Value (PV) Damages and Benefits (£k)

	Damage (PVd)	Damage Avoided	Benefits (PVb)	Key non-monetarised Benefits •
Option 1 (Do nothing)	2744	0	0	
Option 2 (Do minimum)	2667	77	77	
Option 3 (PLP measures)	2174	570	570	

6 Selection and Details of the Preferred Option

6.1 Selecting the Preferred Option

6.1.1 The output from the benefit-cost assessment is presented in Table 6.1. Full details are presented in Appendix G.

Table 6.1 Benefit-Cost Assessment (20 year Appraisal Period)

	PV Costs (£k)	PV Benefits (£k)	Av. Benefit/Cost Ratio	Incremental BCR	Option for Incremental Calculation	Raw PF Score	Adjusted PF Score
Option 1 (Do Nothing)	0	0	0	-	-	-	-
Option 2 (Do Minimum)	76.1	77	1.01	-	-	-	-
Option 3 (PLP measures)	115.23	570	4.95	n/a		28%	136%

6.1.2 The figures presented above are based on a 20 year appraisal period with no allowance made for future replacement costs which is expected to be borne by the property owner through a Legal Agreement.

6.2 Details of the Preferred Option

Technical Aspects

6.2.1 The preferred option (Property Level Protection Measures) comprises flood resistance measures for all 19 properties currently deemed to be at risk from a combination of fluvial, groundwater and surface water flooding. This consists of fully waterproofed property doors and automatic airbricks, pump sumps and pumps, provison of non-return valves and water proofing of external walls. The preferred option also assumes that the 'do minimum' maintenance regime is also maintained.

6.2.2 Once the measures are installed the individual property owners will be responsible for maintenance and deployment in the event of a flood.

6.2.3 No significant social, recreational, amenity or environmental enhancements are proposed as part of the scheme; the scheme option will be aimed directly at those homes perceived to be at risk from flooding. The option measures will not be imposed on people and their consent will be required prior to implementation.

6.2.4 A detailed property level survey has been carried out by JBA which has confirmed the detail and practicality of installing the proposed measures on each of the individual properties. A summary spreadsheet detailing products for each property is contained within Appendix E and individual property data sheets are contained in Appendix M.

Environmental Aspects

6.2.5 This option will not require completion of an Environmental Impact Assessment (EIA) or Strategic Environmental Assessment (SEA). However, Listed Buildings Consent may be required for some of the properties.

6.2.6 This option will not have an impact on Water Framework Directive measures and no mitigation is required.

Costs for the Preferred Option

Table 6.2 Project Costs for Preferred Option (£k)

	Cost for economic appraisal (PV)	Whole life cash cost	Capital Grant approval project cost
Costs to PAR: (excluding costs of approved study)			
Existing Staff costs		3	
Additional Staff costs		0	
Site investigation & survey		7.5	
Consultant fees		5.5	
Cost consultant fees		8.5	
Sub-total		24.5	
PAR to Construction:			
Existing Staff costs	6	6	6
Additional Staff costs	0	0	0
Site investigation & Survey	16	16	16
Consultant fees	0	0	0
Cost consultant fees	0	0	0
Other costs	0	0	0
Sub-total	22	22	22
Construction:			
Construction costs	59.9	59.9	59.9
Inflation allowance for 12 months			2.21
Environmental enhancement	0	0	0
Environmental mitigation	0	0	0
Existing Staff costs	0	0	0
Additional Staff costs	0	0	0
Consultant fees	0	0	0
Site supervision & CDM-C	2	2	2
Cost consultant fees	0	0	0
Compensation	0	0	0
Other costs)	0	0	0
Sub-total	61.9	61.9	64.11
Future Costs:			
Maintenance	0	0	
Future construction	0	0	
Risk Contingency:			
Monte Carlo 95% or similar Maximum Foreseeable Risk			13.72
Monte Carlo 50% or similar Most Likely Risk	6.83	6.83	
Contributions			**24.5**
TOTAL	**90.73**	**115.23**	**124.33**

6.2.7 A risk register has been developed for the implementation phase of the projects. The 50%ile risk allowance (derived using Monte Carlo simulation) has been

applied for economic appraisal and whole life costs. The 95%ile risk value has been added to the financial approval limit.

6.2.8 The 95%ile risk value equates to approximately 15% of the overall implementation costs. This value is relatively low and is justified on the grounds that most of the costs come from quotations from known suppliers on the Environment Agency framework and there is very little in the way of risk to affect the price. The consultant, JBA, has experience in managing the implementation of property level flood protection so the costing is considered to be accurate. The base cost for the economic analysis is 2013 Quarter 3.

6.2.9 The Present Value of costs and benefits has been calculated using inflation rates presented in the 'Treasury Green Book - Appraisal and Evaluation in Central Government, Annex 6' (HM Treasury, 2003). The rates are: 3.5% from year 0 to 30; 3.0% from year 31 to 75; and 2.5% from year 76 to 99.

Contributions and Funding

6.2.10 It is proposed that this project is funded by Local Levy and public contributions.

6.2.11 If individual property owners wish to upgrade the proposed flood resistance measures to achieve a higher Standard of Protection then it is proposed that any additional costs associated with these upgrades will be met by the property owner.

Outcome Measures and Funding Priority

6.2.12 Outcome measures are presented in Table 6.3

Table 6.3 Outcome Measure Contributions and Prioritisation Score

Outcome Measure	Previous Years	2013/14	2014/15	2015/16	2016/17	Future Years	Total
OM 2 Households at reduced risk (nr)			19				19
OM2b – Households moved from v.significant or significant risk to moderate or low (nr)			0				0
OM2c – Proportion of households in 2b that are in the 20% most deprived areas (nr)			0				0
OM3 Households with reduced risk of erosion (nr)			0				0
OM3b – Proportion of those in 3 protected from loss within 20years (nr)			0				0
OM3c - Proportion of households in 3b that are in the 20% most deprived areas (nr)			0				0
OM4a – Hectares of water-dependant habitat created or improved (ha)			0				0
OM4b – Hectares of intertidal habitat created (ha)			0				0
OM4c – Kilometres of river protected (km)			0				0
OM 1 – Economics Whole Life Present Value Benefits (£k) Whole Life Present value Costs (£k) Benefit Cost ratio							570 124.33 4.95
Raw Partnership Funding Score (%)						28%	
Non-FDGiA contributions towards the scheme whole life costs (£k)						£124.5 K	
Adjusted Partnership Funding Score (%)						136%	

7 Implementation

7.1 Project Planning

Phasing and Approach

7.1.1 Building surveys and identification of flood resistance products has been brought forward to run concurrently with PAR development. This has enabled savings on the programme by running the PAR phase and specific product identification and costing phases in parallel.

7.1.2 Installation of the protection measures is scheduled to commence in 2014-15 financial year with a planned completion date within the same year.

7.1.3 Each property owner will be expected to enter into an agreement with Warwickshire County Council which stipulates that the installation of the flood resistance measures is a one-off occurrence and future maintenance and liability for the products is the responsibility of the property owner. This is expected to form part of the deeds associated with the property so that it is passed onto subsequent owners.

Programme and Spend Profile

7.1.4 The key dates for the delivery of the Aston Cantlow PLP measures are presented in Table 7.1 with works substantially complete by the end of the 2014-15 financial year.

7.1.5 The annualised spend profile for scheme delivery is presented in Table 7.2, and it is anticipated that all project spend will be incurred during the financial year 2014/15.

7.1.6 An outline programme for delivery is presented in Appendix I which identifies key milestones and constraints.

Table 7.1 Key Dates

Activity	Date
Planning permission received	Not Applicable
Stakeholder Engagement & Legal Agreements	July 2014
Listed Building Consent	August 2014
Contract Award (Gateway 3)	September 2014
Works start on site on	October 2014
Works substantially complete by	January 2015
Post Installation Survey & Certification	February 2015
Scheme Operational (Gateway 4)	March 2015

Table 7.2 Annualised Spend Profile (£k)

	Previous Years	2013/14	2014/15	2015/16	2016/17	Future Years	Total
Existing Staff costs			6				6
Additional Staff costs			0				0
Fees			2				2
Construction			59.9				59.9
Environmental mitigation			0				0
Environmental enhancement			0				0
Compensation			0				0
Other (Inflation @ 2.5%)			2.21				2.21
Risk contingency (50% risk)			6.83				6.83
Less non grant eligible costs			0				0
Grant Rate			0				0
Total grant eligible sum *			**76.94**				**76.94**

7.2 Delivery Risks

High Level Risk Register

7.2.1 Table 7.3 summarises the five most important delivery risks. The risk allowance for the preferred option is £13.72K (at 95%ile)

Table 7.3 High Level Risk Schedule and Mitigation

Key Delivery Risk	Mitigation
Political – A high level of effort is required to address public concern about the project, which impacts on the final project cost.	Stakeholder engagement session has been carried out and residents assured that appraisal is based on best available information.
Obtaining agreement on proposed measures from nineteen individual property owners.	Continued engagement with property owners. A drop-in session to be arranged in order to display the proposed products so that each owner can review the products prior to procurement and installation.
Technical – problems with fitting doors to buildings, objections on grounds of property character. Listed building status of 4 properties may limit the scope of works and create delays in project delivery whilst awaiting approvals.	Early consultation with a Conservation Officer and selected contractor.
Success of the scheme will depend on adjacent properties taking up the scheme (especially terraced properties)	Develop flood action plan in conjunction with Parish Council
Economic – inaccurate estimation of scheme costs.	Product costs including installation have been derived from quotes from suppliers. Consultants cost taken from previous studies by consultant preparing the business case.

Safety Plan

7.2.2 It is proposed that all products utilised for property level protection will be “kite marked” and comply with the relevant ISO safety standards.

7.2.3 Residents will be given specific training in the use and installation of flood prevention measures prior to final sign-off and handover of the final scheme.

7.2.4 Installation of the flood prevention measures will be undertaken by an approved Environment Agency framework contractor to ensure minimum health and safety requirements are adhered to.

Appendix A **Project Report Data Sheet**

Entries required in clear boxes, as appropriate.

GENERAL DETAILS

Authority Project Ref. (as in forward plan):	
Project Name (60 characters max.):	Aston Cantlow
Promoting Authority: Defra ref (if known)	
Name	Warwickshire County Council
Emergency Works:	No (Yes/No)
Strategy Plan Reference:	n/a
River Basin Management Plan	River Severn
System Asset Management Plan	n/a
Shoreline Management Plan:	n/a
Project Type:	Stand-alone Project

Shoreline Management Study/ Preliminary Study/ Strategy Plan/Prelim. Works to Strategy/ Project within Strategy/Stand-alone Project/ Strategy Implementation/Sustain STANDARD OF SERVICE. Coast Protection/Sea Defence/Tidal Flood Defence/Non-Tidal Flood Defence/Flood Warning
Tidal/Flood Warning - Fluvial/Special

CONTRACT DETAILS

Estimated start date of works/study:	October2014
Estimated duration in months:	5 months
Contract type*	Framework

(*Direct labour, Framework, Non Framework, Design/Construct)

Costs

	APPLICATION (£000's)
PAR Preparation:	24.5
Capital Grant for Environment Agency approval:	99.83
Total Whole Life Costs (cash):	124.33

For breakdown of costs see Table in Section 2.4

CONTRIBUTIONS

Own Resources:	24.5
Windfall Contributions:	0
Deductible Contributions:	0
Loans:	0
ERDF Grant:	0
Other excluded Items:	0

LOCATION – to be completed for all projects

EA Region/Area of project site (all projects):	Midlands Region / Central Area
Name of watercourse (fluvial projects only):	River Alne
District Council Area of project (all projects):	Warwickshire County Council
Grid Reference (all projects):	SP139599

(OS Grid reference of typical mid point of project in form ST064055)

DESCRIPTION

Specific town/district to benefit:	Aston Cantlow

Brief project description including essential elements of proposed project/study
(Maximum 3 lines each of 80 characters)

Provision of Individual Property Protection measures to 19 properties within Aston Cantlow Parish.

DETAILS

Design standard (chance per year):	100		yrs
Existing standard of protection (chance per year)	5		yrs
Design life of project:	20		yrs
Fluvial design flow (fluvial projects only):	n/a		m^3/s
Tidal design level (coastal/tidal projects only):	n/a		m
Length of river bank or shoreline improved:	0		m
Number of groynes (coastal projects only):	n/a		
Total length of groynes* (coastal projects only):	n/a		m
Beach Management Project?	No	Yes/No	
Water Level Management (Env) Project?	No	Yes/No	
Defence type (embankment, walls, storage etc)	Property Level Protection		

* i.e. total length of all groynes added together, ignore any river training groynes

ADDITIONAL AGREEMENTS:

Maintenance Agreement(s):	Awaited		Not Applicable/Received/Awaited
EA Region Consent :	Not Applicable		Not Applicable/Received/Awaited
Non Statutory Objectors:	No	Yes/No (For coastal schemes complete CPA1/CPA2)	
Date Objections Cleared:	Not Applicable		
Other:	Not Applicable		Not Applicable/Received/Awaited

ENVIRONMENTAL CONSIDERATIONS

Natural England (or equivalent) letter:	N/A	Not Applicable/Received/Awaited
Date received	N/A	

SITES OF INTERNATIONAL IMPORTANCE
(Answer Y if project is within, adjacent to or potentially affects the designated site)

Special Protection Area (SPA):	No	Yes/No
Special Area of Conservation (SAC):	No	Yes/No
Ramsar Site	No	Yes/No
World Heritage Site	No	Yes/No
Other (Biosphere Reserve etc)	No	Yes/No

SITES OF NATIONAL IMPORTANCE (Answer Y if project is within, adjacent to or potentially affects the designated site)

Environmentally Sensitive Area (ESA):	No	Yes/No
Site of Special Scientific Interest (SSSI):	No	Yes/No
National/Regional Landscape Designation:	No	Yes/No
National Park/The Broads	No	Yes/No
National Nature Reserve	No	Yes/No
AONB, RSA, RSC, other	No	Yes/No
Scheduled Ancient Monument	No	Yes/No
Other designated heritage sites	No	Yes/No

OTHER ENVIRONMENTAL CONSIDERATIONS

Listed structure consent	Awaited	Not Applicable/Received/Awaited
Water Level Management Plan Prepared?	No	Yes/No
FEPA licence required?	N/A	Not Applicable/Received/Awaited
Statutory Planning Approval Required	N/A	Yes/No/Not Applicable

COMPATIBILITY WITH OTHER PLANS

Shoreline Management Plan	N/A	Yes/No/Not Applicable
River Basin Management Plan	Yes	Yes/No/Not Applicable
Catchment Flood Management Plan	Yes	Yes/No/Not Applicable
Water Level Management Plan	N/A	Yes/No/Not Applicable

SEA/ENVIRONMENTAL IMPACT ASSESSMENT

SEA	N/A	Statutory required/ voluntary/not applicable
EIA	N/A	Yes (schedule 1); Yes (schedule 2); SI1217; not applicable
SEA/EIA status	N/A	Scoping report prepared/draft/draft advertised/final

Other agreements

Detail	Result

(Not Applicable/Received/Awaited for each)

Local authorities only: For projects done under Coast Protection Act 1949, please separately identify: FRM = Benefits from reduction of asset flooding risk; CERM = Benefits from reduction of asset erosion risk

Benefit type (DEF: reduces risk (contributes to Defra SDA 27); CM: capital maintenance; FW: improves flood warning; ST: study; OTH: other projects) PLP

LAND AREA

Total area of land to benefit:	0		Ha
of which present use is:	FRM	CERM	
Agricultural:	0		Ha
Developed:	0		Ha
Environmental/Amenity:	0		Ha
Scheduled for development	0		Ha

PROPERTY & INFRASTRUCTURE PROTECTED

	Number		Value (£'000s)	
	FRM	CERM	FRM	CERM
[1]Residential	19			
Commercial/industrial				
Critical Infrastructure				
Key Civic Sites				
Other (description below):				
Description:				

Costs and Benefits

[1]Present value of total project whole life costs (£'000s): Include all costs including ineligible		124.33
Project to meet statutory requirement?	Y/N	Y

	Value (£'000s)	
	FRM	CERM
Present value of residential benefits:	570	
Present value of commercial/industrial benefits:	-	
Present value of public infrastructure benefits:	-	
Present value of agricultural benefits:	-	
Present value of environmental/amenity benefits:	-	
[1]Present value of total benefits (FRM & CERM)	570	
Net present value:	419	
Benefit/cost ratio:	4.95	
Base date for estimate:	Jan 2014	

Appendix B List of Reports Produced

Aston Cantlow FRMS - Technical Report