

The background of the cover is a stylized illustration of a sunset or sunrise over a body of water. A large, bright yellow sun is in the upper right, casting a warm orange glow across the sky and water. Several birds are silhouetted against the sky, flying towards the left. In the foreground, there are stylized, flowing lines in white and orange, resembling reeds or grass. In the middle ground, a bridge is visible on the water, with its reflection. The overall color palette is dominated by warm oranges, yellows, and blues.

Severn Estuary Flood Risk Management Strategy

Strategic Options Assessment
October 2013

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Purpose of Report

The purpose of this report is to provide technical information to inform decision-making. The conclusions or recommendations of the technical assessments do not imply that options decisions have been made. This technical assessment was carried out prior to the public consultation in 2013.

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Glossary of Terms

Term	Meaning / Definition
SEFRMS	Severn Estuary Flood Risk Management Strategy
SoP	Standard of Protection
JPRP	Joint Probability Return Period
AEP	Annual Exceedance Probability
FRA	Flood Risk Assessment
CHaMP	Coastal Habitat Management Plan
SMP	Shoreline Management Plan
FMP	Foreshore Management Plan
CFMP	Catchment Flood Management Plan
LiDAR	Light Detection and Ranging
NPD	National Property Dataset
EA	Environment Agency
SEA	Strategic Environmental assessment
LPRG	Large Projects Review Group
StAR	Strategic Appraisal Report
WAG	Welsh Assembly Government
Defra	Department for Environment, Food and Rural Affairs
IPCC	Inter-governmental Panel on Climate Change
UKCIP	United Kingdom Climate Impacts Programme
POL	Proudman Oceanographic Laboratory
NTSLF	National Tidal and Sea Level Facility
JPA	Joint Probability Analysis
SFRA	Strategic Flood Risk Assessment
FHRC	Flood Hazard Research Centre
MCM	Multi Coloured Manual
NRP	Non-Residential Property
AAD	Average Annual Damage
FCDPAG	Flood and Coastal Defence Project Appraisal Guidance
SFVI	Social Flood Vulnerability Index
PVd	Present Value damages



Executive Summary

The Environment Agency (Wales, South West and Midlands regions) commissioned a strategic study for the Severn Estuary to examine the current and future flood risk and habitat evolution, and develop, assess and select strategic FRM options to manage flood risks and habitats. This report documents the range of technical analyses carried out to support option development and selection, and the staged option selection process.

The potential options can be grouped into three main themes:

- The potential schemes in the next 20 years to improve flood risk management (FRM) asset weak spots, and reduce flood risk at a flood cell level.
- The potential wider 100 year programme of incremental improvements in response to predicted climate change.
- The potential programme of managed realignments to ensure zero net loss of area and functionality to the Severn Estuary Natura 2000 designated site.

Along the Welsh coastline, potential FRM schemes in the next 20 years have been identified for the the Wentlooge Levels (already underway), River Ebbw to River Usk and Caldicot Levels (already underway). Along the English coastline, potential FRM schemes in the next 20 years have been identified for Westbury-on-Severn and Rodley, Upper Framilode, Berkeley to Littleton-upon-Severn, Avonmouth to Aust (already underway) and Congresbury Yeo (already underway). The Wentlooge Levels, River Ebbw to River Usk, Caldicot Levels, Avonmouth to Aust and Congresbury Yeo schemes could provide up to a 0.1%AEP Standard of Service against tidal flooding, with a strong case for FCRM GiA funding. It is recommended that studies to progress and deliver these schemes occur within the next 5 years.

The Westbury-on-Severn and Rodley, Upper Framilode and Berkeley to Littleton-upon-Severn schemes would likely only receive partial FCRM GiA funding, and have stakeholder complexities that require further discussions. It is recommended that these schemes are delivered in the next 5-15 years.

Potential managed realignment schemes in the next 20 years have been identified for Stroat and Steart Peninsula (both underway). It is recommended that studies to progress and deliver these schemes occur within the next 5 years. Further possible Adaptation locations in the next 20 years could occur at Awre and Minsterworth Ham. Whilst they have a strong case for FCRM GiA funding, these would only occur if landowners were supportive.

The possible wider 100 year programme of managing FRM and habitats is sensitive to climate change predictions. Assessment has identified that under the low 50%ile, medium 95%ile and upper end emissions scenarios, conventional raising and/or hardening of the various existing FRM assets is technically achievable and economically justifiable. However, under the upper end plus surge emissions scenario this approach may be difficult to achieve towards 2110. Alternative options could consist of primary-secondary FRM asset systems, or realignment on FRM grounds.





1. Framework for Responding to Climate Change

1.1 Use of Previous and Ongoing Studies

A large number of strategic studies have previously been carried out within the Severn Estuary. In addition to this the second round of SMPs are currently being developed. The SEFRMS has drawn on these studies to make best use of pre-existing work. Salient studies covering development of FCERM options include:

- Severn Estuary SMP2 (Atkins/ABPmer, 2009).
- North Devon and Somerset SMP2 (Halcrow, 2009).
- CFMPs for the Ogmore to Tawe, Taff and Ely, Eastern Valleys, Wye and Usk, Severn Tidal Tributaries, Bristol Avon, North and Mid Somerset, and River Parrett.
- Gwent Levels Foreshore Management Plan (Atkins, 2004).
- Tidal Usk FRM Strategy (Halcrow, 2008).
- Newport to Chepstow FRM Strategy (Atkins, 2006b).
- Tidal Severn FRM Strategy (Babtie Brown and Root, 2007).
- Clevedon to St. Thomas' Head Strategic Overview (Atkins, 2005).
- Parrett Estuary FRM Strategy (Black and Veatch, 2009).
- Slimbridge Managed Realignment Feasibility Study (Atkins, 2009)
- Avonmouth to Aust Tidal Defence Scheme (Atkins, 2006a).
- Steart Peninsula Managed Realignment (Halcrow, 2009).

The above studies represent a comprehensive source of information, both as regards the range of options considered (from marginal local intervention to large scale heavy engineering) and geographic coverage (approximately 80% of the SEFRMS study area). An initial review of all the studies, and consideration of further possible solutions, rendered a long list of possible strategic options which was subsequently re-ordered into a structured range of options. Both the long list and the structured list are given in Appendix A.

1.2 Objectives and Drivers

The over-arching aim of the Severn Estuary Flood Risk Management Strategy is *'to produce a long-term plan for sustainable flood risk management in the Severn Estuary that takes full account of requirements set out in the CHaMP and provides appropriate levels of protection to all flood risk areas'* (Defra, 2000). SMP2 level objectives were considered, and the objectives for particular flood cells are given in Appendix B.



1.3 Option Development Process

Consideration of the key issues of increasing flood risk and estuary-wide habitat evolution highlighted the following need to:

- Ensure a coherent policy framework drawing on the relevant SMP2/CFMPs.
- Ensure the legal requirements of EU directives are met in regard of habitat evolution.
- Develop policies through to optimised adaptation responses that consider socio-economic, technical and environmental constraints, in a transparent and robust manner.

To assess the potential for habitat creation within the Severn Estuary, a filtering process was carried out. This used a range of criteria to select viable habitat creation sites around the Severn Estuary, defining potential viable sites, their maximum spatial area, and a broad hierarchy, described in more detail in section 3 and Atkins/ABPmer (2010b). This fed into a three stage option appraisal process, outlined as:

- **High Level Options.** These are akin to CFMP policies but are additionally considered in light of the SESMP2 policies (McCue et al, 2009). High Level Options were qualitatively assessed based on the baseline scenario and high level policy drivers at an estuary-wide level, such as the need for habitat creation to address climate change impacts.
- **Alignments and Types.** The selection of potential High Level Options acted as a filter for the Alignments and Types. These were quantitatively assessed based on addressing the drivers and achieving the objectives of each flood cell. Alignments were based on the broad habitat creation hierarchy and required extent at an estuary-wide scale for each epoch, whilst types of FRM were predominantly based on technical appropriateness.
- **Responses.** The selection of potential Alignment and Types acts as a filter for the Responses. These were quantitatively assessed based on optimising the type and SoP. At this stage, potential Responses define alignment, SoP and solution type.

This framework is shown in Figure 1-1. This framework enables estuary-wide habitat and environmental concerns eg Natura 2000 site, to have equal or greater weighting than technical and socio-economic concerns at the Policy and High Level Option phases, with technical and socio-economic concerns becoming increasingly dominant in the Alignment and Type, and Response stages. All these stages were undertaken in parallel with the SEA process, this process is not detailed herein, but is documented in Atkins (2011) and Atkins (2013).

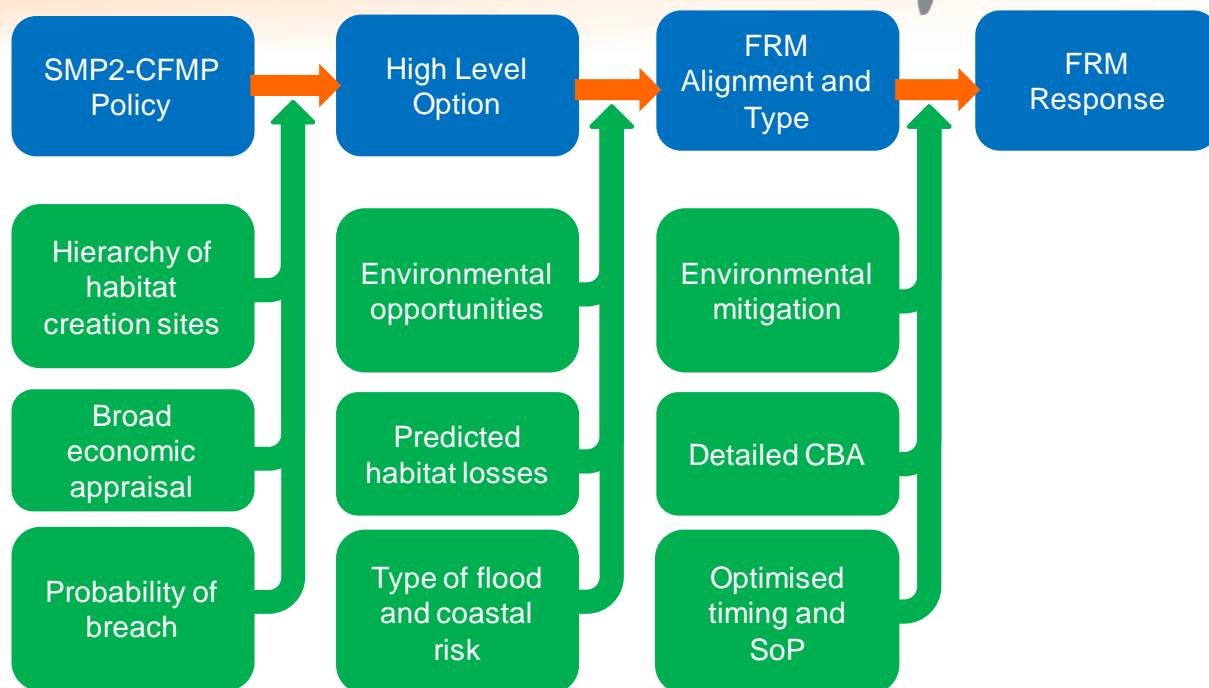


Figure 1-1 – Development from policy through to FRM response.

1.4 Scale of Assessment

Development and assessment of options has been carried out at a range of scales, described in Table 1.1. The estuary wide Natura 2000 site was the focus of the general consideration of site integrity. Flood cells, defined as strictly topographically separate areas, formed the basis of the consideration of environmental issues, flood risk management and socio-economic viability. Sub-reaches, defined by consistent asset type, geometry and exposure, formed the basis of the detailed assessment of options, specifically related to habitat creation and engineering. The various scales of assessment are shown in Appendix D.

Scale	Option stage	Assessment
Estuary wide	Habitat search	Consideration of integrity of Severn Estuary Natura 2000 designated site.
Flood cells	High Level Options	Consideration of environmental issues, flood risk management and socio-economic viability.
Sub reaches	Alignment and Types FRM Responses	Consideration of detailed technical issues related to habitat creation and engineering solutions.

Table 1.1 – Range of assessment scales.



1.5 Existing Policy

Shoreline Management Plan 2 (Defra, 2006) and Catchment Flood Management Plan (Environment Agency et al, 2004) guidance sets out policies focussed on management of the shoreline and flood risk respectively. Estuaries represent transitional regions where both shoreline and flood risk management is required, and consequently where SMP2 and CFMP policies may significantly overlap. The relevant management plans for the SEFRMS are:

- Severn Estuary SMP2 (Atkins, 2010).
- North Devon and Somerset SMP2 (Halcrow, 2010).
- Ogmore to Tawe CFMP.
- Taff and Ely CFMP.
- Eastern Valleys CFMP.
- Wye and Usk CFMP.
- Severn Tidal Tributaries CFMP.
- Bristol Avon CFMP.
- North and Mid Somerset CFMP.
- River Parrett CFMP.

The policy units and preferred policies for the relevant SMP2 and CFMPs were reviewed to assess their coherency. This assessment is provided in detail in Appendix E. In summary the CFMP policy units are much more spatially generic than for the SMP2s, however spatial mismatch is limited between CFMP and SMP2 policy units.



2. Technical Framework

2.1 Introduction

The development of options and their potential impacts on the estuary system were assessed via a wide range of analyses and associated tools. An overview of the technical framework is given in Figure 2-1, set within the context of the source-pathway-receptor approach. The analyses and tools are described in the subsequent sections, with further details in Atkins/ABPmer (2011).

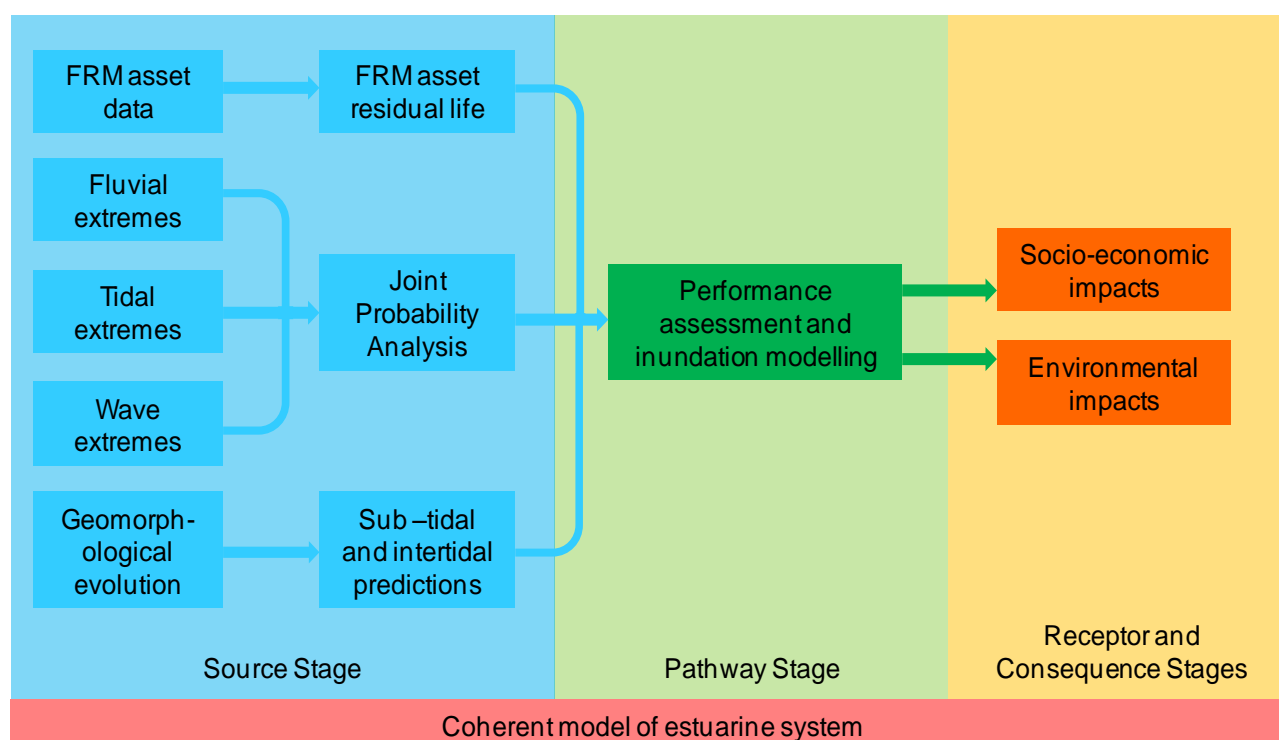


Figure 2-1 – Overview of technical framework.

2.2 Range of Assessments

The assessment techniques described in the subsequent sections were carried out for a wide range of parameters. All techniques were applied for 100% to 0.1% Annual Exceedance Probabilities (AEPs) where appropriate. This included all potential joint probability occurrences for wave, tidal and fluvial processes. The techniques were also applied for the time horizons of 2010, 2030, 2060 and 2110.

2.3 Geomorphology

Geomorphological evolution of the Severn Estuary was assessed via the CHaMP 1D-regime hybrid model, and studies within the Severn Estuary and North Devon and Somerset SMP2s (Atkins, 2011; Halcrow, 2011). Further details of the CHaMP model are given in ABPmer (2009). The SMP2s provided predictions of coastal erosion relating to recession of the coastline, whilst



the CHaMP provided information on the change in foreshore geometry, specifically relating to intertidal changes. These two datasets were used to inform flood risk caused by erosion.

The CHaMP model was run for the baseline scenario, to define habitat losses, and also with total realignment within the estuary, to assess the impact on water levels. The impact on water levels was found to be negligible. Geomorphological sensitivity of potential managed realignment sites was also identified in ABPmer (2009), indicating the level of modelling effort that may be required at scheme level.

2.4 Extreme Climate

The extreme climate in the Severn Estuary was assessed via a range of tools. MIKE21NSW and Delft3D (HISWA) software was used to define the extreme wave climate (both swell and wind) in the outer estuary. BS6349 was applied to define the more constrained extreme wave climate in the estuary upstream of the Severn Crossings. Delft3D was used to define EWLs in the outer estuary (downstream of the Severn Crossings), and related CHaMP modelling identified that the outer estuary EWLs would be insensitive to variations in the FRM asset position i.e. managed realignment.

For the upper estuary (upstream of the Severn Crossings), an Environment Agency 1D ISIS model was used to define EWLs, updated with tidal boundaries from Delft3D. The ISIS model was also used to assess the impact of managed realignment, where identified by the options development. Summary results from this modelling are provided in Appendix F.

2.5 Performance Assessment and Design

The FRM structures around the Severn Estuary experience wave, tidal and fluvial impacts depending on their location within the estuary. To assess the performance of the FRM assets and potential options, three critical datasets were required: hydrodynamic and geomorphological inputs, asset geometry, and asset condition and type.

The approach used to assess damage and breach to FRM assets within the Severn Estuary follows the general approach described by the Integrated Project FLOODsite (EC, 2007). Four principal sources of loading are considered:

- Water (fluvial or tidal) flowing over defences, i.e. weiring.
- Loading on defences from wave impact or overtopping.
- Failure related to direct erosion of the assets.
- Structural degradation of the assets.

The response to wave-tide overtopping was based on the guidance given in the EuroTOP manual (EU, 2007). The response to tidal-fluvial overtopping (weiring) is defined using the broad-crested weir equation (which is indirectly supported by guidance in the EuroTOP manual). Failure related to erosion was based on Severn Estuary and North Devon and Somerset SMP2 findings (capturing predecessor studies such as the Gwent Levels FMP) and the updated CHaMP model. Failure related to structural degradation was based on R&D project 'Assessment and measurement of asset deterioration including whole life costing' (Defra, 2009).

Conceptual designs of options were also developed, relating to:

- Primary, secondary and managed realignments



- Type of construction (e.g. earth embankment, rock armouring, revetment, wave recurve wall or other)
- Outline geometry (e.g. foreshore elevation, front slope angle, crest level and width, roughness and other)

Where necessary, other forms of option were assessed via design codes, existing field knowledge and engineering judgement.

2.6 Flood Risk Assessment

In the estuary upstream of the Severn Crossings, the ISIS model was re-run with potential managed realignments and improvements to assess their affect on EWLs, and the extent of flooding for over design events.

Assessment of flood risk downstream of the Severn Crossings was assessed via a range of tools. Physical appropriateness calculations and simple 1D ISIS models were used to check that over-design weiring and breach would result in total inundation to the occurring EWL. If this was found not to be the case (generally for the larger coastal floodplains), 2D TUFLOW models were developed and run to assess the extent of partial inundation. The summary results of the 2D inundation modelling are provided in Appendix F.

2.7 Environmental and Habitat Assessment

Environmental assessment was carried out as documented in Atkins (2011 and 2013). Assessment of environmental and habitat changes, impacts and opportunities, were drawn from the geomorphological and hydrodynamic work, specifically relating a) to the predicted future habitat extents, based on the hybrid 1D-regime CHaMP model; and b) functionality based on the predicted habitat extents, mapping and interpretation of WEBS data, wider literature review and expert judgement.

2.8 Socio-Economic and Carbon Assessment

2.8.1 Methodology for Estimating Damages and Benefits

The economic damage and benefit assessment was produced in accordance with HM Treasury Guidance, the FCERM-AG, the Flood Hazard Research Centre's Multi-Coloured Manual (2005) and the latest Defra guidance. Assets considered in the assessment where relevant included properties (residential and non-residential), agricultural land, transport links (roads and railways), caravan parks, receptors vulnerable to flooding, as well as strategic assets such as power transmission lines, stations and docks.

2.8.2 Methodology for Estimating Cost

Costs for options development were based on a range of appropriate data sources, and assessment via Atkins engineers and an Environment Agency cost consultant, The cost consultant had access to actual construction costs for FRM schemes from internal Environment Agency records, and the consolidated representative costs were reviewed by Atkins engineers for strategic appropriateness, in light of relevant datasets held in the following projects:

- Unit cost database (Environment Agency, 2007)



- Parrett Estuary FRM Strategy (Black and Veatch, 2009)
- Tidal Usk FRM Strategy (Halcrow, 2008).
- Slimbridge Managed Realignment Feasibility Study (Atkins, 2009)
- Avonmouth to Aust Tidal Defence Scheme (Atkins, 2006a).
- Steart Peninsula Managed Realignment (Halcrow, 2009).
- Tidal Severn FRM Strategy (Babtie Brown and Root, 2007).
- Clevedon to St. Thomas' Head Strategic Overview (Atkins, 2005).
- Rumney Great Wharf Flood Defence Scheme (Atkins, 2004).

Whole life costs were developed for options by applying the unit costs and relating these to the extent (width, length, type, number, etc), and applying a range of percentage uplifts to account for local context, optimism bias, as well as design, supervision and construction costs. The cost database and further details are given in Appendix G.

2.8.3 Carbon Assessment

The carbon assessment of options was carried out at the FRM Response stage, to inform a potential option if there were two closely matched options. This was carried out using the Atkins carbon calculator, which applies the same values as the Environment Agency carbon calculator spreadsheet.



3. Potential Habitat Opportunities

3.1 Methodology

The process to search for habitat opportunities in and adjacent to the Severn Estuary Natura 2000 designated site was undertaken in a phased manner, with each step adding additional criteria with the objective of identifying the best potential sites for habitat creation in the short (0 to 20 years), medium (20 to 50 years) and longer term (50 years +). This method was developed following a review of alternative approaches undertaken elsewhere in similar studies (see Appendix H), and is summarised in Figure 3-1.

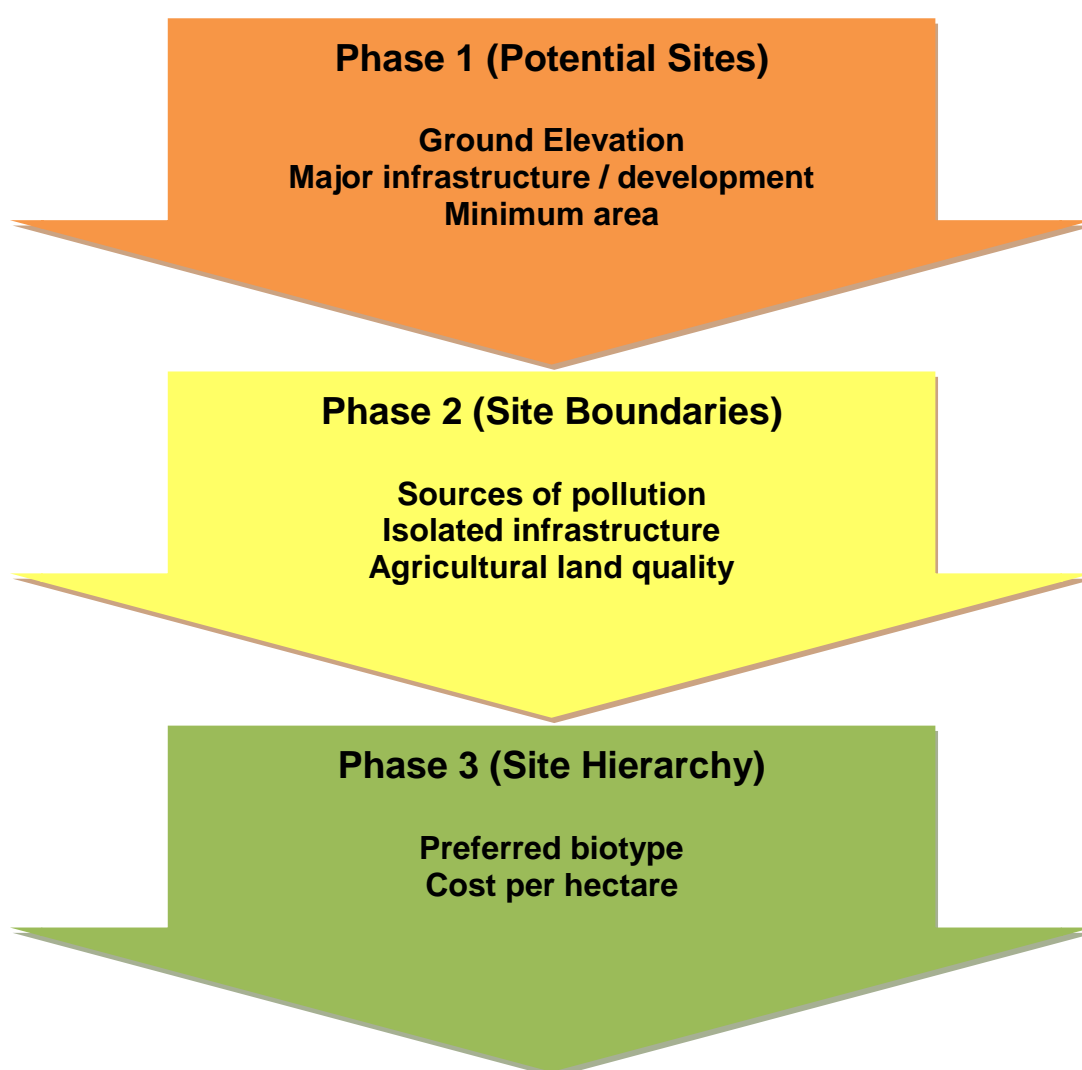


Figure 3-1 – Habitat search methodology.



3.2 Potential Sites

The study area was first screened against the following criteria:

- Elevation.
- The exclusion of major infrastructure, housing/ industry; and
- A minimum size of 5ha.

A digital elevation model of the study area was created using a combination of LiDAR, Nextmap and bathymetric data. The digital elevation model was divided into 20m x 20m grid cells to ensure a manageable dataset. Potential sites for habitat creation were considered to occur between the line of the existing geological constraints (approximately the upper limit of the existing intertidal) and the 10m contour line. The highest elevation at which tidal inundation currently occurs within the study area is approximately 7.3m. The 10m contour line was therefore considered a suitable upper limit for the potential search area.

While major infrastructure, housing/ industry were excluded from the potential site boundaries, minor dead end roads, pylons, scattered buildings and 1 or 2 housing units were included. Similarly railways were not excluded at this stage because it was thought that they could be raised and/or culverted during the design phase of a scheme. In addition contaminated land was not used to discount potential sites at this stage in the analysis. This process identified 57 unique sites equivalent to an area of approximately 13,300ha as shown in Figure 3-2.

A site characterisation process was then undertaken which identified the degree of overlap of each site with a range of environmental, social and economic criteria (see Appendix I). The parameters that were reviewed fell under the following generic headings:

- Topography;
- Habitat suitability;
- Nature conservation;
- Cultural heritage;
- Flood defences; and
- Land use and infrastructure.

A workshop was held with external conservation stakeholders to seek agreement on the methodology and gain provisional background information on each of the 57 sites.

3.3 Site Boundaries

A project team meeting was held on the 19 June 2008 to discuss the 57 sites identified and to add a further degree of refinement to the site boundaries. The primary datasets that were used to re-define these boundaries included:

- Contaminated land/landfills/sources of potential pollution;
- Aggregations of buildings;
- Pylons and cables that dissected the site (where additional constraints present);
- Isolated major infrastructure (including sluices, sewage treatment works);
- Agricultural land quality; and
- Railway lines.

The outcome of this process resulted in 51 potential sites of which a number were reduced in area, created through the subdivision of a site or excluded altogether (for no further consideration at this stage) based on the above criteria: and equated to an equivalent to a total area of approximately 7768ha. A database of comments and the rationale that accompanied the decision making process was maintained throughout this exercise to provide a complete audit trail.



3.4 Site Hierarchy

A third phase of screening was used to assign the sites into four broad categories:

- Long term sites – A
- Long term sites – B
- Short term sites – A
- Short terms sites – B

The sites were first assigned as long term where it was estimated that based on current elevations and water levels, they would support less than 10% of intertidal habitat. The remaining sites that did not meet this criteria were classed as short term. The sites were then further subdivided into A and B categories based on approximate cost per ha. The cost per ha was calculated based on a combination of an estimate of land value and the length and height of flood defence required to protect the surrounding area. The cost of the land within a site was estimated based on land use at the market values contained in Table 3.1.

Land Use	Cost per ha
Agricultural Grade 2	£20,000
Agricultural Grade 3, 4, and 5	£15,000
Golf Course	£50,000
Caravan Park	£200,000

Table 3.1 - Cost per ha of differing land uses.

The cost of the defence was calculated based on an assumed rate of £46 per m³. The required defence height was assumed to be 2.5 m above MHWS with a 4m crest width and slope footprint of 4m width on each side of the defence. Judgement was applied, where appropriate, if there was an obvious modification that could significantly reduce the requirement for a particularly expensive stretch of flood defence and the site boundary was modified accordingly. The sites were classified into Short Term A and B based on the then current benchmark for habitat creation schemes of £30k/ha. The long term sites were also assigned into A and B categories on the same basis. The resulting areas within each of the categories are summarised in Table 3.2 and shown in Figure 3-3. A workshop was held on the 30 September 2008 to capture the views of internal and external stakeholders on the categorisation of sites and their distribution around the estuary.

Category	No. of sites	Area (ha)
Short Term A	11	4217
Short Term B	21	3219
Long Term A	12	783
Long Term B	7	161

Table 3.2 - The number and area of potential hierarchical habitat creation sites.

3.5 Summary of Assessment

The above phased assessment indicates that the available spatial area for potential habitat creation is more than the expected losses, in relation to general intertidal habitat rather than specific biotypes. This enables the habitat search to be constrained within and adjacent to the Severn Estuary Natura 2000 designated site, rather than considering regional opportunities.

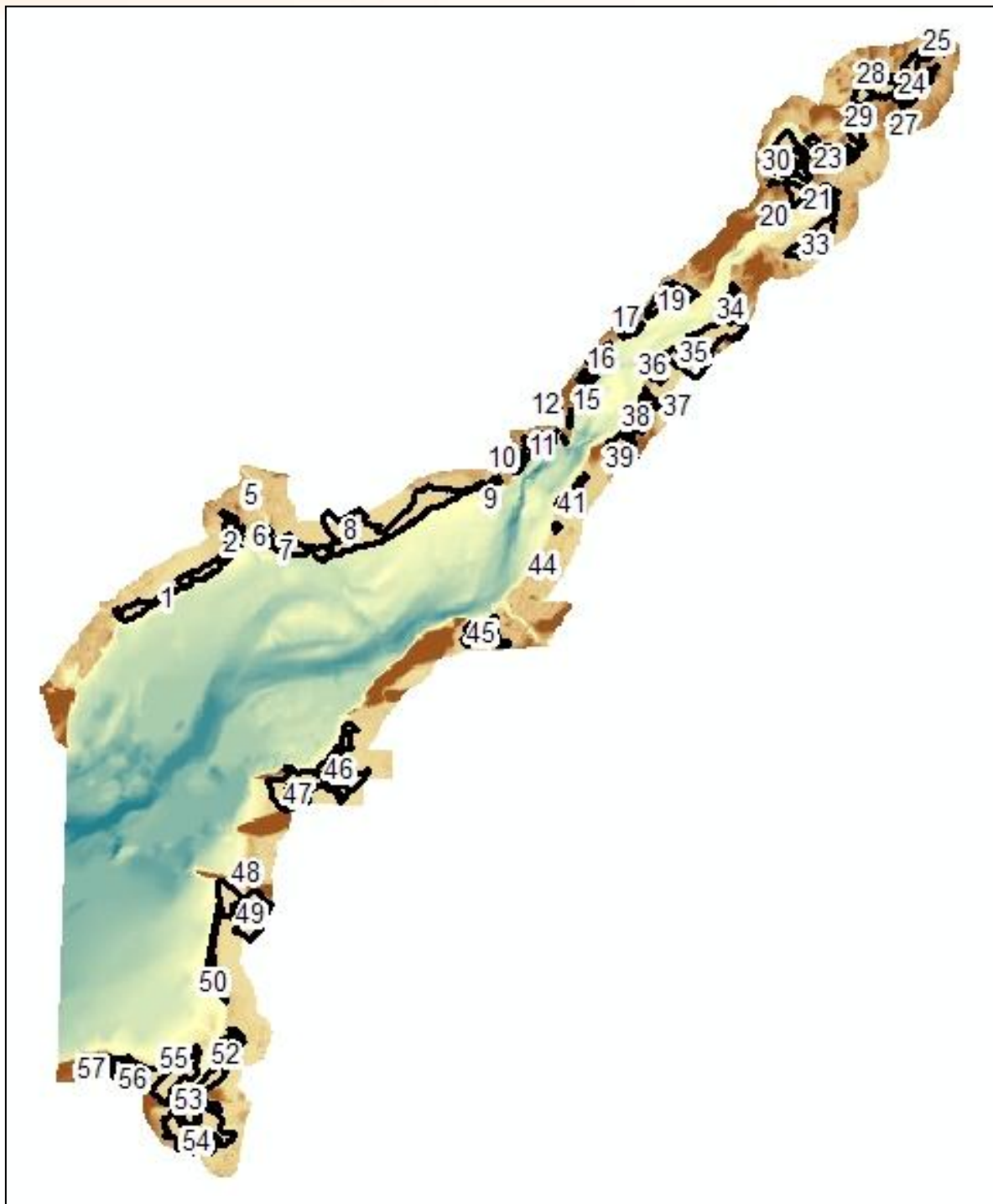


Figure 3-2 - Potential habitat creation sites identified.

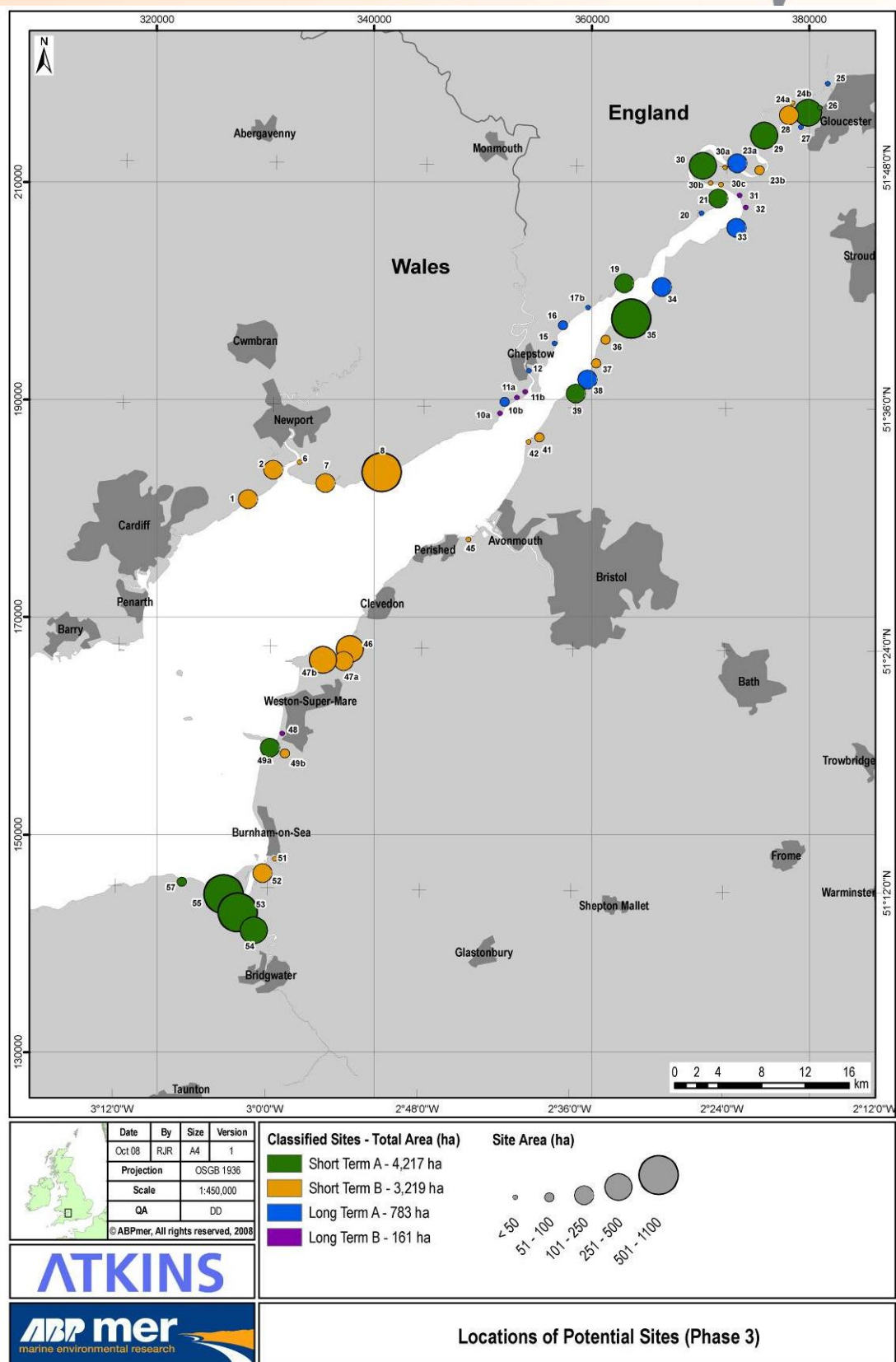


Figure 3-3 – Potential hierarchical habitat creations sites.



4. Potential High Level Options

4.1 Introduction

As flood risk (either from overtopping, weiring, inundation or failure from deterioration or coastal erosion) is a dominant issue within the Severn Estuary and a large proportion of the SEFRMS study area is covered by CFMPs, a system was developed to evaluate flood risk management approaches at a similar policy level to SMPs. As well as the standard analyses, a generic matrix was used to guide the assessment, given in Appendix C. This provided a clear translation from shoreline-focussed SMP2 policies to flood risk-focussed High Level Options.

4.2 Range of High Level Options

The range of High Level Options was defined as:

- No Active Intervention. This is similar to the SMP2 policy, and means that no further works would be carried out to manage flood risk, except relating to legal compliance such as public health and safety.
- Maintain FRM. This refers to proactive maintenance of assets would be carried out to manage flood risk, ensuring the asset structural integrity is maintained. This may require significant activity, such as toe protection, in the longer term due to climate change impacts.
- Sustain FRM. This refers to small scale improvements to FRM assets would be carried out to ensure the Standard of Protection remains consistent, and keeps pace with climate change. In detail, the actual SoP would exhibit a small-scale 'saw-tooth' pattern over time.
- Improve FRM. This refers to larger, capital scheme, improvements to FRM assets would be carried out (or new assets constructed). The Standard of Protection would be increased significantly, over and above climate change impacts, as a one-off intervention.
- Manage FRM. This refers to the wider range of non-structural measures that can be undertaken such as property resilience. It can also refer to flow control and storage methods, although these are less relevant to the study area. Managed realignment is a possibility within this option as well.

4.3 Methodology for Assessment of High Level Options

High Level Options were assessed at a flood cell level via:

- Policy context. This set the initial direction of FRM activity.
- Present day and future level of flood risk. This indicated whether and when (as regards epochs) there was any technical need to consider FRM improvements.
- Appropriateness for habitat creation. This indicated the general viability for habitat creation at each flood cell. Further to this, a habitat balance account was kept for the High Level Options stage, to ensure that at an estuary wide level the potential High Level Options complied with the requirement to compensate for predicted habitat losses. The potential habitat gains (from Manage FRM High Level Options) were defined basically at a site level, rather than any particular alignment.



- Environmental issues (including potential impacts on both the natural and human environment), covered in the SEA report (Atkins, 2011),
- Overall economic viability, based on the baseline damages (Atkins, 2013) and costs from the SMP2 (Atkins, 2010) and further internal review of costs.
- In addition to this, a log of key health and safety issues related to the flood cell and level of FRM activity was developed.

4.4 Summary of Assessment

A summary of the assessment of High Level Options is given in Table 4.1, Table 4.2, Table 4.3 and Table 4.4. Further detail is given in Appendix J. Again, for clarity the summary is split into flood cells in Wales, west bank of the Midlands region, east bank of the Midlands region, and the south west region. The habitat balance account is provided in Table 4.5. The SEA report (Atkins, 2011) and addendum (Atkins (2013) assessed the High Level Options and set out the options that provided maximum benefit to the human and natural environment. A comparison of the SEA and general options is given in Table 4.6. This shows that out of the 38 flood cells, 6 flood cells have SEA and general options that are not the same; this difference is largely driven by the fact that benefits to the human environment increase as the standard of protection increases, whereas impacts on the Natura 2000 sites are the same for both maintain and improve. As a consequence at these locations, the SEA recommended option is Improve, whereas the generally recommended option is Maintain or Sustain due to either socio-economic limitations, or lack of technical need to improve SoP.





LOCATION		FACTUAL CRITERIA					POLICY CONTEXT			SUMMARY ASSESSMENT OF HIGH LEVEL OPTIONS	POTENTIAL HIGH LEVEL OPTIONS		
Relevant placename	Strategic flood sub-cell	Salient environmental features at risk	Habitat Creation Potential	FRM performance (AEP)	Socio-economic viability	Potential sources of H&S risks	CFMP policies	SMP2 policies (0/20/50 years)	Previous strategic assessments		0 to 20 years	20 to 50 years	50 to 100 years
Penarth	FC1-P	Severn N2K sites. Pier listed	Very limited potential for habitat creation.	SoPs: 2-5% (2008), 10-20% (2028), 20-100% (2058), 100% (2108).	PVd of £0.2-0.4M, indicative HTL PVc of <1M, BCR>1.	Close proximity of residents/tourists to any FRM activity (transport, construction or degradation). Possible tidal working conditions for contractors.	Improve FRM (Ogmore and Tawe CFMP, 2007).	HTL/HTL/HTL	None.	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Active management of assets is constrained due to weak economic viability. SoP will reduce over time as sea levels and storminess increase, although flood risk will be limited to less than 10 properties. Historically minimal beach erosion indicates that the seawall integrity would not be critically endangered in the short term. Reactive maintenance could be undertaken to ensure public H&S and amenity value. Habitat assessment does not support Adaptation in any epoch. In light of this, in the short term potential High Level Option is Maintain FRM, moving to Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Sustain
Tremorfa	FC1-0	Severn N2K sites. Over 10 Listed Buildings. Several historic landfill sites.	Very limited potential for habitat creation.	SoPs: 0.1% (2008), 0.1-1% (2028), 0.1-100% (2058), 2-100% (2108).	PVd of £267-623M, indicative HTL PVc of £9M, BCR>5.	Close proximity of industry (steel works) and residents to any FRM activity (transport, construction or degradation). Possible tidal/mudflats working conditions for contractors.	Improve FRM (Taff Ely//Eastern Valleys CFMP PU1, 2007).	HTL/HTL/HTL	None.	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Significant industrial and commercial assets at risk and strong economic viability supports Sustain and Improve FRM. Very high SoP (>0.1% AEP) in the short to medium term does not support Sustain or Improve FRM. Habitat assessment does not support Adaptation in any epoch. In light of this, in the short to medium term the potential High Level Option is Maintain, with Sustain FRM in the long term.	Maintain	Maintain, Sustain	Sustain
Wentlooge Levels	FC1-1	Severn N2K sites. Levels are an Historic Landscape. Two SMs. Over 10 Listed Buildings. Several historic landfill sites and 1 existing landfill site.	Potential for 327Ha of habitat creation in the long term (sites 1 and 2).	SoPs: 2% (2008), 2-20% (2028), 10-100% (2058), 20-100% (2108).	PVd of £365-868M, indicative HTL PVc of £15M, BCR>5.	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible tidal/mudflats working conditions for contractors.	Maintain/Sustain FRM (Eastern Valleys CFMP PU6/7, 2007).	HTL/HTL/HTL	Embankment raising, foreshore management with polders and rock armouring (Gwent Levels FMP, 2004).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. A range of small communities, environmental aspects, critical infrastructure and strong economic viability support Sustain and Improve FRM. A relatively low existing SoP (2% AEP) supports Improve FRM in the short term. Habitat assessment could support Adaptation in the long term. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Improve	Sustain	Sustain, Adaptation
River Ebbw - River Usk	FC1-2	River Usk SAC. 30-50 Listed Buildings. Historic and existing landfills.	Very limited potential for habitat creation.	SoPs: 20% (2008), 20-100% (2028), 100% (2108).	PVd of £108-333M, indicative HTL PVc of £9M, BCR>5.	Close proximity of industry (docks) residents to any FRM activity (transport, construction or degradation). Difficult access in built up areas. Possible fluvial-tidal working conditions for contractors.	Improve FRM (Eastern Valleys CFMP, 2007).	HTL/HTL/HTL	Embankment raising, foreshore management with polders and rock armouring (Gwent Levels FMP, 2004). Maintain and improve defences (Tidal Usk FRM Strategy, 2008).	SESMP2 HTL policy limits options to Maintain, Sustain and Improve FRM. A range of small communities, environmental aspects, critical infrastructure and strong economic viability preclude NAI. A low existing SoP precludes Maintain or Sustain FRM in the short term. Habitat assessment precludes Adaptation in any epoch. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term.	Improve	Sustain	Sustain
Caldicot Levels	FC2-0	Severn N2K sites with terrestrial SSSI behind. Newport Wetlands NNR. Levels are an Historic Landscape. A few SMs. Historic and current landfill sites. Source protection zone.	Potential for 1130Ha of habitat creation in the long term (sites 7 and 8), although possibly 18Ha in the short term (site 6).	SoPs: 10% (2008), 10-100% (2028), 20-100% (2058), 100% (2108).	PVd of £947-1,556M, indicative HTL PVc of £37M, BCR>5.	Close proximity of industry (docks, power station) residents to any FRM activity (transport, construction or degradation). Overhead power lines present. Difficult access in built up areas. Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Wye and Usk CFMP, 2007).	HTL/HTL/HTL	Embankment raising, foreshore management with bank stabilisation and rock armouring (Gwent Levels FMP, 2004). Improve FRM (Caldicot Levels SDI, 2002).	SESMP2 HTL policy limits options to Maintain, Sustain and Improve FRM. A range of small communities, environmental aspects, critical infrastructure and strong economic viability preclude NAI. A relatively low existing SoP precludes Maintain or Sustain FRM in the short term. Habitat assessment precludes Adaptation until the long term. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Improve	Sustain	Sustain, Adaptation
Matherh	FC2-1	Severn N2K sites. Levels are an Historic Landscape. Cluster of Listed Buildings. Several current and historic landfill sites.	Potential for 132Ha of habitat creation in the long term (sites 10a-b, 11a-b, 12).	SoPs: 0.5% (2008), 0.5-2% (2028), 1-100% (2058), 5-100% (2108).	PVd of £3.5-12M, indicative HTL PVc of £5M, BCR>1.	Remote access in rural areas. Mainline railway present. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Wye and Usk CFMP, 2007).	HTL/HTL/HTL	Foreshore management with bank stabilisation and rock armouring. Sustain FRM (Caldicot Levels SDI, 2002).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. A range of small communities, environmental aspects, critical infrastructure and strong economic viability support Sustain, Improve FRM. The relatively high existing SoP (0.5% AEP) could still allow Sustain FRM in the short term. Habitat assessment precludes Adaptation until the long term. In light of this, the potential High Level Option is to Maintain or Sustain FRM in the short term, and then Sustain FRM over the medium and long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Maintain, Sustain	Sustain	Sustain, Adaptation

Key	Stronger reasons to consider criteria	Some reasons to consider criteria	Weaker reasons to consider criteria
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Table 4.1 – High Level Option assessment (Wales).



LOCATION		FACTUAL CRITERIA					POLICY CONTEXT			SUMMARY ASSESSMENT OF HIGH LEVEL OPTIONS	POTENTIAL HIGH LEVEL OPTIONS		
Relevant placename	Strategic flood sub-cell	Salient environmental features at risk	Habitat Creation Potential	FRM performance (AEP)	Socio-economic viability	Potential sources of H&S risks	CFMP policies	SMP2 policies (0/20/50 years)	Previous strategic assessments		0 to 20 years	20 to 50 years	50 to 100 years
Tidenham	FC3-1	Severn N2K sites. Some Grade 2 ag land, 2 Scheduled Monuments	Potential for 40Ha of habitat creation in the short term (sites 15 and 16).	Flooding partly constrained by high ground.	Railway line affected.	Remote access in rural areas. Mainline railway present. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI	Continue with current flood warning subject to funding (Tidal Severn FRM Strategy, 2006).	SESMP2 NAI policy focuses options to NAI and Adaptation. Assets at risk are limited to the railway line and the low economic viability does not support active management. The potential High Level Option is NAI or Adaptation in the short to long term.	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation
Stroat	FC3-2	Severn N2K sites. Broadstone and Roman Villa. Two Listed Buildings.	Potential for 61Ha of habitat creation in the short term (site 17b).	Flooding partly constrained by high ground.	Railway line affected.	Remote access in rural areas. Mainline railway present. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI		SESMP2 NAI policy focuses options to NAI and Adaptation. Assets at risk are limited to the railway line and the low economic viability does not support active management. The potential High Level Option is NAI or Adaptation in the short to long term.	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation
Lydney	FC3-3	Severn N2K sites. Lydney Cliff SSSI. Clusters of listed buildings. Some Grade 2 Ag Land, Historic landfill sites.	Potential for 200Ha of habitat creation in the long term (site 19).	SoPs: 0.1% (2008), 0.1-1% (2028), 0.1-100% (2058), 1-100% (2108).	PVd of £7-17M, indicative HTL PVc of £8M, indicative BCR<->1.	Remote access in rural areas although harbour and associated infrastructure is also present. Railway present. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/MR	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	SESMP2 policy focuses options to NAI, Maintain, Sustain, and Adaptation. Some commercial and residential assets at risk with marginal economic viability supports Maintain and Sustain FRM. High SoP in the short to medium term supports Maintain FRM. Habitat assessment supports Adaptation in the long term. In light of this, the potential High Level Option is Maintain in the short term, and Sustain in the medium to long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Maintain	Maintain, Sustain	Sustain, Adaptation
Purton	FC4-1	Severn N2K sites. Cluster of listed buildings & small historic landfill site not at risk of flooding.	Very limited potential for habitat creation.	Very constrained flood risk.	Railway line affected.	Remote access in rural areas. Railway present. Possible tidal/mudflats working conditions for contractors.	Maintain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI		SESMP2 NAI policy focuses options to NAI and Adaptation. Limited flood risk and assets at risk give poor economic viability, supporting NAI. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is NAI.	NAI	NAI	NAI
Awre	FC4-3	Severn N2K sites. PROWs	Potential for 153Ha of habitat creation in the short term (site 21).	SoPs: 20% AEP (2008), 100% AEP (2028 to 2108).	PVd of <£1M, indicative HTL PVc of £4M, BCR<->1.	Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	MR/HTL/HTL	Continue with current flood warning subject to funding (Tidal Severn FRM Strategy, 2006).	SESMP2 policy focuses options to NAI and Adaptation. Limited flood risk and assets at risk give poor economic viability, supporting Adaptation. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is Adaptation.	Adaptation	Adaptation	Adaptation
Bullo	FC4-4	4 listed buildings.	Very limited potential for habitat creation.	Very constrained flood risk.	PVd of <£1M, indicative HTL PVc of £1M, BCR<->1.	Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI		SESMP2 NAI policy focuses options to NAI and Adaptation. Limited flood risk and assets at risk give poor economic viability, supporting NAI. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is NAI.	NAI	NAI	NAI
Ruddle	FC4-5	3 listed buildings.	Very limited potential for habitat creation.	Very constrained flood risk.	PVd of <£1M, indicative HTL PVc of £1M, BCR<->1.	Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI		SESMP2 NAI policy focuses options to NAI and Adaptation. Limited flood risk and assets at risk give poor economic viability, supporting NAI. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is NAI.	NAI	NAI	NAI
Newnham-on-Severn	FC4-6	2 or 3 listed buildings present	Very limited potential for habitat creation.	SoPs: 5% (2008), 5-10% (2028), 10-20% (2058), 20-100% (2108).	PVd of £2.3-9M, indicative HTL PVc of £3M, BCR<->1.	Close proximity of residents to any FRM activity (transport, construction or degradation). Possible tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Maintain current line of defence to existing standard of protection (Tidal Severn FRM Strategy, 2006).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Flood risk to the town of Newnham gives economic viability, supporting Maintain and Sustain FRM. The relatively high existing SoP could still support Sustain FRM in the medium to long term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is to Maintain FRM in the short term, Maintain/Sustain FRM in the medium term, and then Sustain FRM in the long term.	Maintain	Maintain, Sustain	Sustain
Westbury-on-Severn and Rodley	FC4-7	Approximately 90 listed buildings, PROWs, Westbury House and Gardens.	Potential for 173Ha of habitat creation in the medium to long term (sites 23a-b).	SoPs: 5% (2008), 5-10% (2028), 10-20% (2058), 20-100% (2108).	PVd of £6.3-27M, indicative HTL PVc of £6M, BCR<->1.	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL		SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. A range of small communities give economic viability, supporting Maintain, Sustain and Improve FRM. The low existing SoP supports Improve FRM from the short term onwards. Habitat assessment supports Adaptation from the medium term onwards. In light of this, the potential High Level Option is Improve or Sustain FRM in the short to long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Improve, Sustain	Sustain	Sustain
Wallmore Common	FC4-8	Walmore Common SPA, Ramsar, NNR and SSSI. Approximately 20 listed buildings.	Very limited potential for habitat creation.	SoPs: 0.5% (2008), 1-2% (2028), 2-10% (2058), 10-100% (2108).	PVd of £7.4-10M, indicative HTL PVc of £1M, BCR<->5.	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give strong economic viability, supporting Sustain or Improve FRM. The high existing SoP supports Maintain FRM in the short term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is Maintain FRM in the short term, and Sustain FRM in the medium to long term.	Maintain	Sustain	Sustain
Minsterworth	FC4-9	Few listed buildings, PROWs inc Gloucestershire Way.	Very limited potential for habitat creation.	SoPs: 0.1% AEP (2008 and 2108)	PVd of £2.4-15M, indicative HTL PVc of £2M, BCR<->1.	Rural access for any FRM activity (transport, construction or degradation). Possible fluvial-tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL		SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give marginal economic viability, supporting Maintain or Sustain FRM. The high existing SoP supports Maintain FRM in the short term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is Maintain FRM in the short term, and Maintain/Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Maintain, Sustain
Minsterworth Ham	FC4-10	About 10 listed buildings.PROWs inc Gloucestershire Way	Potential for 349Ha of habitat creation in the short to long term (site 24a-b).	SoPs: 5% AEP (2008), 5-100% (2028), 100% (2058 and 2108).	PVd of £6.6-13M, indicative HTL PVc of £11M, BCR<->1.	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible fluvial-tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	MR/HTL/HTL	Construct new line of defence (Tidal Severn FRM Strategy, 2006).	SESMP2 policy focuses options to NAI and Adaptation. Very limited assets at risk give poor economic viability, supporting NAI or Adaptation. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is Adaptation.	Adaptation	Adaptation	Adaptation

Key	Stronger reasons to consider criteria	Some reasons to consider criteria	Weaker reasons to consider criteria
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Table 4.2 – High Level Option assessment (Midlands west bank).



LOCATION		FACTUAL CRITERIA					POLICY CONTEXT			SUMMARY ASSESSMENT OF HIGH LEVEL OPTIONS	POTENTIAL HIGH LEVEL OPTIONS		
Relevant placename	Strategic flood sub-cell	Salient environmental features at risk	Habitat Creation Potential	FRM performance (AEP)	Socio-economic viability	Potential sources of H&S risks	CFMP policies	SMP2 policies (0/20/50 years)	Previous strategic assessments		0 to 20 years	20 to 50 years	50 to 100 years
The Rea	FC5-3	Approximately 10 Listed Buildings and 2 SMs (not at risk) . Gloucester Refuse tip.	Potential for 39Ha of habitat creation in the short term (site 26).	SoPs: 0.1% AEP (2008), 0.1-2% (2028), 1-20% (2058), 5-100% (2108).	PVd of £2.2-6.6M, indicative HTL PVc of £3M, BCR->1.	Proximity of local communities to any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible fluvial-tidal conditions for contractors.	Reduce FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Raise defences to optimum standard of protection based on current guidance (Tidal Severn FRM Strategy, 2006).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. There is moderate economic viability, supporting Maintain or Sustain FRM. The relatively high existing SoP could still support Sustain FRM in the medium to long term. If habitat losses require, Adaptation could be considered in the medium to long term. In light of this, the potential High Level Option is to Maintain FRM in the short term, Maintain/Sustain FRM in the medium term, and then Sustain FRM in the long term.	Maintain	Maintain, Sustain	Sustain
Stonebench	FC5-4		Potential for 10Ha of habitat creation in the long term (site 27).	SoPs: 0.5% AEP (2008), 0.5-2% (2028), 1-100% (2058), 2-100% (2108).	PVd of £0.1-1.2M, indicative HTL PVc of £2M, BCR<1.	Proximity of local communities to any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible fluvial-tidal conditions for contractors.	Reduce FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. The weak economic viability and relatively high existing SoP supports Maintain and Sustain FRM. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is to Maintain FRM in the short term, moving to Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Sustain
Elmore Back	FC5-5	Approximately 40 listed buildings. Severn Valley Way	Potential for 156Ha of habitat creation in the medium to long term (site 28).	SoPs: 2% AEP (2008), 2-10% AEP (2028), 10-20% (2058), 20-100% (2108).	PVd of £4.6-7.6M, indicative HTL PVc of £7M, BCR<-1.	Close proximity of residents to any FRM activity (transport, construction or degradation). Remote access in more rural areas. Overhead power lines present. Possible fluvial-tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/MR/MR	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	SESMP2 policy focuses options to NAI and Adaptation. Limited assets at flood risk give weak economic viability, supporting NAI or Adaptation. Habitat assessment supports Adaptation in the medium to long term. In light of this, in the short term the potential High Level Option is Maintain FRM, moving to Adaptation in the medium to long term.	Maintain	Maintain, Adaptation	Adaptation
Longney	FC5-6	Approximately 30 listed buildings. Severn Valley Way	Potential for 352Ha of habitat creation in the long term (site 29).	SoPs: 0.1% (2008 to 2028), 0.1-1% (2058), 1-100% (2108).	PVd of £3.7-11.6M, indicative PVc of £4M, BCR->1.	Close proximity of residents to any FRM activity (transport, construction or degradation). Remote access in more rural areas. Overhead power lines present. Possible fluvial-tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/MR/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	SESMP2 policy focuses options to NAI or Adaptation. However, assets at flood risk give moderate economic viability, supporting Maintain or Sustain FRM. Habitat assessment supports Adaptation in the medium to long term. In light of this, in the short term the potential High Level Option is Maintain and Sustain FRM. If climate change reaches the upper end or greater scenario, then Adaptation may be required in the long term.	Maintain	Maintain, Sustain	Sustain, Adaptation
Upper Framilode	FC5-7	Severn N2K sites. Severn Valley Way, small clusters of listed buildings.	Potential for 18Ha of habitat creation in the long term (sites 31 and 32).	SoPs: 1% (2008), 1-2% (2028), 2-20% (2058), 20-100% (2108).	PVd of £70-92M, indicative HTL PVc of £4M, BCR>5.	Close proximity of residents to any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Raise defences to optimum standard of protection based on current guidance (Tidal Severn FRM Strategy, 2006).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Small communities, critical infrastructure and strong economic viability support Maintain, Sustain or Improve FRM. A relatively low existing SoP supports Sustain or Improve FRM in the short term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is to Sustain or Improve FRM in the short term, and then Sustain FRM over the medium and long term.	Sustain, Improve	Sustain	Sustain
Arlingham	FC5-8	Severn N2K sites. Approximately 30 listed buildings. Small historic landfill site at Arlingham.	Potential for 409Ha of habitat creation in the medium to long term (site 30 and 30a-b-c).	SoPs: 0.1% (2008 to 2028), 0.1-1% (2058), 2-100% (2108).	PVd of £16-24M, indicative HTL PVC of £8M, BCR>1.	Proximity of local communities to any FRM activity (transport, construction or degradation). Limited access routes. Overhead power lines are present. Possible fluvial-tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/MR	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	SESMP2 policy focuses options to NAI and Adaptation. However, assets at flood risk give moderate economic viability, supporting Maintain or Sustain FRM. Habitat assessment supports Adaptation in the medium to long term. In light of this, in the short term the potential High Level Option is Maintain and Sustain FRM. If climate change reaches the upper end or greater scenario, then Adaptation may be required in the long term.	Maintain	Maintain, Sustain	Sustain, Adaptation
Slimbridge	FC5-9	Severn N2K sites. Severn Estuary SSSI, Purton Passage SSSI, Frampton Pools SSSI. Historic Garden and Park at Frampton.Approximately 100 listed buildings. 2 SMs at Wansfield Court. Three landfill sites.	Potential for 187Ha of habitat creation in the short term (site 33).	SoPs: 0.1% (2008 to 2028), 0.1-1% (2058), 1-100% (2108).	PVd of £8-42M, indicative HTL PVc of £6M, BCR>1.	Remote access in rural areas. Possible fluvial-tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	MR/HTL/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	SESMP2 policy focuses options to NAI and Adaptation. However, assets at flood risk give moderate economic viability, supporting Maintain or Sustain FRM. Habitat assessment supports Adaptation in the medium to long term. In light of this, in the short term the potential High Level Option is Maintain and Sustain FRM. If climate change reaches the upper end or greater scenario, then Adaptation may be required in the long term.	Maintain	Maintain, Sustain	Sustain, Adaptation

Key	Stronger reasons to consider criteria	Some reasons to consider criteria	Weaker reasons to consider criteria
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Table 4.3 – High Level Option assessment (Midlands east bank).



LOCATION		FACTUAL CRITERIA					POLICY CONTEXT			SUMMARY ASSESSMENT OF HIGH LEVEL OPTIONS	POTENTIAL HIGH LEVEL OPTIONS		
Relevant placename	Strategic flood sub-cell	Salient environmental features at risk	Habitat Creation Potential	FRM performance (AEP)	Socio-economic viability	Potential sources of H&S risks	CFMP policies	SMP2 policies (0/20/50 years)	Previous strategic assessments		0 to 20 years	20 to 50 years	50 to 100 years
Berkeley	FC6-1	Severn N2K sites. Berkeley Castle Historic Park and Garden. Approximately 140 listed buildings.	Potential for 118Ha of habitat creation in the short term (site 34).	SoPs: 0.5% (2008), 0.5-5% (2028), 1-100% (2058), 5-100% (2108).	PVd of £4.6-9.3M, indicative HTL PVc of £2M, BCR>1.	Remote access and working in more rural areas. Nuclear Power Station and overhead powerlines. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Raise defences to optimum standard of protection based on current guidance (Tidal Severn FRMS, 2006).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give moderate economic viability, supporting Maintain or Sustain FRM. The high existing SoP supports Maintain FRM in the short term. If habitat losses require, the habitat assessment supports Adaptation in any epoch. In light of this, the potential High Level Option is Maintain FRM in the short term, and Maintain/Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Sustain
Shepperdine	FC6-2	Severn N2K sites. Severn Estuary SSSI. Clusters of Listed Buildings. 1 SM (hill fort). Oldbury on Severn Power Station contaminated land.	Potential for 691Ha of habitat creation in the medium to long term (sites 35, 36 and 37).	SoPs: 10% AEP (2008), 10-20% (2028), 10-100% (2058), 20-100% (2108).	PVd of £25-58M, indicative HTL PVc of £9M, BCR>1-5.	Remote access and working in more rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRMS, 2006).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give moderate economic viability, supporting Maintain or Sustain FRM. The relatively low existing SoP supports Sustain or Improve FRM in the short term. If habitat losses require, the habitat assessment supports Adaptation in any epoch. In light of this, the potential High Level Option is Sustain/Improve FRM in the short term, and Maintain/Sustain FRM in the medium to long term.	Sustain, Improve	Sustain	Sustain
Littleton-upon-Severn	FC6-3	Severn N2K sites. Two SSSIs. Approximately 150 listed buildings. Approximately 10 SMs. Three historic and one existing landfill sites.	Potential for 203Ha of habitat creation in the short term (site 39) and 146Ha in the long term (site 38).	SoPs: 0.1% (2008), 0.1-2% (2028), 0.5-100% (2058), 2-100% (2108).	PVd of £8-14M, indicative HTL PVc of £4M, BCR>1.	Remote access and working in more rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Raise defences to optimum standard of protection based on current guidance (Tidal Severn FRMS, 2006).	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give moderate economic viability, supporting Maintain or Sustain FRM. The high existing SoP supports Maintain FRM in the short term. If habitat losses require, the habitat assessment supports Adaptation in any epoch. In light of this, the potential High Level Option is Maintain FRM in the short term, and Maintain/Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Maintain, Sustain
Avonmouth to Aust	FC7-0	Severn N2K sites. Two SSSIs. Clusters of Listed Buildings. Two SMs. Approximately 10 historic and 6 existing landfill sites.	Potential for 81Ha of habitat creation in the long term (site 41).	SoPs: 0.5% (2008), 1-5% (2028), 2-20% (2058), 20-100% (2108).	PVd of £493-913M, indicative HTL PVc of £13M, BCR>5.	Close proximity of industry and residents to any FRM activity (transport, construction or degradation). Significant range of overhead and underground services, particularly in the south.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL		SESMP2 HTL policy limits options to Maintain, Sustain and Improve FRM. A range of communities, environmental aspects, critical infrastructure and strong economic viability supports Sustain or Improve FRM. A relatively low existing SoP supports Improve FRM in the short term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term.	Improve	Sustain	Sustain
Portbury	FC8-0	Severn N2K sites. Gordano Valley NNR. 11 SSSIs. Approximately 35 listed buildings.	Potential for 9Ha of habitat creation in the medium term (site 45).	SoPs: 0.1% AEP (2008 to 2058), 0.1-5% (2108).	PVd of £11-296M, indicative HTL PVc of £6M, BCR>5.	Remote access and working in more rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	None.	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Significant industrial and commercial assets at risk and strong economic viability support Sustain and Improve FRM. Very high SoP in the short to medium term supports Maintain FRM. Habitat assessment does not support Adaptation in any epoch. In light of this, in the short to medium term the potential High Level Option is Maintain, with Sustain FRM in the long term.	Maintain	Maintain	Maintain
Woodhill	FC8-1	Severn N2K sites.	Very limited potential for habitat creation.	SoPs: 0.1% AEP (2008), 0.5-20% (2028), 0.1-5% AEP (2058 to 2108).	Non-critical road, and park affected.	Remote access and working in more rural areas. Possible tidal/mudflats working conditions for contractors.	None.	NAI/NAI/NAI	None.	SESMP2 NAI policy limits options to NAI and Adaptation. Limited assets at flood risk give poor economic viability, supporting NAI. Habitat assessment does not support Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is NAI.	NAI	NAI	NAI
Clevedon to Weston-Super-Mare	FC9-0	Severn N2K sites.Two cSACs. Many SSSIs. Mendips AONB. Approximately 150 listed buildings. Two small landfill sites. Three Source Protection Zones.	Potential for 865Ha of habitat creation in the medium term (sites 46, 47a-b).	SoPs: 5% (2008), 5-20% (2028), 10-100% (2058), 100% (2108).	PVd of £1,910-5,223M, indicative HTL PVc of £42M, BCR>5.	Close proximity of residents in urban frontages, with remote access in rural locations, for any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working	None.	MR/MR/MR	None.	SE/NDASSMP2 policy does not limit FRM options at a flood cell scale. A range of communities, environmental aspects, critical infrastructure and strong economic viability support Sustain and Improve FRM. A relatively low existing SoP supports Improve FRM in the short term. Habitat assessment supports Adaptation in any epoch. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term. If climate change reaches the upper end scenario, Adaptation may be required in the long term	Improve	Sustain	Sustain, Adaptation
Brean to Burnham-on-Sea	FC10-0	Severn N2K sites. Three SSSIs. Bridgwater Bay NNR. Over 20 listed buildings. Three SMs.	Potential for 235Ha of habitat creation in the long term (site 49a).	SoPs: 0.1% (2008), 0.1-1% (2028), 0.5-10% (2058), 20-100% (2108).	PVd of £944-2,163M, indicative HTL PVc of £36M, BCR>5.	Close proximity of residents in urban frontages, with remote access in rural locations, for any FRM activity (transport, construction or degradation). Overhead power lines present.	None.	HTL/MR/MR	None.	NDASSMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. A range of communities, environmental aspects, critical infrastructure and strong economic viability supports Sustain or Improve FRM. A high existing SoP supports Maintain or Sustain in the short term. Habitat assessment supports Adaptation in the long term. In light of this, the potential High Level Option is to Sustain FRM through all epochs, with the option for Adaptation in the medium to long term.	Maintain, Sustain	Sustain, Adaptation	Sustain, Adaptation
Huntspill	FC10-1	Severn N2K sites. Huntspill River NNR, Bridgwater Bay SSSI. Over 10 Listed Buildings. One SM.	Potential for 200Ha of habitat creation in the long term (site 52).	SoPs: 0.1% (2008), 0.1-0.5% (2028), 0.1-20% (2058), 1-100% (2108).	PVd of £21-66M, indicative HTL PVc of £8M, BCR>1.	Remote access and working in more rural areas. Drogue and UXOs could be present. Possible tidal/mudflats working conditions for contractors.	None.	HTL/HTL/MR	Hold the Line by re-engineering and improving banks, Managed Realignment in the medium to long term (PEFRMS, 2009).	NDASSMP2 HTL/MR policy focuses options to Maintain, Sustain, Improve and Adaptation. A range of communities, environmental aspects, critical infrastructure and strong economic viability support Sustain or Improve FRM. A high existing SoP supports Maintain FRM in the short to medium term. Habitat assessment precludes Adaptation until the long term. In light of this, the potential High Level Option is to Maintain FRM through all epochs, with the option for Adaptation in the long term.	Maintain	Maintain	Sustain, Adaptation
Pawlett	FC10-2	Severn N2K sites. Bridgwater Bay NNR. Two Listed Buildings in Pawlett. One SM.	Potential for 593Ha of habitat creation in the medium term (site 53).	SoPs: 1% (2008), 2-10% (2028), 2-100% (2058), 10-100% (2108).	PVd of £20-51M, indicative HTL PVc of £18M, BCR>1.	Remote access and working in more rural areas. Drogue and UXOs could be present. Possible tidal/mudflats working conditions for contractors.	None.	HTL/MR/MR		NDASSMP2 policy does not limit options at a flood cell scale. A range of communities, environmental aspects, critical infrastructure and strong economic viability supports Maintain, Sustain or Improve FRM. A high existing SoP supports Maintain FRM in the short term. Habitat assessment supports Adaptation in the medium to long term. In light of this, the potential High Level Option is to Maintain and Sustain FRM in the short to medium term, then Adaptation in the long term.	Maintain	Sustain	Sustain, Adaptation
Stear Peninsula	FC11-0	Severn N2K sites. Bridgwater Bay NNR. Approximately 10 Listed Buildings. Six SMs.	Potential for 77Ha of habitat creation in the short to medium term (site 57 and Steart	SoPs: 10% (2008), 10-20% (2028), 20-100% (2058 to 2108).	PVd of £9-25M, indicative HTL PVc of £20M, BCR<-1.	Remote access and working in more rural areas. Drogue and UXOs could be present. Possible tidal/mudflats working conditions	None.	MR/MR/MR	None.	NDASSMP2 policy does not limit options at a flood cell scale. Limited assets at risk give weak economic viability, precluding Sustain or Improve FRM. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is Adaptation.	Adaptation	Adaptation	Adaptation

Key	Stronger reasons to consider criteria	Some reasons to consider criteria	Weaker reasons to consider criteria
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Table 4.4 – High Level Option assessment (South West).



LOCATION			POLICY CONTEXT	POTENTIAL CUMULATIVE INTERTIDAL CREATION (Ha)		
Relevant placename	Strategic flood sub-cell	SMP2 policy unit	SMP2 policies (0, 20, 50 years)	Short Term	Medium Term	Long Term
Penarth	FC1-P	PEN2	HTL/HTL/HTL			
Tremorfa	FC1-0	CAR2	HTL/HTL/HTL			
Wentlooge Levels	FC1-1	CAR3, WEN1, WEN2	HTL/HTL/HTL			
River Ebbw - River Usk	FC1-2	NEW1, NEW2	HTL/HTL/HTL			
Caldicot Levels	FC2-0	NEW4, NEW5, CALD1	HTL/HTL/HTL			
Mathern	FC2-1	CALD3	HTL/HTL/HTL			
Tidenham+	FC3-1	TID1	NAI/NAI/NAI	30	30	30
Stroat+	FC3-2		NAI/NAI/NAI	65	65	65
Lydney	FC3-3	TID2	HTL/HTL/MR			
Purton	FC4-1	GLO1	NAI/NAI/NAI			
Awre	FC4-3	GLO2	MR/HTL/HTL	183	183	183
Bullo	FC4-4	GLO3	NAI/NAI/NAI			
Ruddle	FC4-5		NAI/NAI/NAI			
Newnham-on-Severn	FC4-6	GLO4	HTL/HTL/HTL			
Westbury-on-Severn and Wallmore Common	FC4-7	GLO5	HTL/HTL/HTL			
	FC4-8	GLO7	HTL/HTL/HTL			
Minsterworth	FC4-9	GLO8	HTL/HTL/HTL			
Minsterworth Ham*	FC4-10	MAI1	MR/HTL/HTL			349
River Leadon	FC4-11	MAI2	NAI/NAI/NAI			
The Rea	FC5-3	MAI6	HTL/HTL/HTL			
Stonebench	FC5-4	SHAR1	HTL/HTL/HTL			
Elmore Back	FC5-5		HTL/MR/MR		324	324
Longney	FC5-6	SHAR2	HTL/MR/HTL			
Upper Framilode	FC5-7	SHAR3, SHAR5	HTL/HTL/HTL			
Arlingham	FC5-8	SHAR4	HTL/HTL/MR			
Slimbridge	FC5-9	SHAR7	MR/HTL/HTL			
Berkeley	FC6-1	SEV1	HTL/HTL/HTL			
Shepperdine	FC6-2	SEV2, SEV3, SEV4	HTL/HTL/HTL			
Littleton-upon-Severn	FC6-3	SEV5	HTL/HTL/HTL			
Avonmouth to Aust	FC7-0	BRIS1, BRIS2, BRIS3	HTL/HTL/HTL			
Portbury	FC8-0	BRIS6	HTL/HTL/HTL			
Woodhill	FC8-1	PORT2	NAI/NAI/NAI			
Clevedon to Weston-	FC9-0	PORT4, KIN1, KIN3	MR/MR/MR	11	11	11
Brean to Burnham-on-Sea	FC10-0	7d43-46, 7e01-06	HTL/MR/MR			381
Huntspill	FC10-1	7d42	HTL/HTL/MR			
Pawlett	FC10-2		HTL/HTL/MR			388
Stear Peninsula	FC11-0	7d32-37	MR/MR/MR	238	398	398
PREDICTED INTERTIDAL HABITAT CREATION (HECTARES)				527	1011	2129
PREDICTED INTERTIDAL HABITAT LOSS (ALL FCRM CAUSE, HECTARES)				-427	-815	-1580
PREDICTED INTERTIDAL HABITAT BALANCE (HECTARES)				100	196	549

+ At Tidenham, Stroat and Awre, it is possible that adaptation would consist of no further maintenance to the existing defences, rather than active creation of habitat.

* It is assumed that if adaptation occurs at Minsterworth Ham in the short term, salinity limitations would result in freshwater rather than intertidal habitats, until the long term when sea level rise would increase up-estuary salinity.

Table 4.5 – Habitat balance account at High Level Option stage.



LOCATION			POTENTIAL HIGH LEVEL OPTIONS			
Relevant placename	Strategic flood sub-	SMP2 policy unit	SEA and addendum preferred	0 to 20 years	20 to 50 years	50 to 100 years
<i>Penarth</i>	<i>FC1-P</i>	<i>PEN2</i>	<i>Improve</i>	<i>Maintain</i>	<i>Maintain, Sustain</i>	<i>Sustain</i>
<i>Tremorfa</i>	<i>FC1-0</i>	<i>CAR2</i>	<i>Improve</i>	<i>Maintain</i>	<i>Maintain, Sustain</i>	<i>Sustain</i>
Wentlooge Levels	FC1-1	CAR3, WEN1, WEN2	Improve	Improve	Sustain	Sustain, Adaptation
River Ebbw - River Usk	FC1-2	NEW1, NEW2	Improve	Improve	Sustain	Sustain, Adaptation
Caldicot Levels	FC2-0	NEW4, NEW5, CALD1	Improve	Improve	Sustain	Sustain, Adaptation
<i>Mathern</i>	<i>FC2-1</i>	<i>CALD3</i>	<i>Improve</i>	<i>Maintain, Sustain</i>	<i>Sustain</i>	<i>Sustain, Adaptation</i>
Tidenham	FC3-1	TID1	NAI	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation
Stroat	FC3-2		NAI	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation
Lydney	FC3-3	TID2	Maintain, Adaptation	Maintain	Maintain, Sustain	Sustain, Adaptation
Purton	FC4-1	GLO1	NAI	NAI	NAI	NAI
Awre	FC4-3	GLO2	Adaptation	Adaptation	Adaptation	Adaptation
Bullo	FC4-4	GLO3	NAI	NAI	NAI	NAI
Ruddle	FC4-5		NAI	NAI	NAI	NAI
<i>Newnham-on-Severn</i>	<i>FC4-6</i>	<i>GLO4</i>	<i>Improve</i>	<i>Maintain</i>	<i>Maintain, Sustain</i>	<i>Sustain</i>
Westbury-on-Severn and Rodley	FC4-7	GLO5	Improve	Improve, Sustain	Sustain	Sustain
<i>Wallmore Common</i>	<i>FC4-8</i>	<i>GLO7</i>	<i>Improve</i>	<i>Maintain</i>	<i>Sustain</i>	<i>Sustain</i>
Minsterworth	FC4-9	GLO8	Maintain	Maintain	Maintain, Sustain	Maintain, Sustain
Minsterworth Ham	FC4-10	MAI1	Adaptation then Sustain	Adaptation	Adaptation	Adaptation
River Leadon	FC4-11	MAI2	NAI	NAI	NAI	NAI
The Rea	FC5-3	MAI6	Maintain	Maintain	Maintain, Sustain	Sustain
<i>Stonebench</i>	<i>FC5-4</i>	SHAR1	<i>Improve</i>	<i>Maintain</i>	<i>Maintain, Sustain</i>	<i>Sustain</i>
Elmore Back	FC5-5		Adaptation	Maintain	Maintain, Adaptation	Adaptation
Longney	FC5-6	SHAR2	Adaptation	Maintain	Maintain, Sustain	Sustain, Adaptation
Upper Framilode	FC5-7	SHAR3, SHAR5	Improve	Sustain, Improve	Sustain	Sustain
Arlingham	FC5-8	SHAR4	Maintain	Maintain	Maintain, Sustain	Sustain, Adaptation
Slimbridge	FC5-9	SHAR7	Adaptation	Maintain	Maintain, Sustain	Sustain, Adaptation
Berkeley	FC6-1	SEV1	Maintain	Maintain	Maintain, Sustain	Sustain
Shepperdine	FC6-2	SEV2, SEV3, SEV4	Improve	Sustain, Improve	Sustain	Sustain
Littleton-upon-Severn	FC6-3	SEV5	Sustain	Maintain	Maintain, Sustain	Maintain, Sustain
Avonmouth to Aust	FC7-0	BRIS1, BRIS2, BRIS3	Improve	Improve	Sustain	Sustain
Portbury	FC8-0	BRIS6	Maintain	Maintain	Maintain	Maintain
Woodhill	FC8-1	PORT2	NAI	NAI	NAI	NAI
Clevedon to Weston-Super-Mare	FC9-0	PORT4, KIN1, KIN3	Improve and Adaptation	Improve	Sustain	Sustain, Adaptation
Brean to Burnham-on-Sea	FC10-0	7d43-46, 7e01-06	Sustain, Adaptation	Maintain, Sustain	Sustain, Adaptation	Sustain, Adaptation
Huntspill	FC10-1	7d42	Maintain, Adaptation	Maintain	Maintain	Maintain, Adaptation
Pawlett	FC10-2		Sustain, Adaptation	Maintain	Sustain	Sustain, Adaptation
Stear Peninsula	FC11-0	7d32-37	Adaptation	Adaptation	Adaptation	Adaptation

Note: flood cells where the HLO that provided maximum benefit to the built and natural environment does not match the overall HLO are highlighted in red text.

Table 4.6 – Comparison between SEA and potential High Level Options.



5. Potential Alignments and Types

5.1 Introduction

The potential High Level Options were used as the starting point for considering Alignments and Types of FRM. As well as the standard analyses, a generic matrix was used to guide the assessment, given in Appendix C.

5.2 Range of Alignments and Types

The range of alignments was determined from potential for habitat creation or primary-secondary FRM assets systems. The range of types was grouped in relation to the condensed list given in Appendix A. This gave a range of 16 generic types:

- Do Nothing.
- Monitoring, covering the full range of potential techniques.
- Flood awareness, including education, forecasting and warning.
- Land management, relating to development control, agricultural practice and also aggregate dredging.
- Maintenance, covering both reactive and proactive activities.
- Soft foreshore management, such as sediment recharge and recycling, and methods such as polders to accrete sediment.
- Hard foreshore management, covering groynes, breakwaters, toe protection and similar works.
- Improvements to existing assets, relating to optimising the geometry, or reinforcement, to improve SoP.
- New linear assets, covering the full range of potential new capital works from earth embankments to heavily engineered revetments and walls.
- Secondary assets, relating to secondary alignment structures. These would tend to be less heavily engineered as they would not be completely exposed to the extreme climate.
- Point structures, relating to refurbishment and improvement of pumping stations, outfalls, RTE or breaches.
- Demountable or temporary defences.
- Property resilience of any description.
- Flow control, to slow or speed conveyance to reduce flood risk.
- Flood storage, generally not appropriate for the study area due to the tidal dominance, but having some relevance towards Gloucester.
- Drainage improvements, such as SUDs and ditches.



5.3 Methodology for Assessment of Alignments and Types

Alignments and Types were assessed at a sub-reach level via:

- High Level Option context. This set the direction of FRM activity at a flood cell level.
- Present day and future level of flood risk and erosion pressure for sub-reaches within flood cells. This indicated whether and when there was any technical need to consider FRM improvements. Within each flood cell different sub-reaches will require different levels of activity to provide a consistent SoP, dependent on the specific SoP for each sub-reach. The range of generic types of FRM were also assessed based on the local context and the ability and appropriateness of the solution type in addressing the flood risk driver,
- Most appropriate alignment for environmental (habitat) reasons, and FRM where secondary alignments were considered. This investigated potential realignments related to habitat creation for each site identified at the High Level Options stage. In addition to this, secondary alignments (in conjunction with existing 'primary' alignments) were investigated. A more detailed habitat balance account was kept for this stage, to ensure that at an estuary wide level the alignments complied with the requirement to compensate for predicted habitat losses.
- Option sensitivity to the range of climate change scenarios defined in Environment Agency (2010) was assessed. Details of this assessment are given in Figure 5-1 to Figure 5-4, indicating the potential for option variation.
- The log of key health and safety issues was also further developed.

5.4 Summary of Assessment

A summary of the assessment of Alignments and Types is given in Table 5.1 to Table 5.6. Further detail is given in Appendix K. Again, for clarity the summary is split into flood cells in Wales, west bank of the Midlands region, east bank of the Midlands region, and the south west region.

From the total range of options, those options that were assumed to occur for wider FRM reasons include monitoring, flood risk awareness (education, forecasting and warning), development control and maintenance activities. In the assessment below, these activities are assumed to occur unless noted otherwise. Other options that were assessed as less relevant to the strategy include flow control and flood storage, due to the predominantly tidal nature of the flood risks rendering these ineffective.



LOCATION			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES		
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term
Penarth	FC1-P	SR1-P	Maintain	Sustain	Sustain	No sensible realignment or habitat opportunity possible due to adjacent significant conurbation and local road. Moderate BCR supports Reduce, Maintain or Sustain FRM: funding may need to come from non-central sources. Any improvement of the existing seawall would require similar construction type as existing. Beach erosion risks in the medium to long term may also require foreshore management in the medium to long term.	Existing			Maintenance	Hard foreshore management, Improve Existing Defence	
Tremorfa	FC1-0	SR1-CF	Maintain	Maintain	Maintain	No sensible realignment possible due to adjacent significant industry and conurbation. Strong BCR supports Maintain/Sustain FRM on the existing alignment. High ground levels mean that ground raising is not required, although continued maintenance of the fronting rock armouring and toe protection would be required to manage erosion risks.				Maintenance, Hard Foreshore Management		
		SR1-RRWB	Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant industry and conurbation. Strong BCR supports Maintain/Sustain FRM on the existing alignment.The existing road levels provide a high SoP into the medium term; in the long term further engineering works would be required to sustain the SoP. Continued maintenance of the fronting rock armouring and toe protection would be required to manage erosion risks.				Maintenance, Hard Foreshore Management		Hard Foreshore Management, Improve Existing Defence
		SR1-RRWB1	Maintain	Sustain	Sustain	No sensible realignment possible due to adjacent significant industry and conurbation. Strong BCR supports Maintain/Sustain FRM on the existing alignment.The existing defences have a low SoP and therefore need improvements, or new defences in places, in the short term: in the medium to long term continued engineering works would be required to sustain the SoP.				Improve Existing Defence, New Linear Defence	Improve Existing Defence	
Wentlooge Levels	FC1-1	SR1-RREB	Improve	Sustain	Sustain	No sensible realignment possible due to adjacent significant landfill and landraising. Realignment is not supported by habitat assessments. Strong BCR supports Improve FRM on the existing alignment. The existing earth embankment gives a very low SoP and therefore in the short term improvements or reconstruction is required. In the medium to long term further improvements would be required to sustain the SoP.	Existing			Improve Existing Defence, New Linear Defence	Improve Existing Defence	
		SR1-0	Maintain	Sustain	Sustain	No sensible realignment possible due to adjacent significant landfill and landraising. Strong BCR supports Maintain/Sustain FRM on the existing alignment. The existing high SoP means that only maintenance works are required in the short to medium term, although continued wharf retreat risk would require foreshore management. Due to the relatively sheltered aspect and low scarp height, soft foreshore management would be more appropriate than hard (supported by GL FMP, Atkins, 2004). Embankment raising, hardening (wave recurve, rock armour, revetment) and/or continued foreshore management would be required to sustain SoP in the medium to long term.				Maintenance, Soft Foreshore Management	Soft Foreshore Management, Improve Existing Defence	
		SR1-1	Maintain	Maintain	Sustain					Maintenance, Soft Foreshore Management		Soft Foreshore Management, Improve Existing Defence
		SR1-2	Improve	Sustain	Sustain, Adaptation	Alignment Options include existing line and along/near B2439 road (~300m inland), within the HTL policy. SoP and asset residual life support maintaining the existing line in the short to medium term. Dependent on climate change impacts, defence hardening, secondary defence line (B2439), and/or wider foreshore management would be required to Maintain/Sustain FRM, and possibly managed realignment in the long term. The existing polders and rock armour have been successful in managing the foreshore; this should be continued from the short to long term, although polders may not be viable due to sea level rise in the long term (supported by RGW PAR, Atkins, 2006). Habitat assessment does not support landward realignment. Strong BCR supports any of the alignments: detailed costing will determine best value.	Existing		Existing, secondary line	Soft Foreshore Management, Improve Existing Defence		Soft Foreshore Management, Improve Existing Defence, Secondary Defence
		SR1-3	Maintain	Sustain	Sustain, Adaptation		Existing			Maintenance		Maintenance, Hard Foreshore Management, Secondary Defence
		SR1-4	Maintain	Maintain	Maintain, Adaptation							Soft Foreshore Management, Hard Foreshore Management, Secondary Defence
		SR1-5	Maintain	Maintain	Maintain, Adaptation							
		SR1-6	Maintain	Maintain	Sustain, Adaptation							
		SR1-REWB	Maintain	Maintain	Sustain, Adaptation							

Table 5.1 – Alignment and Type assessment (Penarth to Wentlooge Levels).



LOCATION			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES		
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term
River Ebbw - River Usk	FC1-2	SR1-REEB	Maintain	Sustain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. A weak length north of the Transporter Bridge requires new defences (supported by Tidal Usk Strategy, Halcrow, 2008), whereas the wider defence length requires maintenance work in the short term, and further engineering works in the medium to long term to sustain the SoP.	Existing		Maintenance	Improve Existing Defence, New Linear Defence		
		SR1-RUWB1	Maintain	Sustain	Sustain				New Linear Defence			
		SR1-RUWB2	Improve	Sustain	Sustain				Maintenance			
		SR1-RUWB3	Maintain	Sustain	Sustain					Maintenance		Hard Foreshore Management, Improve Existing Defence
SR2-RUEB1	Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. Erosion risks are limited in the short to medium term (supported by GL FMP, Atkins, 2004). General high ground precludes breaching, therefore continued maintenance is preferred in the short to medium term. In the long term ground/defence raising and further toe protection may be required.	Maintenance				Improve Existing Defence, New Linear Defence			
SR2-RUEB2	Improve	Sustain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. A weak length south of the Transporter Bridge requires new defences (supported by Tidal Usk Strategy, Halcrow, 2008), whereas the wider defence length requires maintenance work in the short term, and raising in the medium to long term to sustain the SoP.								
SR2-RUEB3	Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. General high ground precludes breaching, therefore continued maintenance is preferred in the short to medium term: in the long term further works may be required.	Maintenance				Improve Existing Defence, New Linear Defence			
SR2-RUEB4	Improve	Sustain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. A weak length requires urgent new defences (supported by Tidal Usk Strategy, Halcrow, 2009), whereas the wider defence length requires maintenance work in the short term, and further engineerign works in the medium to long term to sustain the SoP.	New Linear Defence						Improve Existing Defence, New Linear Defence	
SR2-RUEB5	Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. General high ground precludes breaching, therefore continued maintenance is preferred in the short to medium term: in the long term further works may be required.	Maintenance				Improve Existing Defence, New Linear Defence			
SR2-0	Maintain	Maintain	Maintain, Adaptation	Alignment Options include existing line and along/near road (Goldcliff Road/Saltmarsh Lane/Mead Lane/South Row, ~800m inland), within the context of HTL policy. SoP and asset residual life support maintaining the existing line in the short to medium term. Dependent on climate change impacts, defence raising, hardening (wave recurve, rock armouring, revetment) or secondary defence line may be required to Maintain/Sustain FRM, and possibly managed realignment in the long term. Ongoing erosion would require hard foreshore management rather than soft due to lack of fronting saltmarsh and wave exposure (supported by GL FMP, Atkins, 2004). Strong BCR supports any of the alignments: detailed costing will determine best value.	Existing	Existing, secondary line					Maintenance, Hard Foreshore Management	
SR2-1	Maintain	Maintain, Sustain	Sustain, Adaptation									
SR2-2	Maintain	Maintain, Sustain	Sustain, Adaptation									
SR2-3	Maintain	Maintain, Sustain	Sustain, Adaptation									
Caldicot Levels	FC2-0	SR2-4	Improve	Sustain	Sustain	Alignment Options include existing line, no sensible secondary defence line, within the context of HTL policy. A weaker section of defence with a sub-standard SoP requires improvements in the short term. Strong BCR supports Maintain/Sustain FRM on the existing alignment. Dependent on climate change impacts, defence raising or hardening (wave recurve, rock armouring, revetment) to Maintain/Sustain FRM, and possibly managed realignment in the long term. Erosion risks increase in the medium term, which would require hard foreshore management rather than soft due to wave exposure (supported by GL FMP, Atkins, 2004).	Existing		Improve Existing Defence	Hard Foreshore Management, Improve Existing Defence, New Linear Defence		
		SR2-5	Sustain	Sustain	Sustain				Maintenance			Hard Foreshore Management, Improve Existing Defence
		SR2-6	Sustain	Sustain	Sustain	Alignment Options include existing line, no sensible secondary defence line, within the context of HTL policy. Dependent on climate change impacts, defence raising or hardening (wave recurve, rock armouring, revetment) may be required to Maintain/Sustain FRM, and possibly managed realignment in the long term. Erosion risks increase in the medium term, which would require hard foreshore management rather than soft due to wave exposure (supported by GL FMP, Atkins, 2004). Strong BCR supports Maintain/Sustain FRM on the existing alignment.						
		SR2-7	Maintain, Sustain	Sustain	Sustain, Adaptation				Alignment Options include existing line and along/near main line railway (~300m inland), within the context of HTL policy. SoP and asset residual life support maintaining the existing line in the short to medium term. Dependent on climate change impacts, defence raising, hardening (wave recurve, rock armouring, revetment) and/or secondary defence line may be required to Maintain/Sustain FRM, and possibly managed realignment in the long term. Saltmarsh erosion risk is variable (supported by GL FMP, Atkins, 2004), but likely to require foreshore management in the medium to long term. Strong BCR supports any of the alignments: detailed costing will determine best value.	Existing	Existing, secondary line	Improve Existing Defence, Maintenance
SR2-8		Maintain	Sustain	Sustain, Adaptation	Maintenance							

Table 5.2 – Alignment and Type assessment (River Ebbw to Mathern).



LOCATION			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES		
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term
Tidenham	FC3-1	SR3-0	NAI	NAI	NAI	Localised realignment possible with habitat creation potential. This would result in realignment to high ground (~800m inland) or to the railway line. Monitoring and flood awareness activities should continue.	Existing	High ground	Do Nothing, Monitoring, Flood Awareness			
		SR3-1	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation							
		SR3-2	NAI	NAI	NAI							
Stroat	FC3-2	SR3-3	NAI	NAI	NAI							
		SR3-4	NAI, Adaptation	NAI	NAI, Adaptation							
Lydney	FC3-3	SR3-5	Maintain	Maintain, Sustain	Sustain, Adaptation	Alignment Options include existing line, along/near main line railway (~300m inland) or to high ground (~1.7km inland), within the context of MR policy. SoP and asset residual life support maintaining the existing line in the short to medium term. Habitat assessment supports the main line railway alignment option: detailed costing will determine best value. Maintenance work would continue in the short to long term, with monitoring and flood awareness prior to any potential option for managed realignment.			Existing, secondary line		Monitoring, Flood Wareness, Maintenance, Improve Existing Defence, Secondary Defence	
Purton	FC4-1	SR4-0	NAI	NAI	NAI	No active realignment possible due to high ground.			Existing		Do Nothing, Monitoring, Flood Awareness	
Awre	FC4-3	SR4-2	Adaptation	Adaptation	Adaptation	Alignment Options include existing line and to high ground (up to 1.1km inland), within the context of MR policy. Low SoP, asset residual life and BCR supports the high ground Alignment Option.			High ground		Do Nothing, Monitoring, Flood Awareness	
Bullo	FC4-4	SR4-3	NAI	NAI	NAI	No active realignment possible due to high cliffs.			Existing		Do Nothing, Monitoring, Flood Awareness	
Ruddle	FC4-5	SR4-3	NAI	NAI	NAI							
Newnham-on-Severn	FC4-6	SR4-3	Maintain	Maintain, Sustain	Sustain	No sensible realignment possible due to adjacent conurbation and medium level ground. Strong BCR supports Maintain/Sustain FRM on the existing alignment. A sub-standard SoP in the longer term would require improvement works in the longer term.			Existing		Maintenance	Improve Existing Defence
Westbury-on-Severn and Rodley	FC4-7	SR4-4	Improve, Sustain	Sustain	Sustain	Alignment Options include existing line (no sensible secondary line), within the context of HTL policy. Marginal BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the medium to long term supports engineering improvement works on the existing alignment to sustain the SoP.			Existing		Maintenance	Improve Existing Defence
		SR4-5	NAI	NAI	NAI	No active realignment possible due to high cliffs.			High ground		Do Nothing	
		SR4-6	Maintain	Maintain	Sustain	Alignment Options include existing line and local road secondary line (~500m inland), within the context of HTL policy. Marginal BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the long term would require improvement works on the existing alignment to sustain the SoP.			Existing, secondary line		Maintenance	Improve Existing Defence, Secondary Defence
Wallmore Common	FC4-8	SR4-8	Maintain	Sustain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Strong BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the medium term would require improvement works on the existing alignment to sustain the SoP.			Existing		Maintenance	Improve Existing Defence, Individual Property Protection, Flood Storage
Minsterwor th	FC4-9	SR4-9	Maintain	Maintain, Sustain	Sustain	Alignment Options include existing line and local road secondary line (~500m inland), within the context of HTL policy. Marginal BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the long term would require improvement works on the existing alignment to sustain the SoP.			Existing		Maintenance	Improve Existing Defence, Individual Property Protection, Flood Storage
Minsterwor th Ham	FC4-10	SR4-10	Adaptation	Adaptation	Adaptation	Alignment Options include existing line, field boundaries near pylons (~1.3km inland) or to high ground (~2.0km inland), within the context of MR policy. Low SoP and BCR do not support existing alignment, but could support landward alignments. Habitat assessment supports field boundaries alignment. Landward realignment would require new linear defence with point structures, and may provide some wider flood storage benefit.			Field boundaries, high ground		New Linear Defence, Point Structures, Individual Property Protection, Flood Storage	Maintenance, Improve Existing Defence

Table 5.3 – Alignment and Type assessment (Tidenham to Minsterworth Ham).



LOCATION			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES		
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term
The Rea	FC5-3	SR5-0	Maintain	Maintain, Sustain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Strong BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the medium term would require improvement works to sustain the SoP.	Existing			Maintenance	Improve Existing Defence	
Stonebench	FC5-4	SR5-1	Maintain	Maintain, Sustain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Moderate BCR supports Maintain/Sustain FRM on the existing alignment. Within this context, maintenance activity could become increasingly reactive.	Existing			Maintenance		Improve Existing Defence
Elmore Back	FC5-5	SR5-2	Maintain	Maintain, Adaptation	Adaptation	Alignment Options include existing line, field boundaries near pylons (~800m inland) or to high ground (~1.3km inland), within the context of MR policy. Low BCR does not support existing alignment, but could support landward alignments. Habitat assessment supports field boundaries alignment: detailed costing will determine best value. In the short term activity would include for increasingly reactive maintenance, and in the medium to long term landward alignments would require new linear defences and potentially individual property protection.	Existing	Field boundaries, high ground		Maintenance	New Linear Defence, Point Structures, Individual Property Protection	
Longney	FC5-6	SR5-3	Maintain	Maintain, Sustain	Sustain, Adaptation	Alignment Options include existing line, field boundaries near pylons (~500m inland) or to intermittent high ground (~800m inland), within the context of MR policy. Moderate BCR supports Maintain/Sustain FRM on the existing alignment. Within this context, maintenance activity could become increasingly reactive. Habitat assessment supports intermittent high ground alignment: detailed costing will determine best value.	Existing		Existing, secondary line	Maintenance		Improve Existing Defence
Upper Framilode	FC5-7	SR5-4	Sustain, Improve	Sustain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Strong BCR supports Sustain FRM on the existing alignment. Continuing climate change impacts require improvement works on the existing alignment to sustain or improve the SoP.	Existing			Improve Existing Defence		
		SR5-6	Maintain	Maintain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Strong BCR supports Sustain FRM on the existing alignment. Continuing climate change impacts require improvement works on the existing alignment to sustain the SoP.	Existing			Maintenance		Improve Existing Defence
Arlingham	FC5-8	SR5-5	Maintain	Maintain	Sustain, Adaptation	Alignment Options include existing line or field boundaries near Arlingham village (~1.2km inland), within the context of MR policy. Weak BCR does support existing alignment, but could also support landward alignments. Habitat assessment supports intermittent alignment with banks and to high ground: detailed costing will determine best value. Within this context, maintenance activity could become increasingly reactive.	Existing		Existing, secondary line	Maintenance		Improve Existing Defence, Secondary Defence
Slimbridge	FC5-9	SR5-7	Maintain	Sustain	Sustain	No sensible realignment possible due to adjacent canal.	Existing			Maintenance	Improve Existing Defence	
		SR5-8	Maintain	Sustain	Sustain, Adaptation	Alignment Options include existing line and alignments investigated in ongoing feasibility study, within the context of MR policy. Strong BCR supports existing or landward alignment. Habitat assessment supports landward alignment: detailed costing will determine best value. Landward realignment in the short term could require new linear defences, potentially with point structures and individual property protection.	Existing		Existing, secondary line	Maintenance	Improve Existing Defence, Secondary Defence	

Table 5.4 – Alignment and Type assessment (The Rea to Slimbridge).



LOCATION			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES		
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term
Berkeley	FC6-1	SR6-0	Maintain	Sustain	Sustain	Alignment Options include existing line and secondary alignment along field boundaries, within the context of HTL policy. Strong BCR supports either alignment option. Habitat assessment supports landward alignment in the medium term. The existing alignment has a weak spot that would need raising and/or hardening (wave recurve, rock armouring, revetment). In the medium term improvement works would be required, potentially with foreshore management if along the existing alignment, to sustain the existing SoP. Alternatively, if a secondary alignment is followed, new linear defences would be required.	Existing	Existing, secondary line	Maintenance	Soft Foreshore Management, Hard Foreshore Management, Improve Existing Defence	Soft Foreshore Management, Hard Foreshore Management, Improve Existing Defence, New linear defence	
Shepperdine	FC6-2	SR6-1	Improve	Sustain	Sustain							
		SR6-2a	Maintain	Sustain	Sustain							
		SR6-2b	Maintain	Sustain	Sustain							
		SR6-2c	Maintain	Sustain	Sustain							
Littleton-upon-Severn	FC6-3	SR6-3	Maintain	Sustain	Sustain							
		SR6-4	Maintain	Sustain	Sustain							
Avonmouth to Aust	FC7-0	SR7-0	Improve	Sustain	Sustain	Alignment Options include existing line and minor realignment around Pilning rifle range. The seaward saltmarsh has been historically stable (supported by A-A TDS, Atkins, 2006), and there is a strong BCR that supports the existing alignment. The habitat assessment does not support landward realignment at a strategic scale. The existing SoP is below guidance, supporting raising or hardening (wave recurve, rock armouring, revetment) in the short term; with climate change impacts this would need to be sustained in the medium to long term, potentially with foreshore management.	Existing		Improve Existing Defence	Soft Foreshore Management, Hard Foreshore Management, Improve Existing Defence		
		SR7-1	Maintain	Maintain	Maintain	No sensible realignment possible due to adjacent significant conurbation and industry. Strong BCR supports Maintain/Sustain FRM on the existing alignment. High existing SoP only supports improvements in the longer term. The seaward saltmarsh has been historically slowly eroding (supported by A-A TDS, Atkins, 2006), which may require foreshore management in the short term onwards.	Existing		Maintenance, Hard Foreshore Management		Hard Foreshore Management, Improve Existing Defences	
		SR7-2	Maintain	Maintain	Maintain							
		SR7-3	Maintain	Maintain	Maintain							
		SR7-4	Maintain	Maintain	Sustain							
		SR7-5	Maintain	Maintain, Sustain	Sustain	Alignment Options include existing line and alignments investigated in A-ATDS. Strong BCR supports seaward or landward alignment around the dock perimeter. Habitat assessment does not support realignment. Both alignments would require new linear defences, with the seaward alignment potentially requiring foreshore management (supported by A-A TDS, Atkins, 2006).	Seaward or landward boundary of docks		Hard Foreshore Management, Improve Existing Defence, New linear defence			
		SR7-6	Maintain	Maintain	Sustain							
		SR7-7	Improve	Sustain	Sustain							
SR7-8	Improve	Sustain	Sustain									
Portbury	FC8-0	SR8-0	Maintain	Maintain	Maintain	No sensible realignment possible due to adjacent significant conurbation and industry. High SoP throughout the epochs only requires maintenance.	Existing		Maintenance			
Woodhill	FC8-1	SR8-1	NAI	NAI	NAI	Alignment Options include existing line and high ground landward of lake and park. Weak BCR supports high ground alignment. Habitat assessment does support landward realignment. With no further maintenance, monitoring and flood awareness activities would be required.	Existing	To high ground		Do Nothing, Monitoring, Flood Awareness		
Clevedon to Weston-Super-Mare	FC9-0	SR9-0	Maintain	Maintain	Maintain	No sensible realignment possible due to adjacent significant conurbation and local road. High SoP along some lengths through to the long term only requires maintenance activity, whilst other lengths require improvements to the existing FRM asset. Limited erosion risk (Clevedon Strategy Review, Atkins, 2005) does not require foreshore management.	Existing		Maintenance			
		SR9-1	Sustain	Sustain	Sustain				Improve Existing Defence, New linear defence			
		SR9-2	Maintain	Maintain	Sustain				Maintenance		Improve Existing Defence	
		SR9-3	Maintain	Maintain	Maintain				Maintenance			
		SR9-4	Maintain	Maintain	Maintain	No realignment or FRM improvements viable due to high ground.	Existing		Maintenance			
		SR9-5	Maintain	Maintain	Sustain, Adaptation	Alignment Options include the existing line or a secondary line along the landward earth embankment. Strong BCR supports existing or secondary alignment. Habitat assessment does not support further landward realignment. High SoP only requires improvements in the long term due to climate change, potentially with foreshore management. Erosion risks (supported by Clevedon Strategy Review, Atkins, 2005) may require foreshore management in the short to long term.	Existing		Maintenance, Soft Foreshore Management, Hard Foreshore Management			
		SR9-6	Maintain	Sustain	Sustain, Adaptation	Maintenance, Soft Foreshore Management, Hard Foreshore Management			Maintenance, Soft Foreshore Management, Hard Foreshore Management, Improve Existing Defence			
		SR9-7	Maintain	Sustain	Sustain, Adaptation							
		SR9-CYRB	Improve	Sustain	Sustain, Adaptation							
		SR9-CYLB	Improve	Sustain	Sustain, Adaptation							
		SR9-8	Maintain	Sustain	Sustain, Adaptation							
		SR9-RBRB	Maintain	Maintain	Maintain, Adaptation	Alignment Options include the existing line, landward along historic earth embankment, or landward along field boundaries. Strong BCR supports existing or landward alignments. Habitat assessment supports landward realignments. Weak SoP along some lengths near Congresbury Yeo supports new linear defences (or re-use of historic embankments) on a landward alignment, potentially with point structures and individual property protection. Erosion risks in the short to medium term (supported by Clevedon Strategy Review, Atkins, 2005) would be avoided by landward realignment .	Minor realignment from existing	Existing, Commissioners Bank or other	New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection			
		SR9-RBLB	Maintain	Sustain	Sustain, Adaptation				Improve Existing Defence, New Linear Defence		New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection	
		SR9-9LS	Maintain	Sustain	Sustain				Maintenance			
		SR9-9	Maintain	Maintain	Maintain				Maintenance			
SR9-10	Maintain	Maintain	Maintain	No sensible realignment possible due to adjacent conurbation and local road. Generally high SoP only requires maintenance work, whilst a weaker length would require improvement works along the existing alignment. The beach recharge in the 1980s still provides a viable beach-dune system, although sea level rise and storminess increase may require further beach recharges in the medium and long term.	Existing		Maintenance		Soft Foreshore Management			
SR9-11	Maintain	Maintain	Maintain	No realignment or FRM improvements viable due to high ground.	Existing							

Table 5.5 – Alignment and Type assessment (Berkeley to Weston-super-Mare).



LOCATION			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES			
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term	
Brean to Burnham-on-Sea	FC10-0	SR9-12	Maintain	Maintain, Adaptation	Sustain, Adaptation	Alignment Options include the existing line, or landward along field boundaries and the M5, within the context of MR policy. Strong BCR supports existing or landward alignments. Habitat assessment supports landward realignments. In the short term to medium term, maintenance (and potentially foreshore management) activity could become increasingly reactive, and in the medium to long term landward realignment could require new linear defences, point structures and individual property protection.	Existing	Field boundaries/M5		Maintenance	New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection		
		SR9-13	Maintain	Sustain, Adaptation	Sustain, Adaptation			Existing	Field boundaries				Maintenance, Soft Foreshore Management, Hard Foreshore Management
		SR10-0	Maintain	Sustain, Adaptation	Sustain, Adaptation								
		SR10-1	Maintain	Sustain, Adaptation	Sustain, Adaptation								
		SR10-2	Maintain	Maintain	Maintain			No realignment viable due to high ground.			Do Nothing		
		SR10-3	Maintain	Sustain	Sustain	Alignment Options include the existing modern dunes line, or the ancient dune secondary line (~300m inland), within the context of HTL policy. Dune management should continue into the future, dependent on the alignment chosen (supported by B-B Coastal Study, Black and Veatch, 2008).	Existing, ancient dune line		Maintenance, Soft Foreshore Management, Hard Foreshore Management				
		SR10-4	Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant conurbation and local road. Strong BCR supports existing alignment. High SoP in the short and medium term only requires maintenance and foreshore management to address ongoing beach erosion. In the longer term, improvement works would be required to sustain the SoP.	Existing	Maintenance, Soft Foreshore Management, Hard Foreshore Management		Maintenance, Soft Foreshore Management, Hard Foreshore Management, Improve Existing Defence			
		SR10-5	Maintain	Maintain	Sustain								
		SR10-6	Maintain	Maintain	Maintain								
		SR10-7	Maintain	Maintain	Sustain								
	SR10-8	Maintain	Maintain	Sustain									
Huntpill	FC10-1	SR10-9a	Maintain	Maintain	Sustain, Adaptation	Alignment Options include the existing line, or landward along field boundaries. Medium to strong BCR supports landward alignments. Habitat assessment supports landward realignments. High SoP in the short and medium term supports maintenance and foreshore management activities only, with landward realignments requiring new linear defences, point structures and individual property protection.	Existing	Existing	As per PEFRMS	Maintenance		New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection	
		SR10-9b	Maintain	Maintain	Sustain, Adaptation					Maintenance, Soft Foreshore Management, Hard Foreshore Management			
		SR10-9c	Maintain	Maintain	Sustain, Adaptation								
Pawlett	FC10-2	SR10-RPRBa	Maintain	Maintain	Sustain, Adaptation			As per PEFRMS		Maintenance	New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection		
		SR10-RPRBb	Maintain	Sustain	Sustain, Adaptation								
		SR10-RPRBc	Maintain	Maintain	Sustain, Adaptation								
Steart Peninsula	FC11-0	SR11-RPLB	Adaptation	Adaptation	Adaptation	Alignment Options are being assessed in detail in the Steart Peninsula project. Maintenance activity will become increasingly reactive, with no further maintenance in the medium to long term.	As per Steart MR	Maintenance		Do Nothing, Monitoring, Flood Awareness			
		SR11-0	Adaptation	Adaptation	Adaptation								
		SR11-1	Adaptation	Adaptation	Adaptation								
		SR11-2	Adaptation	Adaptation	Adaptation	Alignment Options are being assessed in detail in the Steart Peninsula project. Landward realignment in the short term would require new linear defences. In the medium term, maintenance of the landward realignment will become increasingly reactive, with no further maintenance in the long term.							
		SR11-3	Adaptation	Adaptation	Adaptation								
		SR11-4	Maintain	Adaptation	Adaptation	Alignment Options are being assessed in detail in the Steart Peninsula project. In the short term, maintenance activity will become increasingly reactive, with landward realignment occurring in the medium term. This would be maintained through to the long term.							
		SR11-5	Maintain	Adaptation	Adaptation								

Table 5.6 – Alignment and Type assessment (Brean to Steart Peninsula).

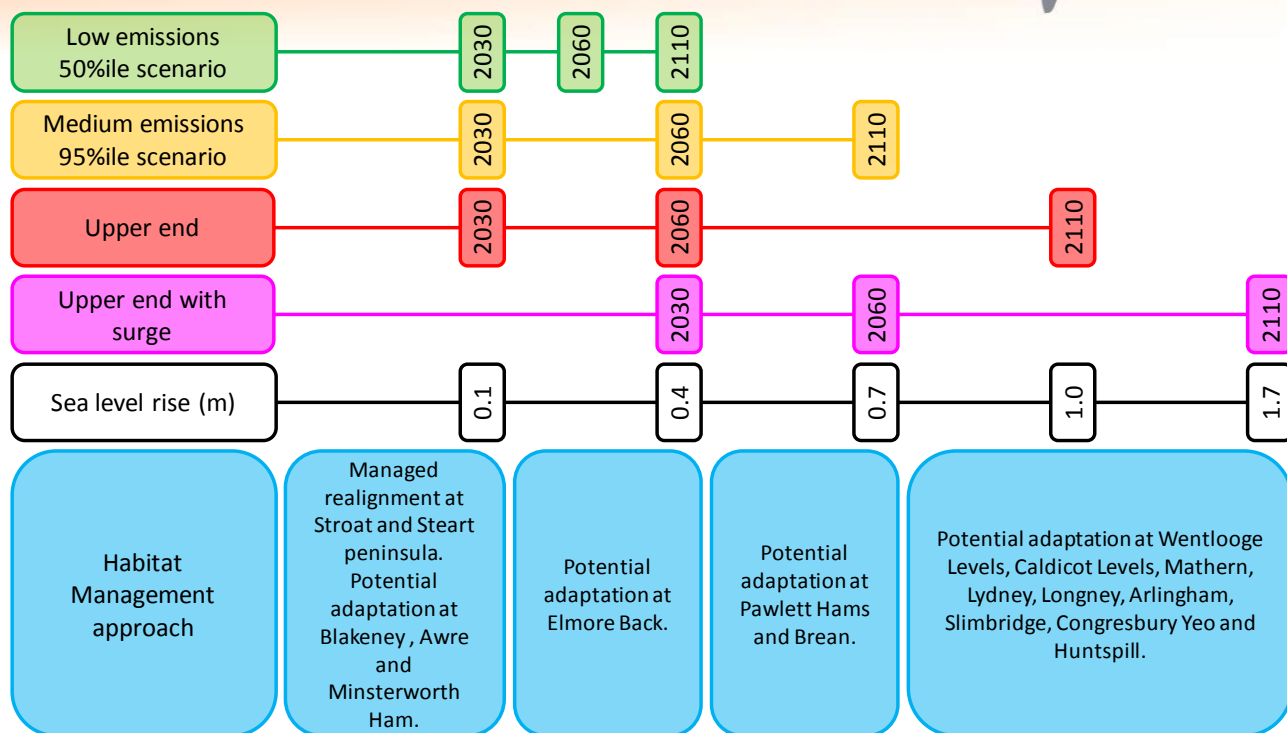


Figure 5-1. Estuary wide compensatory habitat climate change sensitivity.

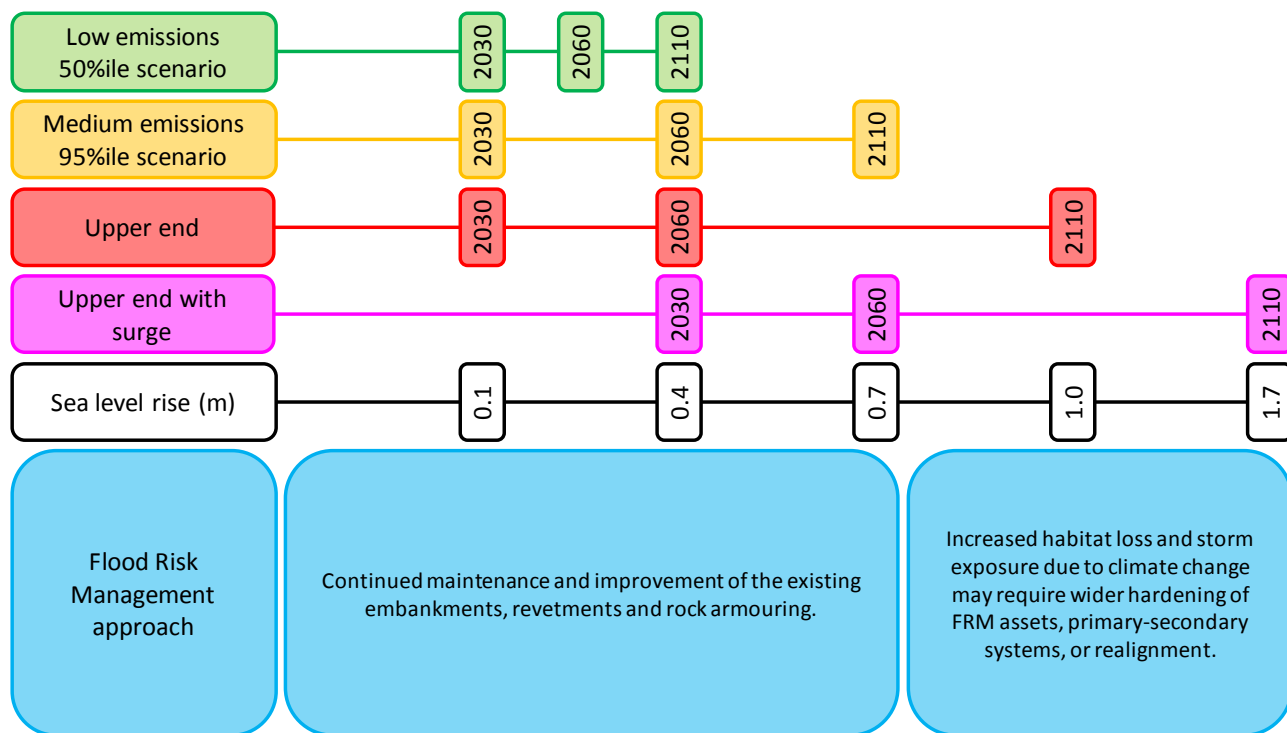


Figure 5-2. Wentlooge-Caldicot Levels, Berkeley to Littleton-upon-Severn climate change sensitivity.

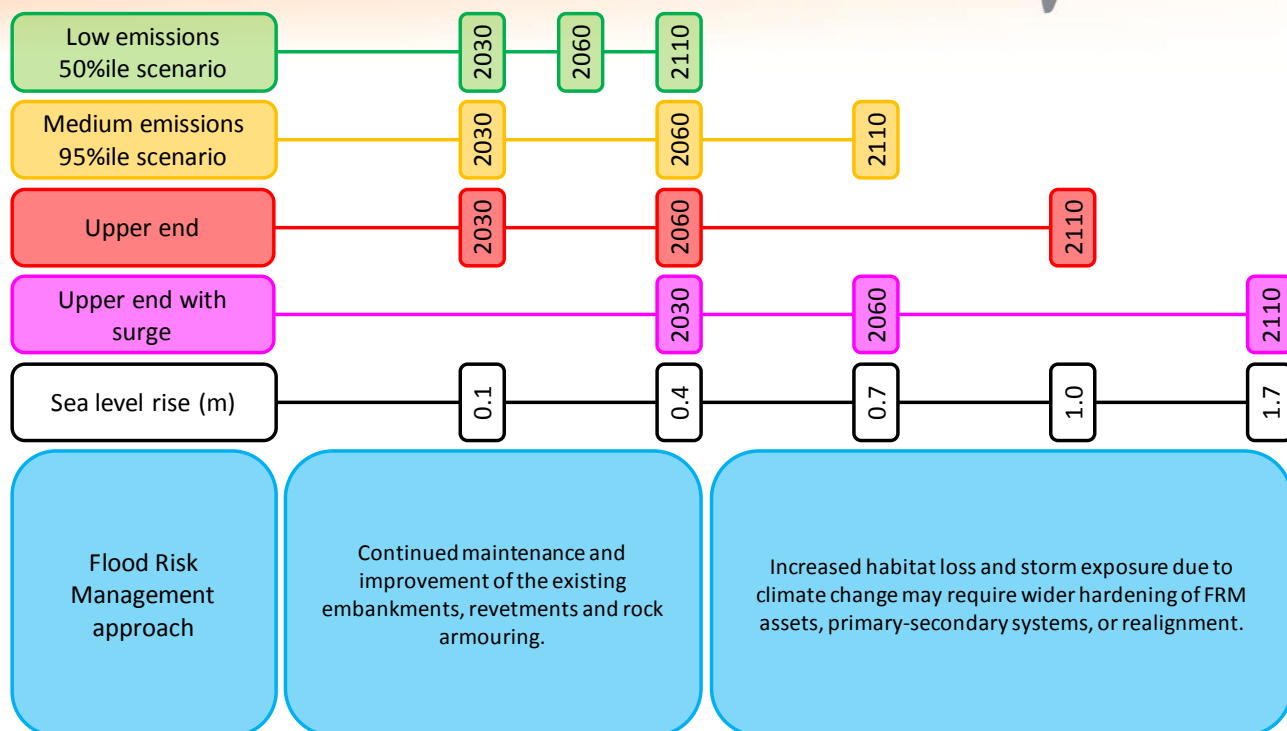


Figure 5-3. Mathern climate change sensitivity.

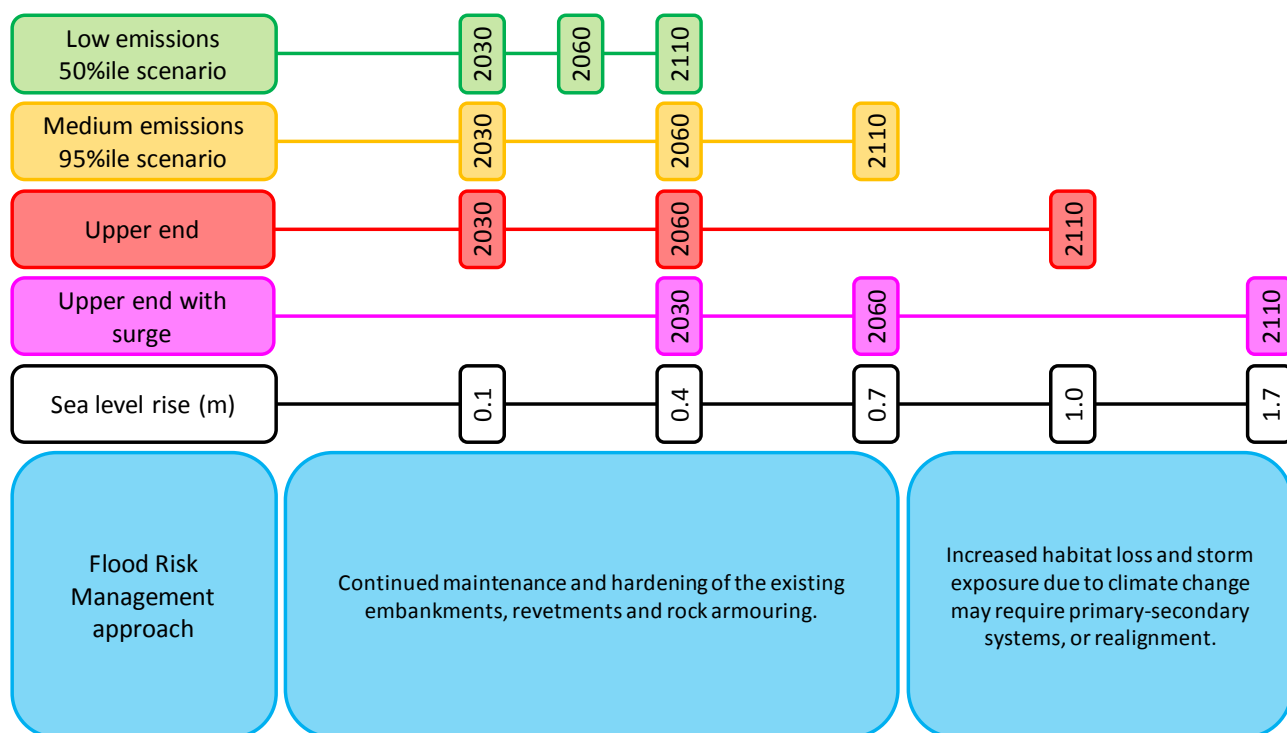


Figure 5-4. Avonmouth to to Burnham-on-Sea climate change sensitivity.



6. Potential FRM Responses

6.1 Introduction

The potential Alignments and Types were used as the starting point for considering FRM Responses. As well as the standard analyses, a generic matrix was used to guide the assessment, given in Appendix C.

6.2 Range of Responses

The potential FRM responses included a range of 40 defined responses, from Do Nothing and non-structural measures through to heavily engineered structural measures. They were:

- Do Nothing
- Visual inspection
- Conventional survey
- Remote survey
- Education and awareness
- Forecasting and warning
- Control of agricultural practice
- Control of development
- Control of aggregate dredging
- Reactive maintenance
- Proactive maintenance
- Sediment recharge
- Polder fields
- Groynes
- Breakwaters
- Toe protection
- Reinforcement
- Optimised geometry
- Earth embankment
- Revetment
- Rock armouring
- Wave recurve wall
- Concrete/masonry wall
- Ground raising
- Earth embankment secondary alignment
- Concrete/masonry wall secondary alignment
- Ground raising secondary alignment
- Pumping stations
- Outfalls
- Regulated Tidal Exchange
- Demountable and temporary defences
- Property stilts
- Property rafts
- Barriers
- Reduced conveyance
- Increased conveyance
- Flood storage
- SUDS and ditches



6.3 Methodology for Assessment of FRM Responses

FRM Responses were assessed at a sub-reach level via:

- Alignments and Types context. This set the direction of FRM activity at a sub-reach level.
- Technical and economic optimisation of the solution. This was achieved via further more detailed assessment of the technical appropriateness of the relevant FRM responses, and also took into account the relative cost of those responses.
- The SoP was optimised initially via BCR, and then applied the FCERM-AG rules (differing between England and Wales) relating to iBCR for further optimising of the SoP. As the flood cell level of assessment is the prime control on flood risk management, the final consideration of responses was carried out at this level. However, costs were developed in detail at a sub-reach level for each relevant range of types and SoPs.
- In addition to the flood cell level Do Nothing and Do Minimum scenarios, the detailed sub-reach assessment was re-focussed at flood cell level to scenarios referring to a) managing FRM with the existing form of assets (i.e. no further hardening of assets than there is presently), b) managing FRM and hardening by the least cost method, and c) managing FRM, hardening by the least cost method and also realigning when required by FRM and habitat needs. There is no simplification in this process: it was undertaken to avoid piecemeal engineering works across the temporal and spatial scope. This is particularly relevant to the large coastal floodplains, where avoidance of many different types of FRM is preferred to avoid unnecessary interface vulnerability. For example, ILIT (2006) highlighted interface issues in relation to the flooding of New Orleans in 2005.
- Environmental assessment of the potential FRM Response was carried out, documented in the SEA report (Atkins, 2011) and addendum (Atkins, 2013). This looked at impacts on both the natural and human environment. In many cases the needs of different aspects of the environment are in direct conflict. For example measures to maintain or increase the standard of protection in a particular area (and therefore benefit the human and built environment) could result in adverse effects on the Severn Estuary European site. For each flood cell the SEA identified the option that minimises overall environmental impacts and/or maximises environmental benefit. Detailed assessment of the footprint impact of the optimised FRM responses was carried out at a sub-reach level. This ensured that the footprint impacts, in combination with the realignment gains, would still ensure a positive habitat balance. Within this assessment, optimised technical solutions were strongly driven by avoidance of footprint impact on the Severn Estuary Natura 2000 site i.e. generally seaward works were avoided unless technically critical.
- The log of key health and safety issues was kept, but not developed further than for the Alignments and Types stage.

6.4 Summary of Assessment

6.4.1 Introduction

A summary of the assessment of FRM Responses is given in Table 6.1 to Table 6.7. Much greater detail is given in Appendix L to Q, including detailed socio-economic and carbon assessment of options, FCRM GiA calculation and the log of health and safety risks. Again, for clarity the summary is split into flood cells in Wales, west bank of the Midlands region, east bank of the Midlands region, and the south west region. The detailed habitat balance account, including coastal squeeze, footprint losses and realignment gains, is provided in Table 6.8.



6.4.2 Penarth to Mathern

At Penarth and Mathern (both Wales), all options return BCRs around or above unity, with the highest BCR for Sustain defences in current form with 2%AEP SoS. As iBCRs are all below unity, this is the economically preferred option. The environmentally preferred option is Improve, as a reduction in flood risk will benefit people, property, infrastructure and historic assets. All Maintain or Sustain options would continue to cause intertidal habitat loss by coastal squeeze and/or direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option is Sustain defences in current form with 2%AEP SoS.

At Tremorfa (Wales), all options return high BCRs, with the highest BCR for Sustain defences in current form with 2%AEP SoS. As iBCRs are well above unity for all %AEP, the economically preferred option is Sustain defences in current form with 0.1%AEP SoS. The environmentally preferred option is Improve, as a reduction in flood risk will benefit people, property, infrastructure and historic assets. All Maintain or Sustain options would continue to cause intertidal habitat loss by coastal squeeze and/or direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option is Sustain defences in current form with 0.1%AEP SoS.

At the Wentlooge Levels, River Ebb to River Usk, and Caldicot Levels (all Wales), all Sustain or Improve options return high BCRs, with the highest BCR for Sustain or Improve defences in current form with 2%AEP SoS. As iBCRs are well above unity for all %AEP, the economically preferred option is Improve defences in current form with 0.1%AEP SoS. The environmentally preferred option is Improve, as a reduction in flood risk will benefit people, property, infrastructure and historic assets. All Sustain or Improve options would continue to cause intertidal habitat loss by coastal squeeze and direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option for Wentlooge Levels, River Ebbw to River Usk, and Caldicot Levels is Improve defences in current form with 0.1%AEP SoS.

6.4.3 Tidenham to Gloucester Weirs

Tidenham, Purton, Bullo and Ruddle have no assets at flood risk, with preferred options of Do Nothing. Stroat offers high potential for MR for up to 39 Ha of habitat creation (short to long term), with landward flooding constrained by natural ground levels and embankments. The MR option is the only option that returns a BCR that is greater than unity. The environmentally preferred option is NAI as it supports a naturally functioning system. It has a habitat creation cost of £34K/Ha.

At Lydney all options return BCRs above unity, with the highest BCR for Sustain defences in current form with 2%AEP SoS. As iBCRs are above 5 for all %AEP, the economically preferred option is Sustain defences in current form with 0.1%AEP SoS. The environmentally preferred option is Maintain or Improve, as a maintained or reduced flood risk will benefit people, property, infrastructure and historic assets. All Maintain or Sustain options would continue to cause intertidal habitat loss by coastal squeeze and/or direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option is Sustain defences in current form with 0.1%AEP SoS.

Awre offers high potential for Adaptation. The most favourable Adaptation option under the decision rule is for localised breaching with landward flooding constrained by natural ground levels and embankments, potentially including 183 Ha of habitat creation. The Adaptation option is the only option that returns a BCR greater than unity. The environmentally preferred option is Adaptation as it supports a naturally functioning system and significant compensatory habitat creation. The habitat creation cost is £18K/Ha. The selected option is Adaptation, with the timescale to be determined by actual sea level rise.



At Newnham-on-Severn all options return BCRs above unity, with the highest BCR for Sustain defences in current form with 2%AEP SoS. As iBCRs are variable between unity and 5, the economically preferred option is Sustain defences in current form with 2%AEP SoS (Newnham-on-Severn). The environmentally preferred option is Maintain or Improve, as reduced or maintained flood risk will benefit people, property, infrastructure and historic assets. The selected option is Sustain defences in current form with 2%AEP SoS.

At Westbury-on-Severn to Rodley, the most favourable Sustain or Improve option under the decision rule is the 2%AEP SoS option. The iBCR of above unity justifies moving up to 1%AEP SoS. The environmentally preferred option is Improve, as a reduction in flood risk will benefit people, property, infrastructure and historic assets. The selected option is Improve defences in current form with 1%AEP SoS.

At Walmore Common and Minsterworth all options return BCRs above unity, with the highest BCR for Sustain defences in current form with 2%AEP SoS. As iBCRs are above 5 for all %AEP, the economically preferred option for all locations is Sustain defences in current form with 0.1%AEP SoS. The environmentally preferred option is Maintain or Improve, as a maintained or reduced flood risk will benefit people, property, infrastructure and historic assets. The selected option for all locations is Sustain defences in current form with 0.1%AEP SoS.

Minsterworth Ham offers high potential for Adaptation. The most favourable Adaptation option under the decision rule is the 2%AEP SoS option with landward embankments and individual property protection (IPP), potentially including up to 261 Ha of habitat creation. The iBCR of 5 justifies moving up to the 1%AEP SoS option. The environmentally preferred option is Adaptation as it could support a naturally functioning system and significant compensatory habitat creation as salinity increases with climate change. The habitat creation cost is £4K/Ha. The selected option is Adaptation, with the timescale to be determined by actual sea level rise.

6.4.4 Gloucester Weirs to Slimbridge

At The Rea and Stonebench all options return BCRs above unity, with the highest BCR for Sustain defences in current form with 2%AEP SoS. As iBCRs are variable between unity and 5, the economically preferred option is Sustain defences in current form with 0.5%AEP SoS (The Rea) and 1%AEP SoS (Stonebench). The environmentally preferred option is Maintain or Improve, as reduced or maintained flood risk will benefit people, property, infrastructure and historic assets. The selected option for all locations is Sustain defences in current form with SoS as defined above.

Elmore Back has similar or higher BCRs for Adaptation options compared to Maintain, Sustain or Improve options. This could provide good potential for Adaptation options in the medium to long term, and meet the strategic need for compensatory intertidal habitat to offset coastal squeeze in the Strategy area in the medium to long term, with the timescale to be determined by actual sea level rise.

At Longney, Arlingham and Slimbridge all options return BCRs above unity, with the highest BCR for Sustain defences in current form with 2%AEP SoS. As iBCRs are above 5 for all %AEP, the economically preferred option for all locations is Sustain defences in current form with 0.1%AEP SoS. The environmentally preferred option is Maintain or Improve, as a maintained or reduced flood risk will benefit people, property, infrastructure and historic assets. All Maintain or Sustain options at Slimbridge would continue to cause intertidal habitat loss by coastal squeeze and/or direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option for all locations is Sustain defences in current form with 0.1%AEP SoS.



At Upper Framilode, all Sustain or Improve options return high BCRs, with the highest BCR for Sustain or Improve defences in current form with 2%AEP SoS. As iBCRs are well above unity for all %AEP, the economically preferred option is Improve defences in current form with 0.1%AEP SoS. The environmentally preferred option is Improve, as a reduction in flood risk will benefit people, property, infrastructure and historic assets. The selected option is Improve defences in current form with 0.1%AEP SoS.

6.4.5 Berkeley to Hinkley Point

At Berkeley to Littleton-upon-Severn all Sustain or Improve options return high BCRs, with the highest BCR for Sustain or Improve defences in current form with 2%AEP SoS. The iBCRs vary between unity and 5, with the economically preferred option being Improve defences in current form with 1%AEP SoS. The environmentally preferred option is Improve, as a reduction in flood risk will benefit people, property, infrastructure and historic assets. All Sustain or Improve options would continue to cause intertidal habitat loss by coastal squeeze and direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option is Improve defences in current form with 0.5%AEP SoS.

At Avonmouth to Aust, all Sustain or Improve options return high BCRs, with the highest BCR for Sustain or Improve defences in best value hardened form with 2%AEP SoS. As iBCRs are well above 5 for all %AEP, the economically preferred option is Improve defences in best value hardened form with 0.1%AEP SoS. The environmentally preferred option is Improve, as a reduction in flood risk will benefit people, property, infrastructure and historic assets. All Sustain or Improve options would continue to cause intertidal habitat loss by coastal squeeze and direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option is Improve defences in best value hardened form with 0.1%AEP SoS.

Woodhill has no assets at flood risk, with a preferred option of Do Nothing. At Portbury all options return BCRs above unity, with the highest BCR for Sustain defences in current form with 2%AEP SoS. As iBCRs are above 5 for all %AEP, the economically preferred option is Sustain defences in current form with 0.1%AEP SoS. The environmentally preferred option is Maintain or Improve, as a maintained or reduced flood risk will benefit people, property, infrastructure and historic assets. All Maintain or Sustain options would continue to cause intertidal habitat loss by coastal squeeze and/or direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option is Sustain defences in current form with 0.1%AEP SoS.

At Clevedon to Weston-super-Mare, all Sustain or Improve options return high BCRs, with the highest BCR for Sustain or Improve defences in best value hardened form with 2%AEP SoS. As iBCRs are well above 5 for all %AEP, the economically preferred option is Improve defences in best value hardened form with 0.1%AEP SoS. The environmentally preferred option is Improve, as a reduction in flood risk will benefit people, property, infrastructure and historic assets. All Improve options would continue to cause intertidal habitat loss by coastal squeeze and direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option is Improve defences in current form with 0.1%AEP SoS.

Brean to Burnham-on-Sea and Pawlett have similar or higher BCRs for Adaptation options compared to Maintain, Sustain or Improve options. They could provide good potential for Adaptation options in the medium to long term, and meet the strategic need for compensatory intertidal habitat to offset coastal squeeze in the Strategy area in the medium to long term, with the timescale to be determined by actual sea level rise. As iBCRs are well above 5 for all %AEP, the economically preferred option for all locations is to provide 0.1%AEP SoS.

At Huntspill all options return BCRs above unity, with the highest BCR for Sustain defences in best value hardened form with 2%AEP SoS. As iBCRs are well above 5 for all %AEP, the



economically preferred option for all locations is Sustain defences in best value hardened form with 0.1%AEP SoS. The environmentally preferred option is Maintain/Sustain, as no increase in flood risk will benefit people, property, infrastructure and historic assets. The Maintain or Sustain options would continue to cause intertidal habitat loss by coastal squeeze and/or direct footprint increase impacts within the Severn Estuary SPA, SAC and Ramsar. The selected option for all locations is Sustain defences in best value hardened form with 0.1%AEP SoS.

Stearth offers high potential for MR for up to 237 Ha of habitat creation in the short term (potentially increasing to 302 Ha after the short term), combined with Stearth village road access protection via embankments. The MR option (2%AEP SoS) is initially selected as the economically preferred option, with iBCRs not warranting any high SoS. The environmentally preferred option is MR as it supports a naturally functioning system and significant compensatory habitat creation. It has a habitat creation cost of £83K/Ha.

6.4.6 Switching Point Analysis

Aggregate Dredging

The potential impact of continued dredging of sandflats is broadly estimated to be a reduction in licensed sandflat levels of up to 0.1m by 2030, 0.2-0.3m by 2060, and 0.3-0.6m by 2110. Testing of the potential influence on extreme wave heights indicated that for the most sensitive areas (the Gwent Levels and Somerset Levels), the impact on wave climate could be up to +10% by 2110, noted to be within the accuracy of the wave prediction method. This potential increase in extreme wave heights was found to generally reduce SoP by one interval i.e. an SoP of 1% AEP would reduce to 2% AEP. This level of change would not impact on the High Level Options and Alignment and Types option stages. However, it would marginally affect the FRM Responses stage, by requiring increased raising or hardening of embankments in the long term.

Avonmouth Docks Deep Water Expansion

The proposed Avonmouth Dock expansion would not impact on the High Level Option stage, as Improve FRM for the flood cell would still be preferred. However, dependent on partnering opportunities with Bristol Port Company, the Alignment and Type and FRM Response stages could be significantly changed. If a partnering solution is found, the proposed quay could result in continuation of the existing defence line. If not, potentially an inland defence along the dock perimeter would be preferred.

Nuclear Power Station Proposals

The Oldbury proposals indicate that the in-estuary redevelopment area would be predominantly within the existing tidal reservoir area. The potential High Level Options, Alignment and Types and FRM Responses would only be strengthened by the potential redevelopment. The Hinkley proposals would have a similar influence.

Severn Tidal Power Proposals

Consideration of the potential construction cost of a Severn tidal power structure is given in DECC (2010). Dependent on the structure and operation of the long-listed options, it could be considered conceptually that all upstream tidal flood damages are avoided. A broad comparison of costs and benefits (Atkins, 2013) clearly indicates that BCRs range between 0-0.3 for the inner to outer estuary options. This indicates that such a structure would not be developed with the sole purpose of flood risk management.

Variation in Climate Change

The rate of sea level rise, whilst not providing a clear switching point in itself, was assessed to determine how different UKCP09 scenarios relate to the Defra (2006) guidance. This identified



that in the short term there is greater certainty as regards sea level rise, storminess and river flow. For example, the sea level rise potentially ranges from 0.05-0.2m (UKCP09), with a core scenario of 0.1m (UKCP09). This level of variation would not significantly influence the potential strategy. However, in the medium to long term there is reduced certainty in sea level rise, storminess and river flow. Again, the potential range of sea level rise is 0.3-1m (UKCP09), with a core scenario of 0.7m. The potential strategy in the medium to long term could be strongly influenced by this uncertainty. As tide gauge monitoring indicates a recent trend of c2mm/year, compared to the average 5mm/year planned for up to 2030, it is possible that the amount of habitat compensation (and defence realignment), defence raising and/or hardening could be significantly reduced.



LOCATION			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach		Economically preferred option	Technical solution and epochal timing
Penarth	FC1-P	SR1-P	Maintenance and improvement of the existing wall is socio-economically marginal. Above 2% SoP the BCR is <1, with 2% SoP having a marginal BCR. Inclusion of foreshore management in the medium to long term would reduce the BCR<1.	2% SoP with defences improved in their current form when and where necessary. BCR of 1.3, with iBCR of 4.	Penarth sea wall raised with a 1m wave recurve in the medium to long term, with toe maintained/protected.
Tremorfa	FC1-0	SR1-CF	Maintenance and improvement of the existing structures (BCR of 244 to 412 dependent on SoP) does not require further hardening, with continued toe protection required.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 304, with iBCR of 248.	Cardiff Flats frontage maintained with rock armouring on front face and toe.
		SR1-RRWB			Cardiff Flats frontage maintained with rock armouring and man made ground levels.
		SR1-RRWB1			River Rhymney west bank embankments being maintained generally and a short length raised in the short term. Embankments raised by up to 0.8m in the medium to long term.
Wentlooge Levels	FC1-1	SR1-RREB	Assessment of potential alignment options of primary defence line (BCR of 70 to 235 dependent on SoP and type) or realigned (BCR of 93 to 104 dependent on SoP) indicates the primary line is socio-economically preferred. Assessment of the types of primary defence (embankments, rock armouring, revetments, polders, wave recurve walls, toe protection) indicates that improvements of the current type are preferred (BCR of 169 to 235, in comparison to a BCR of 70 to 80), with wider foreshore management in the form of polders and toe protection being required.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 169, with iBCR of 58.	River Rhymney east bank embankments being maintained generally and a short length raised in the short term. Embankments raised by up to 0.6m in the medium to long term.
		SR1-0			Maintenance of armoured earth embankment at Little Wharf in the short to medium term, with potential for polder development. Raising by up to 0.6m in the long term.
		SR1-1			Continued maintenance of polders, rock armouring and earth embankment at Rumney Great Wharf in the short to medium term. Raising of embankment by up to 1m in the long term.
		SR1-2			Continued maintenance of polders and rock armouring, and earth embankment raising by up to 0.6m, at Sluice Farm in the short term. Raising of earth embankment by up to 1m in the long term.
		SR1-3			Continued maintenance of earth embankment and rock armouring in the short term. Raising of earth embankment by up to 1.3m in the medium to long term.
		SR1-4			Continued maintenance of concrete revetment in the short to long term. No raising required.
		SR1-5			Continued maintenance of concrete revetment in the short to long term. No raising required.
		SR1-6			Continued maintenance of earth embankment and rock armouring in the short to medium term. Raising of earth embankment by up to 0.6m in the long term.
		SR1-REWB			Continued maintenance of earth embankment in the short to medium term. Raising of earth embankment by up to 0.5m in the long term.

Table 6.1 – FRM Response assessment (Wales).



LOCATION			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach		Economically preferred option	Technical solution and epochal timing
River Ebbw - River Usk	FC1-2	SR1-REEB	Assessment of the types of primary defence (embankments, rock armouring, revetments, vertical walls) indicates that improvements in the current type, along with new wall construction along the River Usk, are preferred (BCR of 31 to 44, compared to BCR of 15 to 16).	0.1% SoP with defences improved in their current form when and where necessary. BCR of 31, with iBCR of 10.	Continued maintenance of earth embankment in the short term. Raising of earth embankment by up to 1m in the medium to long term.
		SR1-RUWB1			Continued maintenance of dock defences; no raising required.
		SR1-RUWB2			New wall constructed near Transporter Bridge on River Usk west bank in the short term, with wider raising in the medium and long term.
		SR1-RUWB3			Continued maintenance of various defences in the short to medium term. Raising of defences by up to 0.9m in the long term.
Caldicot Levels	FC2-0	SR2-RUEB1	Assessment of potential alignment options of primary defence line (BCR of 47 to 93 dependent on SoP and type) or realigned (BCR of 55 to 71 dependent on SoP) indicates the primary line is socio-economically preferred. Assessment of the types of primary defence (embankments, rock armouring, revetments, polders, wave recurve walls, toe protection) indicates that improvements in the current type are preferred (BCR of 66 to 93, in comparison to a BCR of 47 to 86), with wider foreshore management in the form of toe protection being required.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 66, with iBCR of 18, although marginal with defence hardening, and also long term realignment.	Variable level of ground raising/defences in long term.
		SR2-RUEB2			Raising of earth embankment by up to 0.6m (near Transporter Bridge on the River Usk east bank) in the short term. Continued raising in the medium to long term up to 1m.
		SR2-RUEB3			Maintenance in the short to medium term. Raising of wall by up to 0.6m in the long term.
		SR2-RUEB4			Riverside scheme recently constructed.
		SR2-RUEB5			Maintenance in the short to long term.
		SR2-0			Continued maintenance of revetment and wave recurve in the short to long term. No raising required.
		SR2-1			Continued maintenance of revetment in the short to medium term. Up to 0.4m revetment raising in the long term.
		SR2-2			Continued maintenance of revetment in the short to medium term. Up to 0.4m revetment raising in the long term.
		SR2-3			Continued maintenance of earth embankment in the short to medium term. Raising of earth embankment, with toe protection, by up to 0.7m in the long term.
		SR2-4			Continued maintenance of earth embankment and rock armouring in the short term, with raising of up to 0.2m. Further raising of up to 1m in the medium to long term.
		SR2-5			Continued maintenance of earth embankment in the short term, with raising of up to 0.1m. Further raising of up to 1m in the medium to long term, with rock armouring.
		SR2-6			Continued maintenance of earth embankment in the short term, with raising of up to 0.4m. Further raising of up to 1m in the medium to long term.
Mathern	FC2-1	SR2-7	Assessment of potential alignment options of primary defence line (BCR of 1 to 3 dependent on SoP and type) or realigned (BCR of 1 to 2 dependent on SoP) indicates there is little difference between these options although the primary defence line is marginally preferred. Assessment of the types of primary defence (embankments, rock armouring, revetments, wave recurve walls, toe protection) indicates that defence hardening when necessary is marginally preferred (BCR of 1.2 to 2.6, in comparison to a BCR of 1.3 to 2.2).	2% SoP with defence hardening when and where necessary, although marginal with improvements in current form or secondary alignment. BCR of 2.2, with iBCR of 1.	Maintenance of rock armoured embankment in the short term, with raising of up to 0.8m in the medium to long term.
		SR2-8			Maintenance of earth embankment in the short to medium term, with raising of up to 0.7m in long term.

Table 6.2 – FRM Response assessment (Wales continued).



LOCATION			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach		Economically preferred option	Technical solution and epochal timing
Tidenham	FC3-1	SR3-0	No maintenance. Railway embankment is present with failing tide flaps.	No maintenance. Railway embankment is present with failing tide flaps.	No maintenance. Railway embankment is present with failing tide flaps.
		SR3-1			
		SR3-2			
Stroat	FC3-2	SR3-3	No maintenance. Railway embankment is present with failing tide flaps.	No maintenance. Railway embankment is present with failing tide flaps. Fronting FRM embankments were breached for local BAP scheme.	No maintenance. Railway embankment is present with failing tide flaps. Fronting FRM embankments were breached for local BAP scheme.
		SR3-4			
Lydney	FC3-3	SR3-5	Assessment of potential alignment options of primary defence line (BCR of 14 to 23 dependent on SoP and type) or realigned (BCR of 9 to 11 dependent on SoP) indicates the realignment is socio-economically preferred, and supported in the long term by the habitat assessment.	0.1% SoP with defences maintained in their current form. BCR of 13, with iBCR of 6.	Maintenance of earth embankment, with raising of up to 1.3m in the medium to long term
Purton	FC4-1	SR4-0	No maintenance of defences.	No maintenance of defences.	No maintenance of defences.
Awre	FC4-3	SR4-2	Assessment of potential alignment options of primary defence line or realigned to high ground indicates that the primary defence line is not socio-economically viable with the decision rule.	Potential adaptation at Awre, to high ground. Full GiA funding for realignment.	Potential adaptation in the short to medium term to high ground.
Bullo	FC4-4	SR4-3	No maintenance of defences.	No maintenance of defences.	No maintenance of defences. High ground present.
Ruddle	FC4-5	SR4-3	No maintenance of defences.	No maintenance of defences.	No maintenance of defences. High ground present.
Newnham-on-Severn	FC4-6	SR4-3	Assessment of the existing defence indicates that improvements in the current type have a BCR of 4 to 8. Sustaining 2% SoP with raising of the embankment is economically supported.	2% SoP with defences maintained in their current form when and where necessary. BCR of 8, with iBCR of 2.	Maintenance of earth embankment from the short term, with raising in the medium to long term.
Westbury-on-Severn and Rodley	FC4-7	SR4-4	Assessment of potential alignment options of existing line (BCR of 13 to 17 dependent on SoP) or realigned at Westbury (BCR of 6 to 7 dependent on SoP) indicates the existing alignment is socio-economically preferred.	1% SoP with defences improved in their current form when and where necessary. BCR of 16, with iBCR of 5. Partial GiA funding in the short term.	Raising of earth embankment by 0.3m in the short term, with further raising of up to 0.8m in the medium to long term.
		SR4-5			No maintenance of defences. High ground present.
		SR4-6			Maintenance of earth embankment into the future.
Wallmore Common	FC4-8	SR4-8	Assessment of the existing defence indicates that improvements in the current type have a BCR of 31 to 35. Sustaining 0.1% SoP with raising of the embankment is economically supported.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 31, with iBCR of 12.	Raising of earth embankment by up to 0.4m in the medium to long term.
Minsterworth	FC4-9	SR4-9	Assessment of the existing defence indicates that improvements in the current type have a BCR of 49. Sustaining 0.1% SoP with raising of the embankment is economically supported.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 49 with iBCR of 7.	Raising of earth embankment by up to 0.3m in the long term.
Minsterworth Ham	FC4-10	SR4-10	Assessment of potential alignment options of existing line (BCR of 3 to 14 dependent on SoP) or realigned with resilience measures (BCR of 29 to 38 dependent on SoP) indicates the realignment is socio-economically preferred, as well as being supported by the habitat assessment.	Potential adaptation at Minsterworth Ham with 1% SoP into the future, BCR of 38 and iBCR of 1. Full GiA funding for realignment.	Potential adaptation with cut off embankments or property protection.

Table 6.3 – FRM Response assessment (Midlands west bank).



LOCATION			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach		Economically preferred option	Technical solution and epochal timing
The Rea	FC5-3	SR5-0	Assessment of the existing defence indicates that improvements in the current type have a BCR of 3 to 15 dependent on BCR. Sustaining 0.5% SoP with raising of the embankment is economically supported.	0.5% SoP with defences improved in their current form when and where necessary. BCR of 18, with no iBCR.	Raising of earth embankment by up to 0.9m in the medium to long term.
Stonebench	FC5-4	SR5-1	Assessment of the existing defence indicates that improvements in the current type have a BCR of 1 to 4 dependent on BCR. Sustaining 1% SoP with raising of the embankment is economically supported.	1% SoP with defences improved in their current form when and where necessary. BCR of 4, with no iBCR.	Raising of earth embankment by up to 1.1m in the long term.
Elmore Back	FC5-5	SR5-2	Assessment of potential alignment options of existing line (BCR 1 to 2 dependent on SoP) or realigned (BCR of 1 to 2 dependent on SoP) indicates that either option is socio-economically preferred, and are marginally viable.	2% SoP with defences maintained in their current form, with potential adaptation in the medium term. BCR of 1.7, with no iBCR.	Maintenance of earth embankment in the short term. Potential adaptation with construction of ring banks around the main access road with property protection in the medium term.
Longney	FC5-6	SR5-3	Assessment of potential alignment options of existing line (BCR of 17 to 18) or realigned (BCR of 6 to 7 dependent on SoP) indicates that improvements along the existing line are economically preferred.	0.1% SoP with defences maintained in their current form. BCR of 17, with iBCR of 10.	Maintenance of earth embankment in the short term. Raising of earth embankment by up to 0.5m in the medium to long term.
Upper Framilode	FC5-7	SR5-4	Assessment of the existing defence indicates that improvements in the current type have a BCR of 35 to 85 dependent on SoP. Improving 0.1% SoP with raising of the embankment is the preferred option.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 35, with iBCR of 29. Full to partial GiA funding for short term works.	Raising of earth embankment by 0.6m in the short to long term.
		SR5-6			Raising of earth embankment by 0.1m in the long term.
Arlingham	FC5-8	SR5-5	Assessment of potential alignment options of existing line (BCR of 32 to 47) or realigned (BCR of 25) indicates the existing alignment is economically preferred over realignment in the long term.	0.1% SoP with defences improved in their current form. BCR of 11, with iBCR of 11.	Raising of earth embankment by up to 0.9m in the long term.
Slimbridge	FC5-9	SR5-7	Assessment of potential alignment options of existing line (BCR of 20) or realigned (BCR of 3 to 7 dependent on SoP) indicates the existing alignment is socio-economically preferred, over realignment in the short term.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 11, with iBCR of 83.	Maintenance of canal bank into the future.
		SR5-8			Raising of earth embankment by up to 0.5m in the long term.

Table 6.4 – FRM Response assessment (Midlands east bank).



LOCATION			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach		Economically preferred option	Technical solution and epochal timing
Berkeley	FC6-1	SR6-0	Assessment of the types of primary defence (embankments, rock armouring, revetments, wave recurve walls, toe protection) indicates that improvements to the existing form when necessary are preferred (BCR of 7 to 21, in comparison to a BCR of 4 to 9, dependent on SoP). The BCRs support a 1% SoP socio-economically.	1% SoP with defences improved in their current form when and where necessary. BCR of 8, with iBCR of 3. Partial FDGiA funding for short term works.	Raising of 0.3m in the short term. Further raising of earth embankment in the medium to long term by 1m.
Shepperdine	FC6-2	SR6-1			Raising of short lower section by 0.6m in the short term. Further raising of earth embankment in the medium to long term by 1m.
		SR6-2a			Raising of 0.3m in the short term. Further raising of earth embankment in the medium to long term by 1m.
		SR6-2b			Raising of earth embankment in the medium to long term by 0.7m.
		SR6-2c			Raising of 0.1m in the short term. Further raising of earth embankment in the medium to long term by 1m.
Littleton-upon-Severn	FC6-3	SR6-3			Raising of 0.1m in the short term. Further raising of earth embankment in the medium to long term by 1m.
		SR6-4			Raising of 0.1m in the short term. Further raising of earth embankment in the medium to long term by 1m.
Avonmouth to Aust	FC7-0	SR7-0	Assessment of the types of primary defence (embankments, rock armouring, revetments, wave recurve walls, toe protection) indicates that defence hardening (with wave recurve walls) when necessary is marginally preferred (BCR of 41 to 85, in comparison to a BCR of 53 to 82). Assessment of potential alignment options around the docks (using the proposed dock expansion quay level as a defence, or constructing a new defence along the landward dock perimeter) indicates the seaward alignment is marginally socio-economically preferred. The preferred option will be dependent on the partnering approach with BPC.	0.1% SoP with defence hardening when and where necessary, although marginal with back line around Avonmouth Docks. BCR of 58, with iBCR of 17. Partial GiA funding for short term works.	Raising of earth embankment by 0.4m in the short term, with a further raising of 1.4m or 1m wave recurve wall in the medium to long term.
		SR7-1			Maintenance of wave wall and revetment into the future.
		SR7-2			Maintenance of revetment into the future.
		SR7-3			Maintenance of wave wall and revetment into the future.
		SR7-4			Maintenance of railway embankment in the short to medium term. Addition of 0.6m wave recurve wall in the long term, by agreement.
		SR7-5			Dependent on partnership with BPC deep water expansion. High quay level would provide flood defence. Otherwise landward wall constructed in short term.
		SR7-6			Dependent on partnership with BPC. New seaward embankment construction, 0.7m above ground level in short term, then with up to 1.7m raising in medium to long term. Otherwise landward wall constructed in short term.
		SR7-7			
		SR7-8			
Portbury	FC8-0	SR8-0	Assessment of the existing defence indicates that improvements in the current type have an extremely high BCR. Sustaining 0.1% SoP with maintenance in the long term is the preferred option.	Existing SoP with defences maintained in their current form when and where necessary. BCR of 188, with no iBCR.	Maintenance of defences from the short to long term.
Woodhill	FC8-1	SR8-1	No maintenance of defences.	No maintenance of defences.	No maintenance of low wall and promenade.

Table 6.5 – FRM Response assessment (South West).



LOCATION			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach		Economically preferred option	Technical solution and epochal timing
Clevedon to Weston-Super-Mare	FC9-0	SR9-0	Assessment of potential alignment options of primary defence line (BCR of 172 to 431 dependent on SoP and type) or realigned (BCR of 109 to 309 dependent on SoP) indicates the existing alignment is marginally socio-economically preferred. Assessment of the types of primary defence (embankments, rock armouring, revetments, polders, wave recurve walls, toe protection) indicates that defence hardening is very marginally preferred (BCR of 172 to 431, in comparison to a BCR of 172 to 430) where the existing alignment is maintained, with foreshore management in the form of sand beach recharge and toe protection being required.	0.1% SoP with defence hardening when and where necessary. BCR of 311, with iBCR of 82. Full GiA funding for short term works.	Maintenance of vertical wall into the future.
		SR9-1			Raising of vertical wall by 1m in the medium to long term.
		SR9-2			Wave recurve wall addition of 0.6m in the long term.
		SR9-3			Maintenance of high ground into the future.
		SR9-4			Rock armouring and raising of embankment by 0.5m in the long term.
		SR9-5			Revetment raising by up to 1.8m in the long term.
		SR9-6			Revetment raising by up to 2m in the medium to long term.
		SR9-7			Revetment raising by up to 2m in the medium to long term.
		SR9-CYRB			Recent scheme has addressed low spots with minor realignment in the short term. Further embankment raising by up to 1m in the medium to long term.
		SR9-CYLB			Recent scheme has addressed low spots with minor realignment in the short term. Further embankment raising by up to 1m in the medium to long term.
		SR9-8			Revetment raising by up to 0.4m in the short term. Further raising by up to 1.4m in the medium to long term.
		SR9-RBRB			Embankment raising by up to 0.5m in the short term. Further raising by up to 0.7m in the medium to long term.
		SR9-RBLB			Embankment raising by up to 0.3m in the short term. Further raising by up to 0.7m in the medium to long term.
		SR9-9LS			Beach recharge and raising at Sand Bay in the medium to long term
		SR9-9			Maintenance of beach into the future.
		SR9-10			Maintenance of vertical wall into the future.
		SR9-11			Maintenance of dunes into the future.

Table 6.6 – FRM Response assessment (South West continued).



LOCATION			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach		Economically preferred option	Technical solution and epochal timing
Brean to Burnham-on-Sea	FC10-0	SR9-12	Assessment of potential alignment options of primary defence line (BCR of 556 to 1657 dependent on SoP and type) or realignment around River Axe/Brean (BCR of 477 to 505 dependent on SoP) indicates the partial realignment is socio-economically preferred in the medium to long term, and supported by the habitat assessment. Assessment of the types of primary defence (embankments, rock armouring, revetments, polders, wave recurve walls, toe protection) indicates that defence hardening is marginally preferred (BCR of 567 to 1657, in comparison to a BCR of 556 to 1609), with foreshore management in the form of dune management and toe protection being required.	0.1% SoP with defence hardening when and where necessary, with localised realignment around River Axe and Brean in the medium to long term. BCR of 505, with iBCR of 734.	Maintenance of embankment in the short term, with potential adaptation and landward realignment in the medium to long term with earth embankments.
		SR9-13			Reducing maintenance in the short to medium term, with potential adaptation and landward realignment and property protection in the long term.
		SR10-0			Reducing maintenance in the short to medium term, with potential adaptation and landward realignment and property protection in the long term.
		SR10-1			Reducing maintenance in the short to medium term, with potential adaptation and landward realignment and property protection in the long term.
		SR10-2			Maintenance of dunes into the future.
		SR10-3			Maintenance of dunes into the future.
		SR10-4			Maintenance of dunes into the future.
		SR10-5			Wall raising of up to 1m in the long term, with beach management in the long term.
		SR10-6			Maintenance of revetment and wave wall into the future, with beach management in the long term.
		SR10-7			Wall raising of up to 0.3m in the long term.
		SR10-8			Embankment raising of up to 0.7m in the long term.
Huntspill	FC10-1	SR10-9a	Assessment of potential alignment options of primary defence line (BCR of 369 to 513 dependent on SoP and type) or realignment south of Huntspill river (BCR of 46 to 54 dependent on SoP) indicates the existing alignment is socio-economically preferred. However, the habitat assessment, and legal need for compensatory habitat, supports long term realignment. The BCRs support a 0.1% SoP socio-economically.	0.1% SoP with defence hardening when and where necessary. BCR of 369, with iBCR of 17.	Maintenance of embankments in the short to medium term. Embankment raising by up to 0.2m in the long term
		SR10-9b			
		SR10-9c			
Pawlett	FC10-2	SR10-RPRBa	Assessment of potential alignment options of primary defence line (BCR of 27 to 64 dependent on SoP and type) or realignment around Pawlett Ham (BCR of 20 to 23 dependent on SoP) indicates the realignment is socio-economically preferred. However, PEFRMS has identified MR here for the long term, and this is supported by the habitat assessment.	0.1% SoP with defences maintained in their current form, with managed realignment in the long term. BCR of 23, high iBCR.	Maintenance of embankment in the short term. Potential adaptation, with landward realignment with earth embankment and to high ground in the long term.
		SR10-RPRBb			
		SR10-RPRBc			
Steart Peninsula	FC11-0	SR11-RPLB	Assessment of potential alignment options of primary defence line (BCR of 1 to 2 dependent on SoP) or realignment across Steart Peninsula (BCR of 3) indicates realignment is socio-economically preferred, and also viable. The realignment details are being worked up to greater detail in the Steart project.	Managed realignment site at Steart in the short term with SoP of 2-5%. BCR of 3, no iBCR. Full GiA funding for realignment.	Landward realignment in the short term, with individual property protection and earth embankments.
		SR11-0			Maintenance into the short term only.
		SR11-1			Landward realignment in the short term, with individual property protection and earth embankments protecting main access road in the short term.
		SR11-2			Landward realignment in the short term, with individual property protection and earth embankments.
		SR11-3			
		SR11-4			
		SR11-5			

Table 6.7 – FRM Response assessment (South West continued).



Location Details	Short Term			
	Man-made and uncertain change (Ha)	Footprint impacts (Ha)	Potential habitat creation (Ha)	Overall balance (Ha)
HBU1	63	0.0	237	300
HBU2	1	0.0	0	1
HBU3	-450	-0.4	11	-439
HBU4	-4	0.0	0	-4
HBU5	-136	0.0	95	-41
HBU6	28	0.0	183	183
Upstream of HBU6		0.0		
ESTUARY TOTAL	-498	-0.4	526	28
Location Details	Medium Term			
	Man-made change (Ha)	Footprint impacts (Ha)	Potential habitat creation (Ha)	Overall balance (Ha)
HBU1	-66	-0.2	302	236
HBU2	-14	0.0	0	-14
HBU3	-797	-1.6	11	-788
HBU4	-9	-0.2	0	-9
HBU5	-19	0.0	95	76
HBU6	90	0.0	507	597
Upstream of HBU6		0.0		
ESTUARY TOTAL	-815	-2.0	915	98
Location Details	Long Term			
	Man-made change (Ha)	Footprint impacts (Ha)	Potential habitat creation (Ha)	Overall balance (Ha)
HBU1	-253	-0.7	1,071	817
HBU2	-40	0.0	0	-40
HBU3	-1,126	-3.9	11	-1,119
HBU4	-156	-0.8	0	-157
HBU5	-206	0.0	95	-111
HBU6	201	-0.8	768	968
Upstream of HBU6		0.0		
ESTUARY TOTAL	-1,580	-6.1	1,945	359

Table 6.8 – Cumulative habitat balance account at FRM Response stage.



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Appendix A : Previously Considered Options





A.1 Strategic Options from Previous Studies



Source	Previous Options	Related SEFRMS option
Tidal Severn FRM Strategy (Jacobs Babbie, March 2006)	Continue with current flood warning subject to funding	Type: Flood awareness
	Improve flood warning and forecasting	
	Continue with current maintenance practices	Type: Maintenance
	Maintain current line of defence to existing SoP	HLO: Sustain
	Raise defences to optimum SoP based on current guidance	HLO: Improve
	Managed retreat - to high ground	HLO: Manage
	Managed retreat - with new defences	
	Raise highway level	Type: New linear defence
	Construct new line of defence	
	Reinstate abandoned flood defence	
	Breach existing defences to create flood flow route	Type: Flow control
	Construct formal flood flow route	
	Reduce ground levels to improve conveyance	Type: Flow control
	De-silt the channel	
	Construct a tidal barrage	
	Manage fluvial flows upstream of Gloucester	Type: Flood storage
	Offline storage of tidal flows	
	Development control	Type: Land management
	Optimise natural defences	Type: Improve existing defence
	Improve drainage system to reduce tide locking	Type: Drainage improvements
Parrett Estuary FRM Strategy (Black and Veatch, January 2009)	Improve outfall by replacing flap gate	Type: Point structures
	Individual property protection	Type: Individual property protection
	Offline flood storage	Type: Flood storage
	Online flood storage	
	Optimise existing flood storage	
	Flood warning and flood awareness	Type: Flood awareness
	Re-engineer the banks and hold the line	Type: Improve existing defence
	Bridge and weir modifications	Type: Flow control
	Tidal Barrier	



	Channel widening	Type: Drainage improvements
	SUDS	
	Managed realignment	HLO: Manage
	Land management	Type: Land management
	Dredging	
	Development control	
	Individual property protection	Type: Individual Property Protection
Tidal Usk FRM Strategy (Halcrow, 2008)	Maintain	HLO: Maintain
	Sustain	HLO: Sustain
	Improve	HLO: Improve
	Upgrade	
	Ring dykes for key infrastructure	Type: Individual property protection
	Individual property protection	
	Floating properties	
	Demountable defences	Type: Demountable defences
	Tidal Barrage	Type: Flow control
	Tidal Barrier	
	Tidal throttle	
	Secondary line of defence	Type: Secondary defences
	Managed realignment	HLO: Manage
	Advance the existing line	Type: New linear defence
	Improve fronting mudflats	Type: Soft foreshore management
	Flood storage	Type: Flood storage
	Land management	Type: Land management
Gwent Levels FMP (Atkins, 2004)	Wave recurve walls	Type: New linear defence
	Concrete revetments	
	Earth embankments	
	Shore normal groynes	Type: Hard foreshore management
	Shore parallel breakwaters	
	Rock armouring of wharf cliff	
	Polder fields	Type: Soft foreshore management
	Foreshore recharge	



	Vegetated reinforcement of wharf cliff	
Newport to Chepstow Tidal Strategy (Atkins, 2006)	Flood warning and flood awareness	Type: Flood awareness
	Improvements to flood forecasting	
	Development control	Type: Land management
	Foreshore monitoring	Type: Monitoring
	Reactive maintenance	Type: Maintenance
	Polder trials	Type: Soft foreshore management
	Offshore sediment traps	
	Rock armouring of wharf cliff	Type: Hard foreshore management
	Offshore breakwater	
	Groynes	
	Structural reinforcement of defence	Type: Improve existing defence
	Managed realignment	HLO: Manage







A.2 Consolidation of Strategic Options from Previous Studies

Generic Type		FRM Responses
Reference	Description	
0	Do Nothing	Do Nothing
1	Monitoring	Visual inspection
		Conventional survey
		Remote survey
2	Flood awareness	Education and awareness
		Forecasting and warning
3	Land management	Agricultural practice
		Development control
		Aggregate dredging
4	Maintenance	Reactive
		Proactive
5	Soft foreshore management	Sediment recharge
		Polder fields
6	Hard foreshore management	Groynes
		Breakwaters
		Toe protection
7	Improve existing defence	Reinforcement
		Optimised geometry
8	New linear defence	Earth embankment
		Revetment
		Rock armoured embankment
		Wave recurve wall
		Concrete/masonry wall
		Ground raising
9	Secondary defences	Earth embankment
		Concrete/masonry wall
		Ground raising
10	Point structures	Pumping stations
		Outfalls
		RTE
11	Demountable/temporary defences	Demountable/temporary defences
12	Individual property protection	Stilts
		Rafts
		Flood proofing
		Ring defences
13	Flow control	Barriers
		Reduced conveyance
		Increased conveyance
14	Flood storage	Flood storage
15	Drainage improvements	SUDS/ditches





Appendix B : Flood Cell Objectives







LOCATION			NDAS AND SE SMP2 OBJECTIVES
Relevant placename	Strategic flood sub-cell	SMP2 policy unit	
Penarth	FC1-P	PEN2	<ol style="list-style-type: none"> 1. To manage the risk of flooding to people and property; 2. To manage the risk of flooding to key community, recreational and amenity facilities; 3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture; 4. To seek to minimise the impact of policies on marine operations and activities; 5. To manage the risks of flooding and erosion to critical infrastructure; 6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs; 7. To maintain the integrity of internationally designated sites and the favourable condition of their features; 8. To manage adverse impacts on nationally designated conservation sites; 9. To enhance nationally designated conservation sites, where practical; 10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.
Tremorfa	FC1-0	CAR2	<ol style="list-style-type: none"> 1. To manage the risk of flooding to people and property; 2. To manage the risk of flooding to key community, recreational and amenity facilities; 3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture; 4. To seek to minimise the impact of policies on marine operations and activities; 5. To manage the risks of flooding and erosion to critical infrastructure; 6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs; 7. To maintain the integrity of internationally designated sites and the favourable condition of their features; 8. To manage adverse impacts on nationally designated conservation sites; 9. To enhance nationally designated conservation sites, where practical; 10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.
Wentlooge Levels	FC1-1	CAR3, WEN1, WEN2	<ol style="list-style-type: none"> 1. To manage the risk of flooding to people and property; 2. To manage the risk of flooding to key community, recreational and amenity facilities; 3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture; 4. To seek to minimise the impact of policies on marine operations and activities; 5. To manage the risks of flooding and erosion to critical infrastructure; 6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs; 7. To maintain the integrity of internationally designated sites and the favourable condition of their features; 8. To manage adverse impacts on nationally designated conservation sites; 9. To enhance nationally designated conservation sites, where practical; 10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting. 11. To reduce the risk of loss of agricultural land due to flooding / erosion
River Ebbw - River Usk	FC1-2	NEW1, NEW2	<ol style="list-style-type: none"> 1. To manage the risk of flooding to people and property; 2. To manage the risk of flooding to key community, recreational and amenity facilities; 3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture; 4. To seek to minimise the impact of policies on marine operations and activities; 5. To manage the risks of flooding and erosion to critical infrastructure; 6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs; 7. To maintain the integrity of internationally designated sites and the favourable condition of their features; 8. To manage adverse impacts on nationally designated conservation sites; 9. To enhance nationally designated conservation sites, where practical; 10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.



LOCATION			NDAS AND SE SMP2 OBJECTIVES
Relevant placename	Strategic flood sub-cell	SMP2 policy unit	
Caldicot Levels	FC2-0	NEW4, NEW5, CALD1	<ol style="list-style-type: none"> 1. To manage the risk of flooding to people and property; 2. To manage the risk of flooding to key community, recreational and amenity facilities; 3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture; 4. To seek to minimise the impact of policies on marine operations and activities; 5. To manage the risks of flooding and erosion to critical infrastructure; 6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs; 7. To maintain the integrity of internationally designated sites and the favourable condition of their features; 8. To manage adverse impacts on nationally designated conservation sites; 9. To enhance nationally designated conservation sites, where practical; 10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting. 11. To reduce the risk of loss of agricultural land due to flooding / erosion 12. To manage the risk of erosion and tidal flooding to MoD ranges.
Mathern	FC2-1	CALD3	
Tidenham	FC3-1	TID1	<ol style="list-style-type: none"> 1. To manage the risk of flooding to people and property; 2. To manage the risk of flooding to key community, recreational and amenity facilities; 3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture; 4. To seek to minimise the impact of policies on marine operations and activities; 5. To manage the risks of flooding and erosion to critical infrastructure; 6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs; 7. To maintain the integrity of internationally designated sites and the favourable condition of their features; 8. To manage adverse impacts on nationally designated conservation sites; 9. To enhance nationally designated conservation sites, where practical; 10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.
Stroat	FC3-2		
Lydney	FC3-3	TID2	<ol style="list-style-type: none"> 1. To manage the risk of flooding to people and property; 2. To manage the risk of flooding to key community, recreational and amenity facilities; 3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture; 4. To seek to minimise the impact of policies on marine operations and activities; 5. To manage the risks of flooding and erosion to critical infrastructure; 6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs; 7. To maintain the integrity of internationally designated sites and the favourable condition of their features; 8. To manage adverse impacts on nationally designated conservation sites; 9. To enhance nationally designated conservation sites, where practical; 10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.



LOCATION			NDAS AND SE SMP2 OBJECTIVES
Relevant placename	Strategic flood sub-cell	SMP2 policy unit	
Purton	FC4-1	GLO1	<div>1. To manage the risk of flooding to people and property;</div> <div>2. To manage the risk of flooding to key community, recreational and amenity facilities;</div> <div>3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture;</div> <div>4. To seek to minimise the impact of policies on marine operations and activities;</div> <div>5. To manage the risks of flooding and erosion to critical infrastructure;</div> <div>6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs;</div> <div>7. To maintain the integrity of internationally designated sites and the favourable condition of their features;</div> <div>8. To manage adverse impacts on nationally designated conservation sites;</div> <div>9. To enhance nationally designated conservation sites, where practical;</div> <div>10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.</div>
Blakeney	FC4-2	GLO2	
Awre	FC4-3		
Bullo	FC4-4	GLO3	
Ruddle	FC4-5		
Newnham-on-Severn	FC4-6	GLO4	
Westbury-on-Severn and Wallmore Common	FC4-7	GLO5	
	FC4-8	GLO7	
Minsterworth	FC4-9	GLO8	
Minsterworth Ham	FC4-10	MAI1	
River Leadon	FC4-11	MAI2	
The Rea	FC5-3	MAI6	<div>1. To manage the risk of flooding to people and property;</div> <div>2. To manage the risk of flooding to key community, recreational and amenity facilities;</div> <div>3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture;</div> <div>4. To seek to minimise the impact of policies on marine operations and activities;</div> <div>5. To manage the risks of flooding and erosion to critical infrastructure;</div> <div>6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs;</div> <div>7. To maintain the integrity of internationally designated sites and the favourable condition of their features;</div> <div>8. To manage adverse impacts on nationally designated conservation sites;</div> <div>9. To enhance nationally designated conservation sites, where practical;</div> <div>10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.</div>
Stonebench	FC5-4	SHAR1	
Elmore Back	FC5-5		
Longney	FC5-6	SHAR2	
Upper Framilode	FC5-7	SHAR3, SHAR5	
Arlingham	FC5-8	SHAR4	
Slimbridge	FC5-9	SHAR7	
Berkeley	FC6-1	SEV1	<div>1. To manage the risk of flooding to people and property;</div> <div>2. To manage the risk of flooding to key community, recreational and amenity facilities;</div> <div>3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture;</div> <div>4. To seek to minimise the impact of policies on marine operations and activities;</div> <div>5. To manage the risks of flooding and erosion to critical infrastructure;</div> <div>6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs;</div> <div>7. To maintain the integrity of internationally designated sites and the favourable condition of their features;</div> <div>8. To manage adverse impacts on nationally designated conservation sites;</div> <div>9. To enhance nationally designated conservation sites, where practical;</div> <div>10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.</div> <div>11. To reduce the risk of loss of agricultural land due to flooding / erosion</div>
Shepperdine	FC6-2	SEV2, SEV3, SEV4	
Littleton-upon-Severn	FC6-3	SEV5	



LOCATION			NDAS AND SE SMP2 OBJECTIVES
Relevant placename	Strategic flood sub-cell	SMP2 policy unit	
Avonmouth to Aust	FC7-0	BRIS1, BRIS2, BRIS3	1. To manage the risk of flooding to people and property; 2. To manage the risk of flooding to key community, recreational and amenity facilities; 3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture; 4. To seek to minimise the impact of policies on marine operations and activities; 5. To manage the risks of flooding and erosion to critical infrastructure; 6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs; 7. To maintain the integrity of internationally designated sites and the favourable condition of their features; 8. To manage adverse impacts on nationally designated conservation sites; 9. To enhance nationally designated conservation sites, where practical; 10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.
Portbury	FC8-0	BRIS6	
Woodhill	FC8-1	PORT2	
Clevedon to Weston-Super-Mare	FC9-0	PORT4, KIN1, KIN3	1. To manage the risk of flooding to people and property; 2. To manage the risk of flooding to key community, recreational and amenity facilities; 3. To manage the risk of flooding to industrial, commercial and economic assets and activities, including tourism and agriculture; 4. To seek to minimise the impact of policies on marine operations and activities; 5. To manage the risks of flooding and erosion to critical infrastructure; 6. To allow natural processes and to maintain the visibility of geological exposures throughout geological SSSIs; 7. To maintain the integrity of internationally designated sites and the favourable condition of their features; 8. To manage adverse impacts on nationally designated conservation sites; 9. To enhance nationally designated conservation sites, where practical; 10. To manage the risk to scheduled sites and other internationally, nationally, regionally and locally important cultural historic environment sites and their setting.
Brean to Burnham-on-Sea	FC10-0	7d43-46, 7e01-06	
Huntspill	FC10-1	7d42	
Pawlett	FC10-2		
Steart Peninsula	FC11-0	7d32-37	11. To achieve compliance with WFD objectives 12. To prevent pollution from contaminated sources 13. To ensure critical road and rail linkages are maintained



Appendix C : Generic Filtering Matrices





C.1 Filtering guide between SMP2 policy and High Level Options

Note: Low, Medium and High refer to the level of appropriateness between SMP2 policy and High Level Option.

		HIGH LEVEL OPTION					FILTER REASONING
		NAI	Maintain FRM	Sustain FRM	Improve FRM	Adaptation	
SMP2 POLICY	No Active Intervention	High	Low	Low	Low	Medium	No Active Intervention does not allow for any construction activity (except to support H&S) and directly translates as an equivalent policy.
	Hold The Line	Low	High	High	High	Medium	Hold The Line would normally occur with Maintain, Sustain or Improve FRM is considered, although Reduce FRM and Manage FRM could be relevant in some cases.
	Advance The Line	Low	Medium	High	High	Low	Advance The Line would normally occur with an improvement in SoP, and therefore is most relevant to Sustain and Improve FRM. Within the Severn Estuary Advance The Line is not a preferred policy.
	Managed Realignment	Low	Medium	Medium	Medium	High	Managed Realignment would normally be undertaken with continued provision of existing SoP and wider FRM activity.



C.2 Filtering guide between High Level Options and Alignments and Types

Note: Low, Medium and High refer to the level of appropriateness between High Level Option and Alignments and Types.

HIGH LEVEL OPTION	GENERIC TYPE AND REFERENCE																FILTER REASONING
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	Do Nothing	Monitoring	Flood awareness	Maintenance	Individual property protection	Soft foreshore management	Hard foreshore management	Demountable/temporary defences	Improve existing defence	New linear defence	Secondary defences	Point structures	Flow control	Land management	Flood storage	Drainage improvements	
NAI	High	Medium	Medium	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	No Active Intervention does not allow for any construction activity, however continued monitoring to assess FRM asset degradation and failure, and wider flood awareness, would still occur.
Maintain	Low	High	High	High	Medium	Medium	Medium	Low	Low	Low	Low	Low	Low	Low	Low	Low	Maintain FRM would require ongoing maintenance, and potentially further construction activity in the long term to ensure structural integrity.
Sustain	Low	Medium	Medium	Medium	Medium	High	High	High	High	High	High	High	High	Medium	Medium	Medium	Sustain FRM would require more construction activity on the existing asset as well as potentially new constructed FRM assets in the medium to long term.
Improve	Low	Medium	Medium	Medium	Medium	Medium	Medium	High	High	High	High	High	High	Medium	Medium	Medium	Improve FRM would require construction activity, whether on the existing FRM asset or via new construction.
Adaptation	Low	Medium	Medium	Medium	High	Low	Low	Medium	Low	Low	Low	Low	Low	Low	Low	Low	Adaptation would consider wider FRM techniques to allow re-alignment of FRM assets to improve security.



C.3 Filtering guide between Alignments and Types and FRM Responses

Note: Low, Medium and High refer to the level of appropriateness between Alignments and Types and FRM Responses.

PHASE 2 GENERIC TYPE		PHASE 3 FRM RESPONSES	HYDRODYNAMIC APPROPRIATENESS			AESTHETIC APPROPRIATENESS		FILTER REASONING	RELEVANT FLOOD CELLS				
REFERENCE	DESCRIPTION		FLUVIAL	TIDAL	COASTAL	RURAL	URBAN						
0		Do Nothing	High	High	High	Medium	Medium	This range of FRM responses are basic FRM activities that would be carried out regardless of HD or aesthetic context.	FC1-11				
1	Monitoring	Visual inspection	High	High	High	Medium	High						
		Conventional survey	High	High	High	Medium	Medium						
		Remote survey	High	High	High	High	Medium						
2	Flood awareness	Education and awareness	High	High	High	Medium	Medium	This range of FRM responses are basic FRM activities that would be carried out regardless of HD or aesthetic context.	FC1-11				
		Forecasting and warning	High	High	High	Medium	Medium						
3	Maintenance	Reactive	Medium	Medium	Medium	Medium	Medium	Individual property protection is designed purely to improve resilience to surroundign inundation. It is not sensitive to hydrodynamic context, but dependent on construction will have variable appropriateness to aesthetic context.	FC1-11				
		Proactive	Medium	Medium	Medium	Medium	Medium						
		Stilts	Medium	Medium	Medium	Low	Medium						
4	Individual property protection	Rafts	Medium	Medium	Medium	Low	Medium	This range of FRM responses would be carried out to promote sediment retention and provide wave dissipation, hence are most relevant to the coastal context, but are not necessarily sensitive to the Groyne (timber, rock or other) are cross-shore, shore-attached structures that aim to control the transport of sediment alongshore and are most effective for non-cohesive sediment (sand and gravel), and where tidal and wave-induced currents are significant. Hence they are relevant to both tidal and coastal contexts. There is no over-riding sensitivity to aesthetic context, although as hard structures would relate more easily to an urban context.	FC1-11				
		Flood proofing	Medium	Medium	Medium	High	Medium						
		Ring defences	Medium	Medium	Medium	High	Medium						
		Sediment recharge	Low	Medium	High	Medium	Medium						
5	Soft foreshore management	Polder fields	Low	Medium	High	Medium	Medium	This range of FRM responses would be carried out to promote sediment retention and provide wave dissipation, hence are most relevant to the coastal context, but are not necessarily sensitive to the Groyne (timber, rock or other) are cross-shore, shore-attached structures that aim to control the transport of sediment alongshore and are most effective for non-cohesive sediment (sand and gravel), and where tidal and wave-induced currents are significant. Hence they are relevant to both tidal and coastal contexts. There is no over-riding sensitivity to aesthetic context, although as hard structures would relate more easily to an urban context.	FC1-2, 7-11				
6	Hard foreshore management	Groynes	Low	Medium	High	Medium	High			Breakwaters (submerged or exposed) are alongshore structures that aim to control the inshore wave environment and related sediment transport. They are most effective for non-cohesive sediment (sand and gravel). Hence they are relevant to the coastal context. There is no over-riding sensitivity to aesthetic context, although as hard structures would relate more easily to an urban context.	FC9-11		
		Breakwaters	Low	Low	High	Medium	High					Toe protection (concrete, rock, geofabric or other) aims to directly control sediment erosion at the toe of structures. Whilst predominantly used in tidal and coastal environments, they are also used in fluvial contexts. There is no over-riding sensitivity to aesthetic context, although as hard structures would relate more easily to an urban context.	FC9-11
		Toe protection	Medium	High	High	Medium	High						
7	Demountable/temporary defences	Demountable/temporary defences	High	Medium	Low	Low	High	Reinforcement of the existing FRM structure aims to increase the resilience of the asset against damage and breach, from either fluvial-tidal weiring or wave overtopping. Hence it is relevant to all hydrodynamic contexts. There is no over-riding sensitivity to aesthetic context.	FC4-5				
8	Improve existing defence	Reinforcement/hardening	Medium	Medium	High	Medium	High			Optimisation of the existing FRM asset structure (particularly the front or rear face slope and crest height) aims to improve performance where flood risk is dominated by wave overtopping i.e. coastal contexts particularly. There is no over-riding sensitivity to aesthetic context.	FC1-11		
		Optimised geometry	Medium	Medium	High	High	High	Earth embankments are designed to provide FRM primarily for wave sheltered environments, i.e. fluvial and tidal, as they are very vulnerable to damage or breach from wave overtopping. There is no over-riding sensitivity to aesthetic context, although as more natural structures would relate more easily to a rural context.	FC1-2, 7-11				
		Earth embankment	High	Medium	Low	High	Medium					Revetments (hardened embankments) are designed to withstand conditions where weiring or wave overtopping is energetic and of longer duration, primarily relevant to the tidal and coastal context. There is no over-riding sensitivity to aesthetic context, although as hard structures would relate more easily to an urban context.	FC1-11
9	New linear defence	Revetment	Medium	Medium	High	Medium	High	Rock armoured embankments and wave recurve walls are designed to dissipate wave energy in an efficient manner, and therefore are relevant to the coastal context. There is no over-riding sensitivity to Concrete/masonry walls and ground raising are designed to control weiring in an efficient manner, i.e. wave-sheltered environments. Hence they are relevant to the coastal context. Concrete/masonry walls	FC1-3, 6-11				
		Rock armoured embankment	Low	Low	High	Medium	High			Compartmentalised and secondary lines of defence are designed to control flood risk once there is some flooding inland. These are generally used for large flood cells (all within the coastal or tidal context within the Severn Estuary). Dependent on the construction used for the secondary line, there	FC1-2, 7-11		
		Wave recurve wall	Low	Low	High	Medium	High					Point structures are designed to support or improve the evacuation of water from the floodplain or adjacent rivers; appropriate to all hydrodynamic contexts. There is no over-riding sensitivity to aesthetic context.	FC1-11
		Concrete/masonry wall	High	High	Low	Medium	High						
10	Secondary defences	Ground raising	High	Low	Low	High	Medium	Reduced conveyance techniques (such as throttling and bridges) are designed to temporarily manage the magnitude of flow, and therefore are relevant to the fluvial context.	FC1-11				
		Earth embankment	Low	Medium	Medium	High	Low			Increased conveyance techniques (such as dredging and channel widening) are designed to temporarily manage the magnitude of flow, and therefore are relevant to the fluvial context. It is notable within the Severn Estuary that the magnitude of sediment in suspension results in dredging being an generally inefficient activity.	FC4-5		
		Concrete/masonry wall	Low	Medium	Medium	Low	High					Management of agricultural practice or development control is necessarily within a rural context (where agriculture takes place and there is currently no development), and would only have an FRM benefit	FC4-5
11	Point structures	Ground raising	Low	Medium	Medium	Medium	Medium	Aggregate dredging (particularly in relation to the sandbanks in the central Severn Estuary) has been considered frequently as a potential factor in reducing wave shelter to coastal FRM assets, hence is particularly relevant to the coastal context. There is no over-riding sensitivity to aesthetic context.	FC3-6				
		Pumping stations	Medium	Medium	Medium	Medium	Medium			Flood storage solutions are designed for situations where flow and volume magnitudes are temporary and finite, and therefore are relevant to the fluvial context. There is no over-riding sensitivity to aesthetic context.	FC1-11		
		Outfalls	Medium	Medium	Medium	Medium	Medium					The use of SUDS/ditches would only have an FRM benefit where run-off contributes to the primary flood risk, i.e. in a fluvial context. There is no over-riding sensitivity to aesthetic context.	FC1-3, 6-11
12	Flow control	RTE	Medium	Medium	Medium	Medium	Medium	Reduced conveyance techniques (such as throttling and bridges) are designed to temporarily manage the magnitude of flow, and therefore are relevant to the fluvial context.	FC4-5				
		Barriers	Medium	High	Medium	Medium	High			Increased conveyance techniques (such as dredging and channel widening) are designed to temporarily manage the magnitude of flow, and therefore are relevant to the fluvial context. It is notable within the Severn Estuary that the magnitude of sediment in suspension results in dredging being an generally inefficient activity.	FC4-5		
		Reduced conveyance	High	Low	Low	Medium	High					Management of agricultural practice or development control is necessarily within a rural context (where agriculture takes place and there is currently no development), and would only have an FRM benefit	FC3-6
		Increased conveyance	Medium	Low	Low	Medium	Medium						
13	Land management	Agricultural practice	High	Low	Low	High	Low	Flood storage solutions are designed for situations where flow and volume magnitudes are temporary and finite, and therefore are relevant to the fluvial context. There is no over-riding sensitivity to aesthetic context.	FC4-5				
		Development control	High	Low	Low	High	Low			The use of SUDS/ditches would only have an FRM benefit where run-off contributes to the primary flood risk, i.e. in a fluvial context. There is no over-riding sensitivity to aesthetic context.	FC4-5		
		Aggregate dredging	Low	Low	High	Medium	Medium					Flood storage solutions are designed for situations where flow and volume magnitudes are temporary and finite, and therefore are relevant to the fluvial context. There is no over-riding sensitivity to aesthetic context.	FC4-5
14	Flood storage	Flood storage	High	Low	Low	Medium	Medium	The use of SUDS/ditches would only have an FRM benefit where run-off contributes to the primary flood risk, i.e. in a fluvial context. There is no over-riding sensitivity to aesthetic context.	FC4-5				
15	Drainage improvements	SUDS/ditches	Medium	Medium	Medium	Medium	High			The use of SUDS/ditches would only have an FRM benefit where run-off contributes to the primary flood risk, i.e. in a fluvial context. There is no over-riding sensitivity to aesthetic context.	FC4-5		

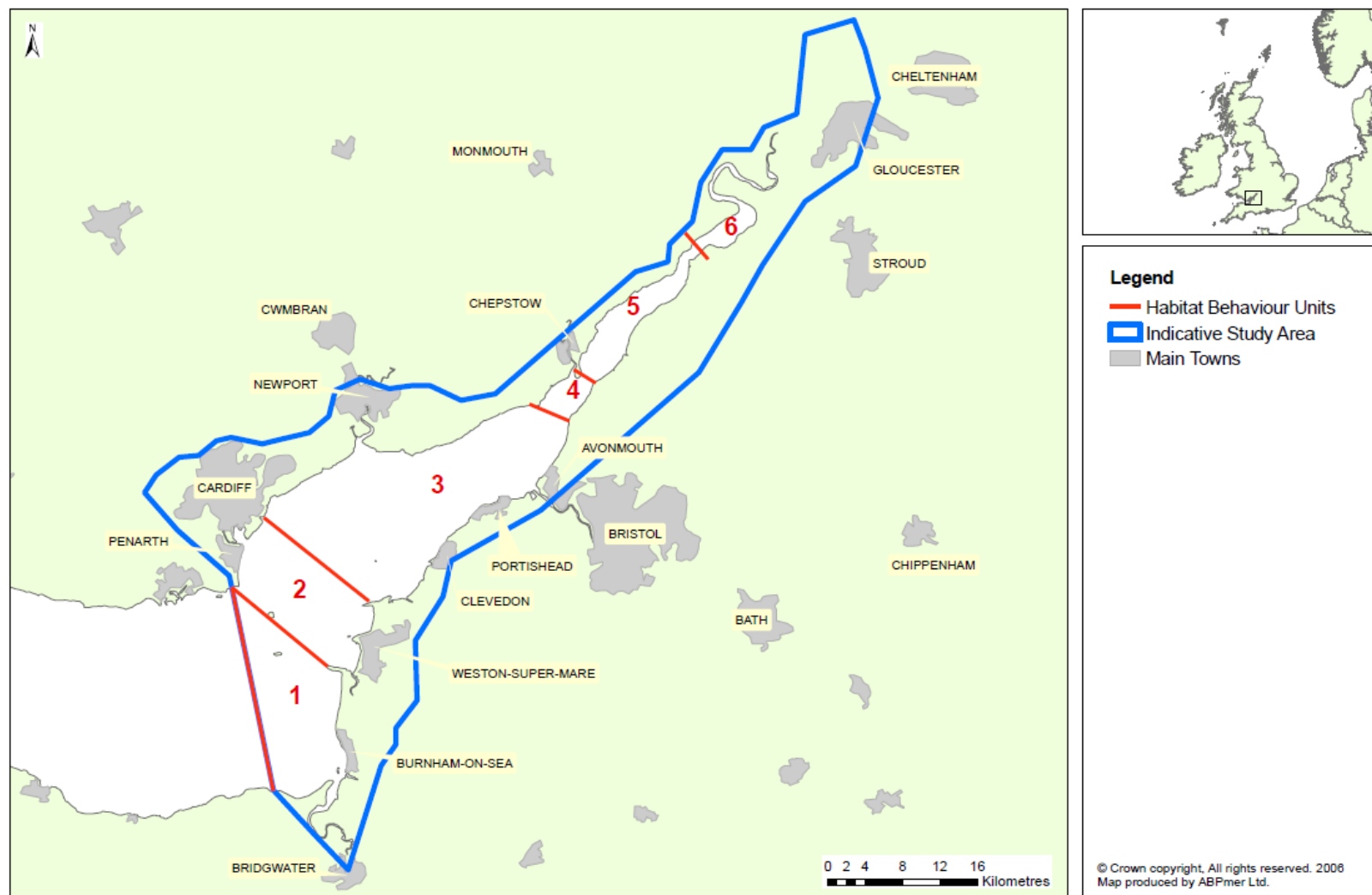




Appendix D : Scales of Assessment



D.1 Estuary Wide with Habitat Behaviour Units

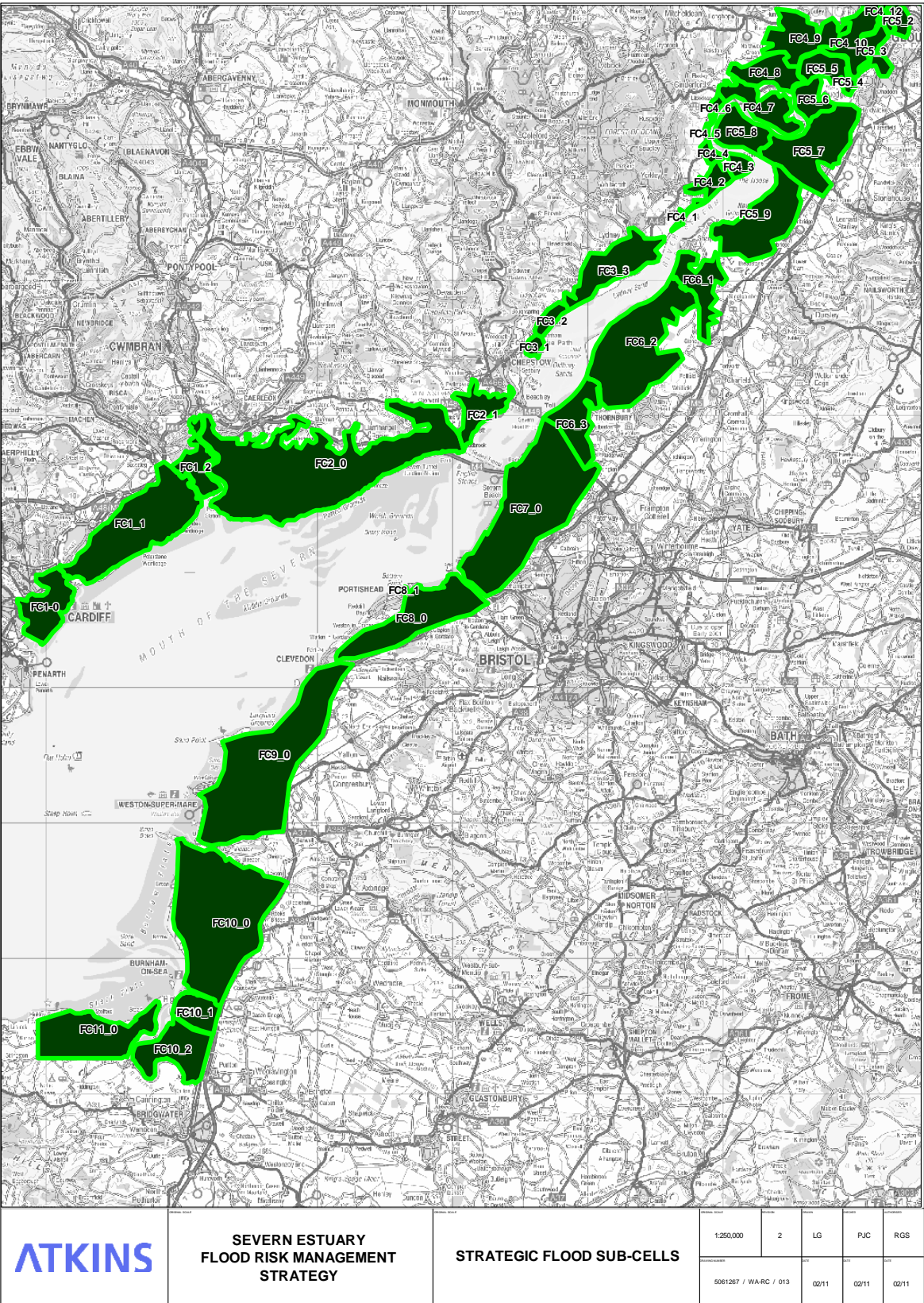


Habitat Behaviour Units





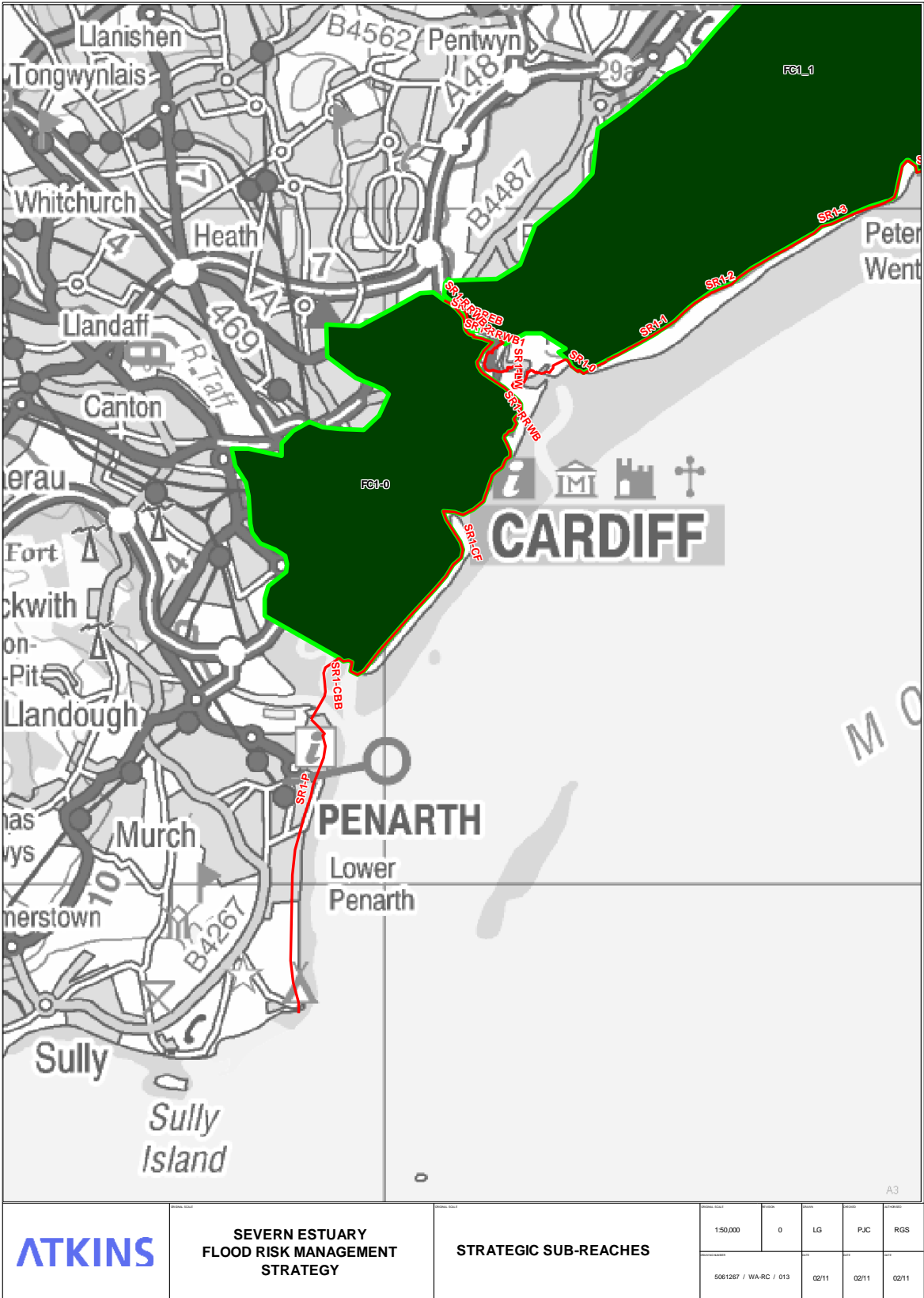
D.2 Flood Cells



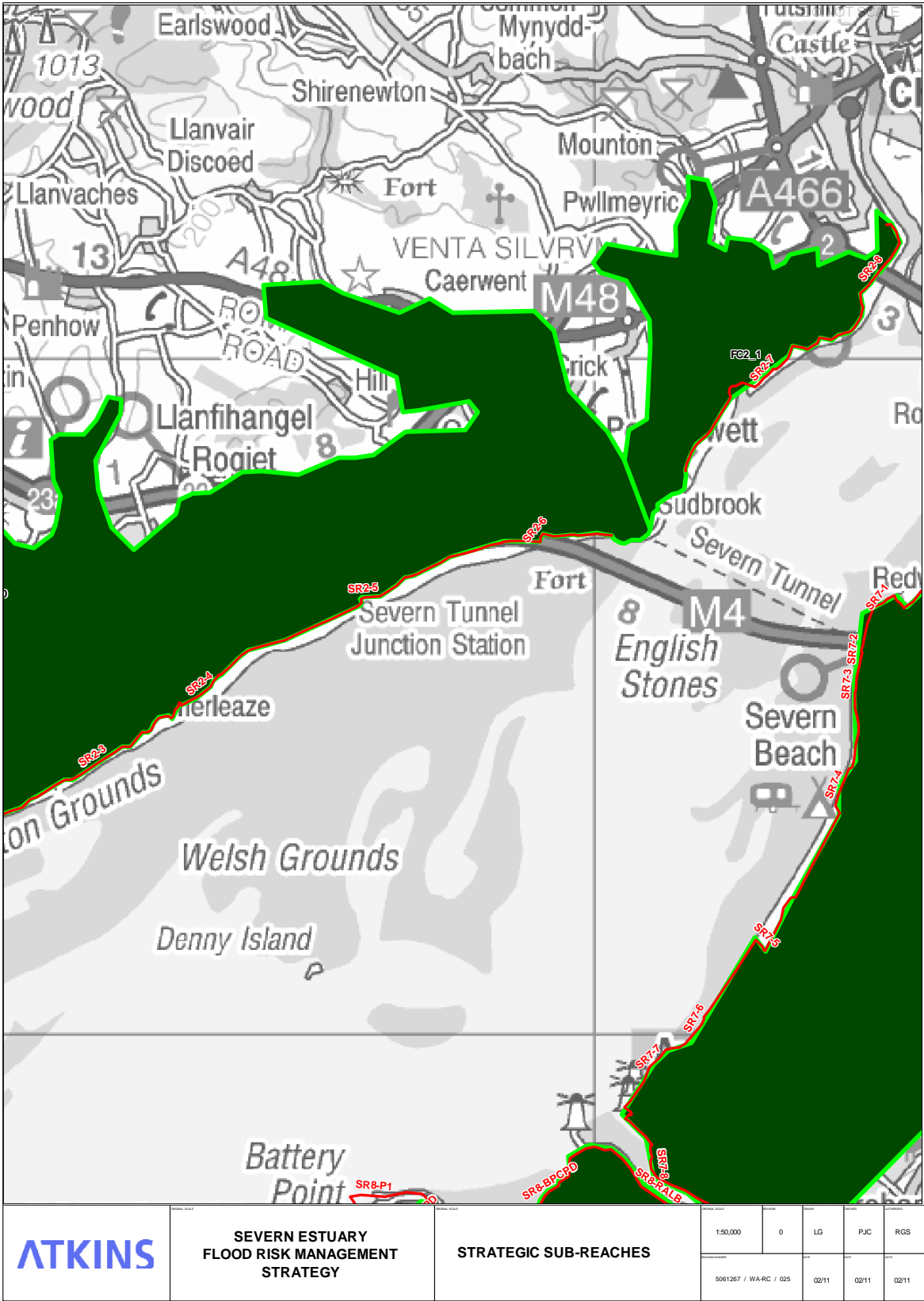


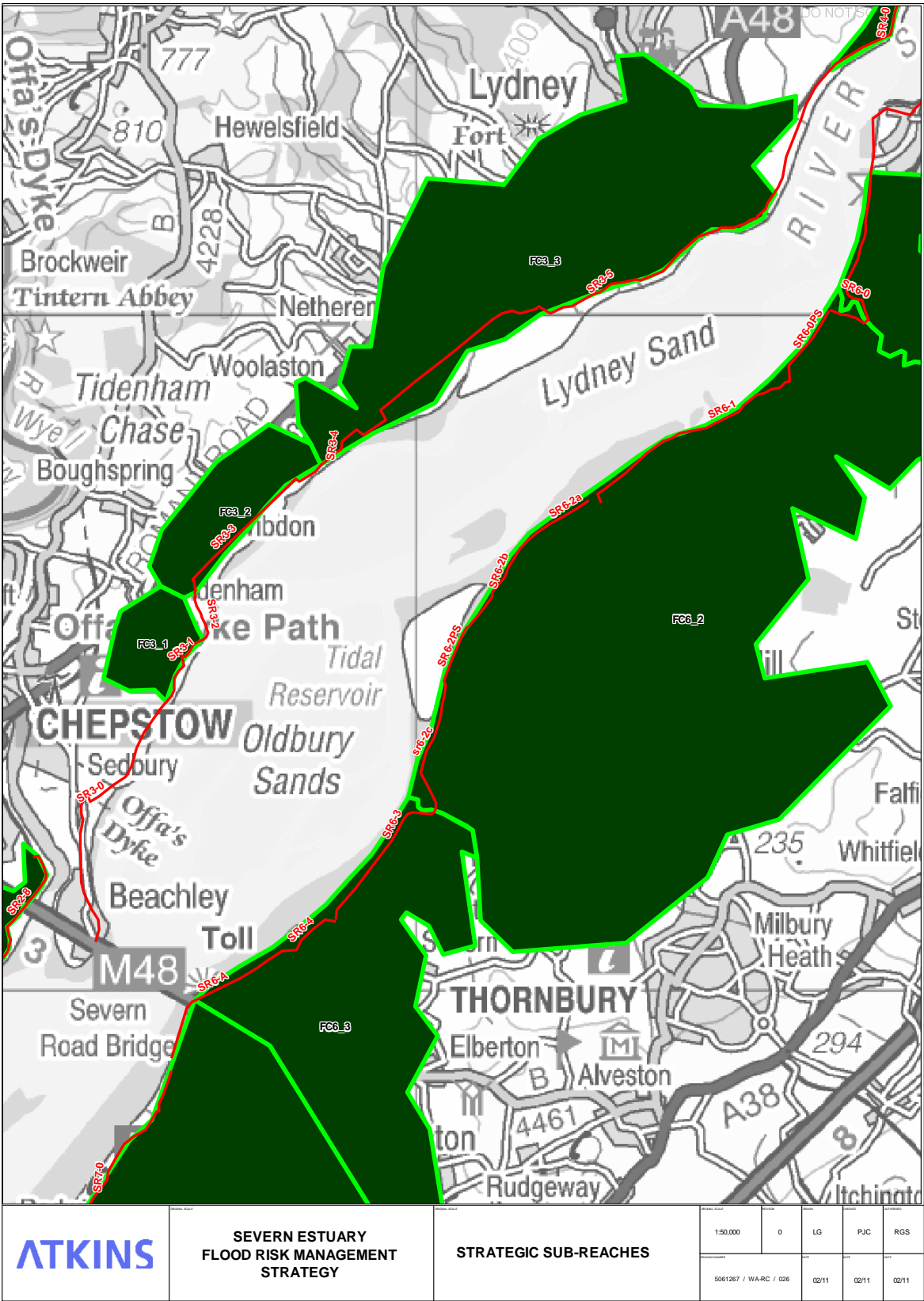


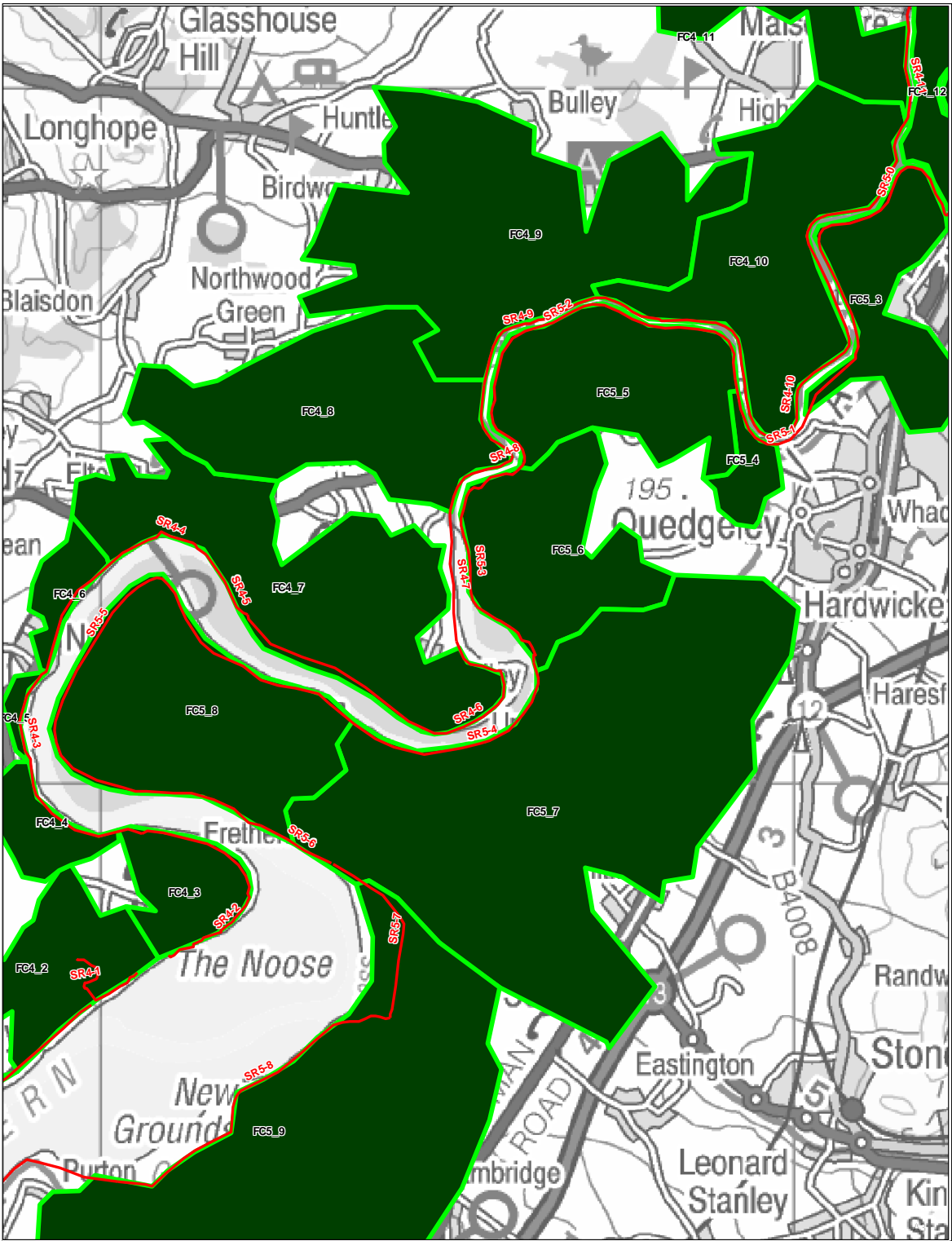
D.3 Sub-reaches




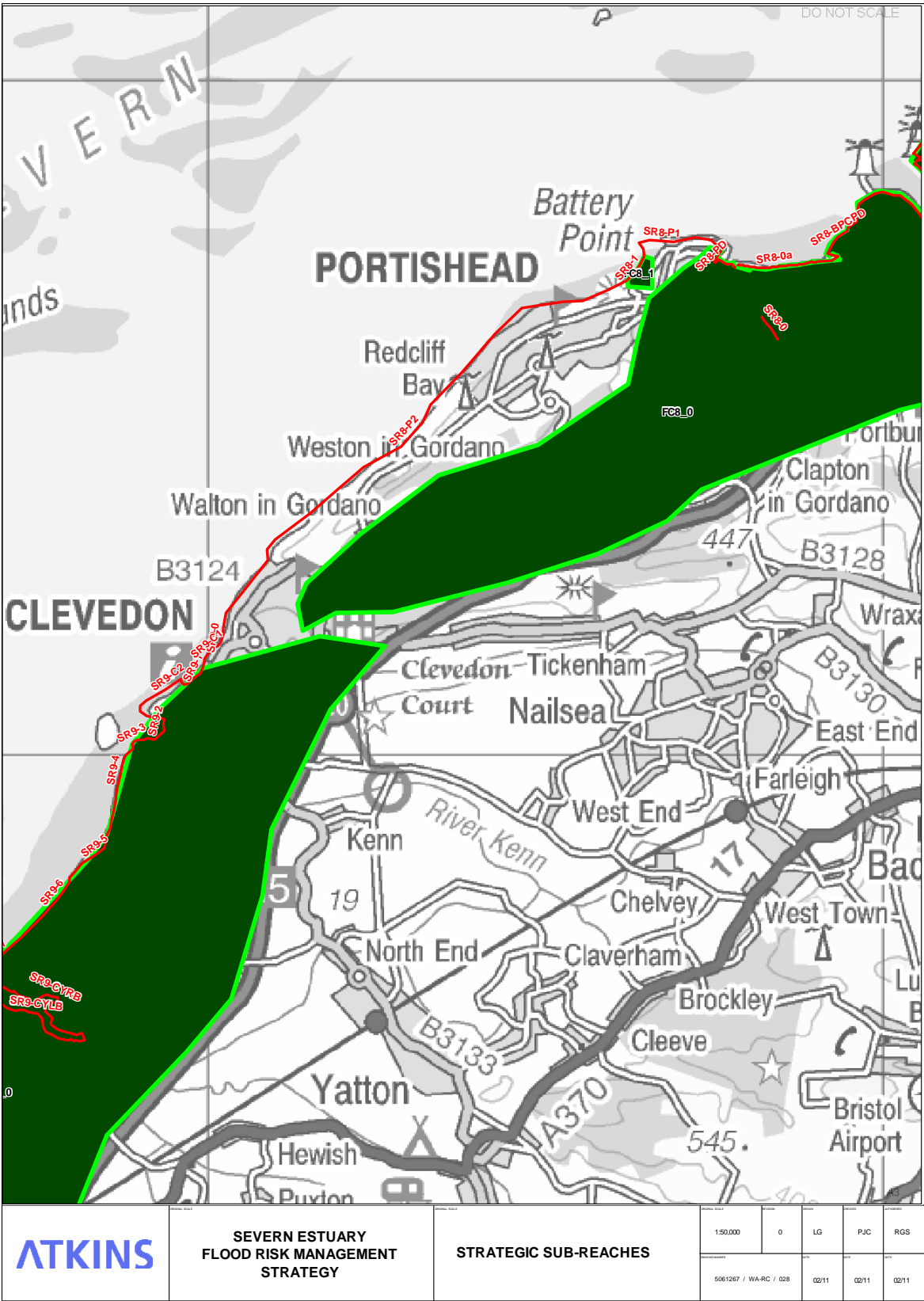








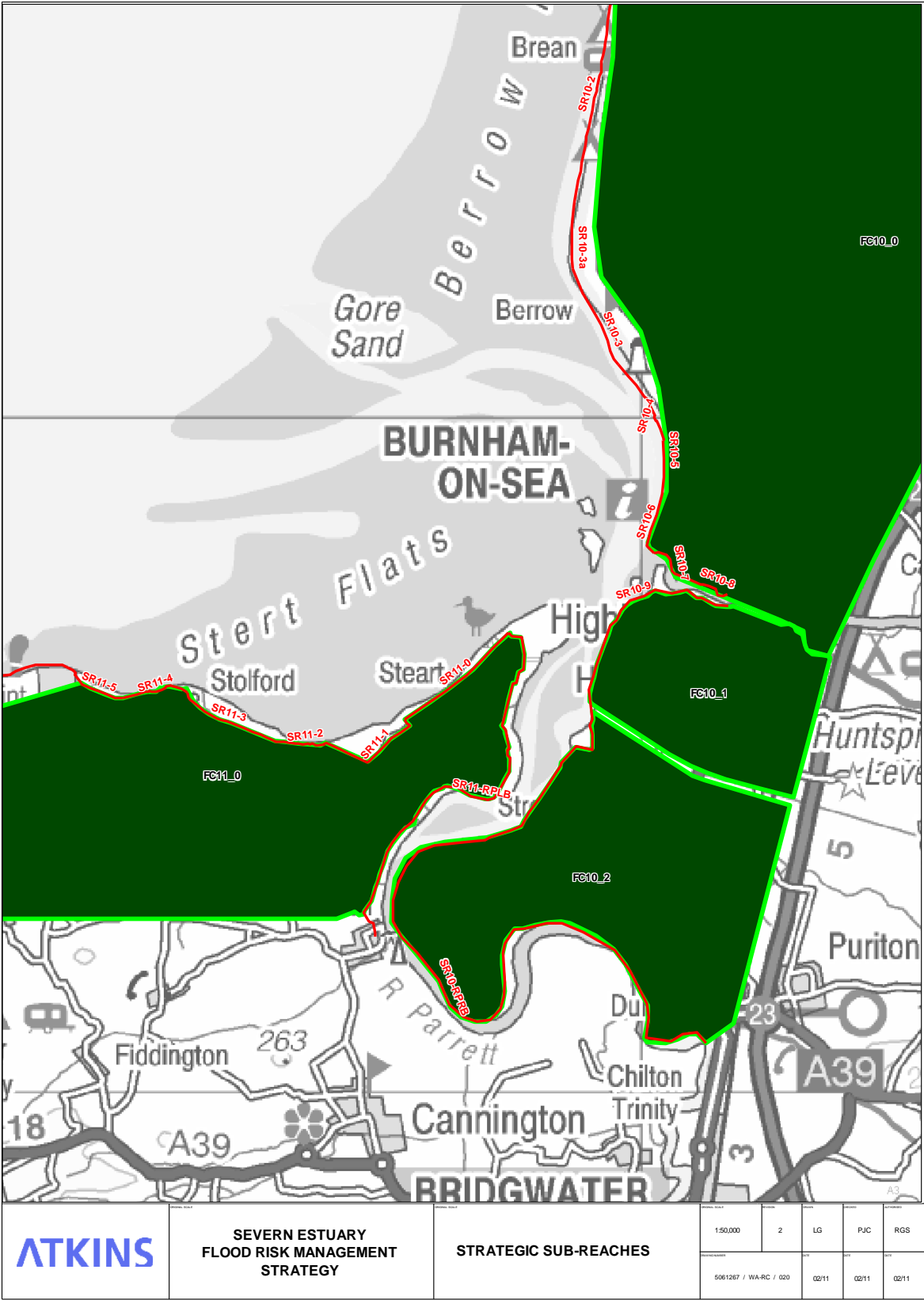
	SEVERN, SOUT	SEVERN, SOUT	SEVERN, SOUT	SEVERN, SOUT	SEVERN, SOUT	SEVERN, SOUT	SEVERN, SOUT	SEVERN, SOUT
	SEVERN ESTUARY FLOOD RISK MANAGEMENT STRATEGY		STRATEGIC SUB-REACHES					
	1:50,000	0	LG	PJC	RGS			
	5061267 / WA-RC / 027		02/11	02/11	02/11			





STRATEGIC SUB-REACHES

document number	document	document	document	document
1:50,000	0	LG	PJC	RGS
document number	date	date	date	date
5061267 / WA-RC / 029	02/11	02/11	02/11	02/11





Appendix E : Coherency Between CFMPs and SMP2s





CFMP Policy Unit	SMP2 Policy Unit	SEFRMS Location and Flood Cell	CFMP Policy	SMP2 Policy	
Urban Cadoxton	PEN1	Penarth, FC1-P	Take further action to reduce flood risk.	Hold The Line (2010-2110)	
	PEN2				
Cardiff	CAR1	Cardiff Flats, FC1-0			
	CAR2				
	CAR3				
Wentlooge Levels	WEN1	Wentlooge Levels, FC1-1	Take further action to sustain the current level of flood risk into the future	Hold The Line (2010-2110), consider Managed Realignment (2060-2110)	
	WEN2				
Ebbw Corridor	NEW1	River Ebbw to Usk, FC1-2		Take further action to reduce flood risk	Hold The Line (2010-2110)
Newport	NEW2				
	NEW4	Caldicot Levels, FC2-0			
	NEW5				
Caldicot Levels	CALD1	Mathern, FC2-1	Take further action to sustain the current level of flood risk into the future	Hold The Line (2010-2110), consider Managed Realignment (2060-2110)	
Cwmbran and the M4 Corridor	CALD2-3				
Severn Vale	TID1	Tidenham, FC3-1		No Active Intervention (2010-2110)	
		Stroat, FC3-2			
Lydney	TID2	Lydney, FC3-3		Hold The Line (2010-2060), Managed Realignment (2060-2110)	
	LYD1				Hold The Line (2010-2110)
Severn Vale	GLO1	Purton, FC4-1		No Active Intervention (2010-2110)	
		Blakeney, FC4-2			
	GLO2	Awre, FC4-3		Managed Realignment (2010-2030), Hold The Line (2030-2110)	
	GLO3	Bullo, FC4-4		No Active Intervention (2010-2110)	
		Ruddle, FC4-5			
	GLO4	Newnham, FC4-6		Hold The Line (2010-2110)	
	GLO5	Westbury,			



		FC4-7		
	GLO7	Rodley, FC4-8		
	GLO8	Minsterworth, FC4-9		
	MAI1	Minsterworth Ham, FC4-10		Managed Realignment (2010-2030), Hold The Line (2030-2110)
	MAI6	The Rea, FC5-3		Hold The Line (2010-2110)
	SHAR1	Stonebench, FC5-4		
		Elmore Back, FC5-5		Hold The Line (2010-2030), Managed Realignment (2030-2060), Hold The Line (2060-2110)
	SHAR2	Longney, FC5-6		Hold The Line (2010-2110)
	SHAR3	Upper Framilode, FC5-7		
	SHAR5			
	SHAR4	Arlingham, FC5-8		Hold The Line (2010-2060), Managed Realignment (2060-2110)
	SHAR6	Slimbridge, FC5-9		Managed Realignment (2010-2030), Hold The Line (2030-2110)
	SHAR7			
	SEV1	Berkeley, FC6-1		Hold The Line (2010-2110)
	SEV2	Shepperdine, FC6-2		
	SEV3			
	SEV4			
	SEV5	Littleton, FC6-3		Hold The Line (2010-2110)
	BRIS1	Avonmouth to Aust, FC7-0		
	BRIS2			
	BRIS3			
Lower Avon Rural			Hold The Line (2010-2110)	
Portbury and Levels and Moors	BRIS6	Portbury, FC8-0		
Coastal Towns	PORT1	Woodhill, FC8-1	Areas of low to moderate flood risk where we are generally managing existing flood	No Active Intervention (2010-2110)
	PORT2			
	PORT3			



	PORT4		risk effectively	
North Somerset Moors	KIN1	Clevedon to Weston-Super-Mare, FC9-0	Take further action to reduce flood risk	Managed Realignment (2010-2110)
Weston-Super-Mare	KIN2			No Active Intervention (2010-2110)
	KIN3			Hold The Line (2010-2110)
	KIN4			No Active Intervention (2010-2110)
	7e06			Hold The Line (2010-2110)
	7e05	Brean to Bridgwater, FC10-0	Areas of low to moderate flood risk where we are generally managing existing flood risk effectively	No Active Intervention (2010-2110)
Levels and Moors	7e03-7e4			Hold The Line (2010-2030), Managed Realignment (2030-2060), Hold The Line (2060-2110)
	7e02			Hold The Line (2010-2110)
	7d46-7e01			No Active Intervention (2010-2110)
Coastal Towns	7d45			Hold The Line (2010-2110)
	7d44			Hold The Line (2010-2030), Managed Realignment (2030-2110)
	7d43			Hold The Line (2010-2110)
Levels and Moors	7d42		Areas of low to moderate flood risk where we are generally managing existing flood risk effectively	Hold The Line (2010-2030), Managed Realignment (2030-2110)
	7d41			Hold The Line (2010-2110)
Not applicable	7d34-7d37	Steart Peninsula, FC11-0	Not applicable	Managed Realignment (2010-2030), Hold The Line/No Active Intervention (2030-2110)
	7d32-7d33			Hold The Line (2010-2030), Managed Realignment (2030-2060), Hold The Line (2060-2110)





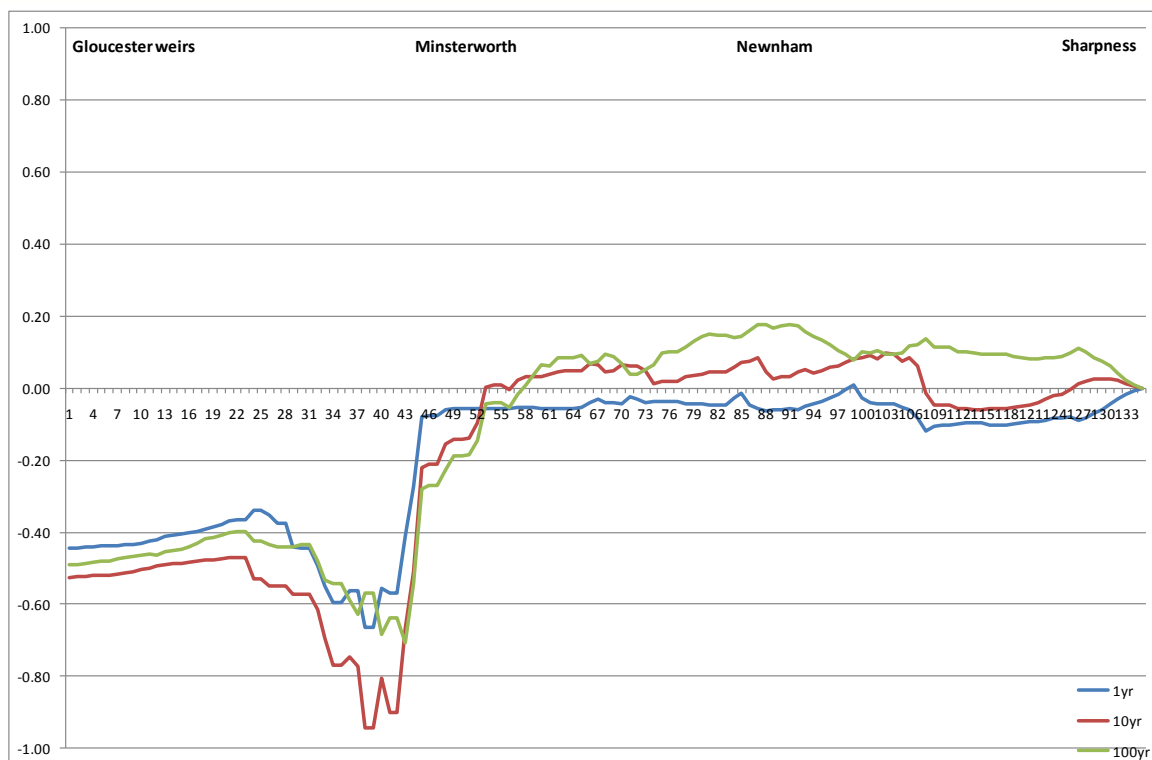
Appendix F : Summary of Flood Risk Assessment Results



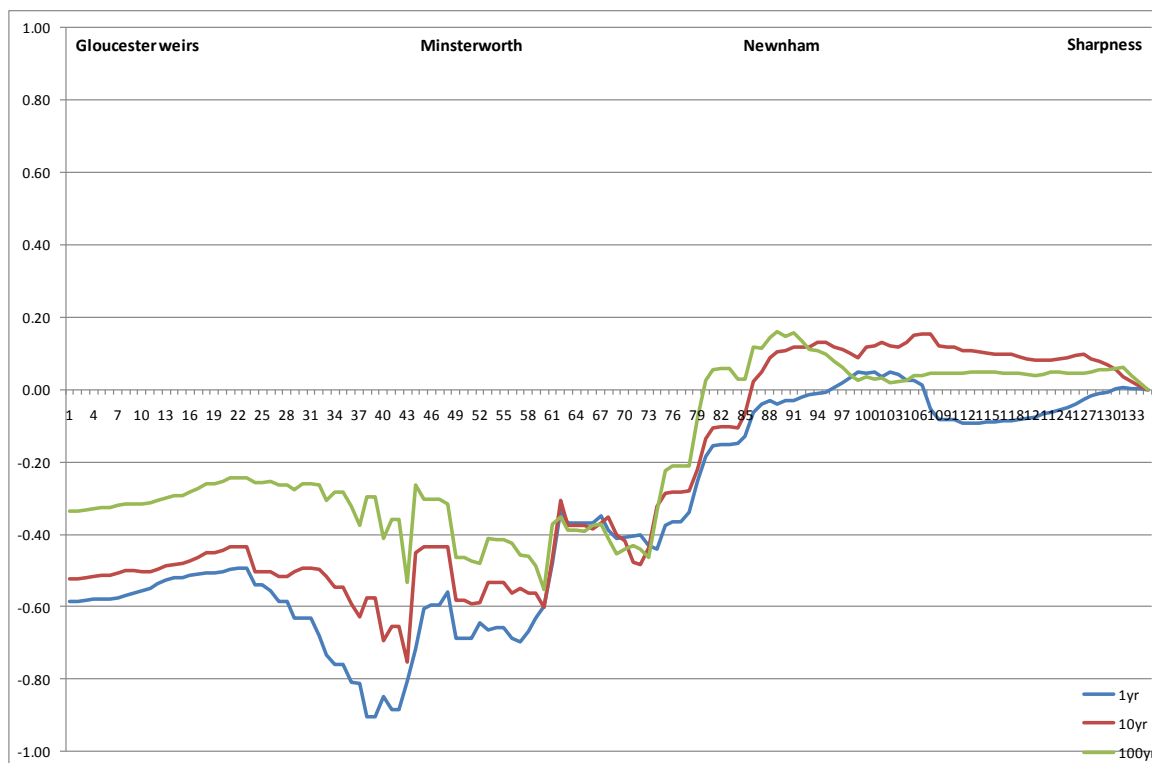




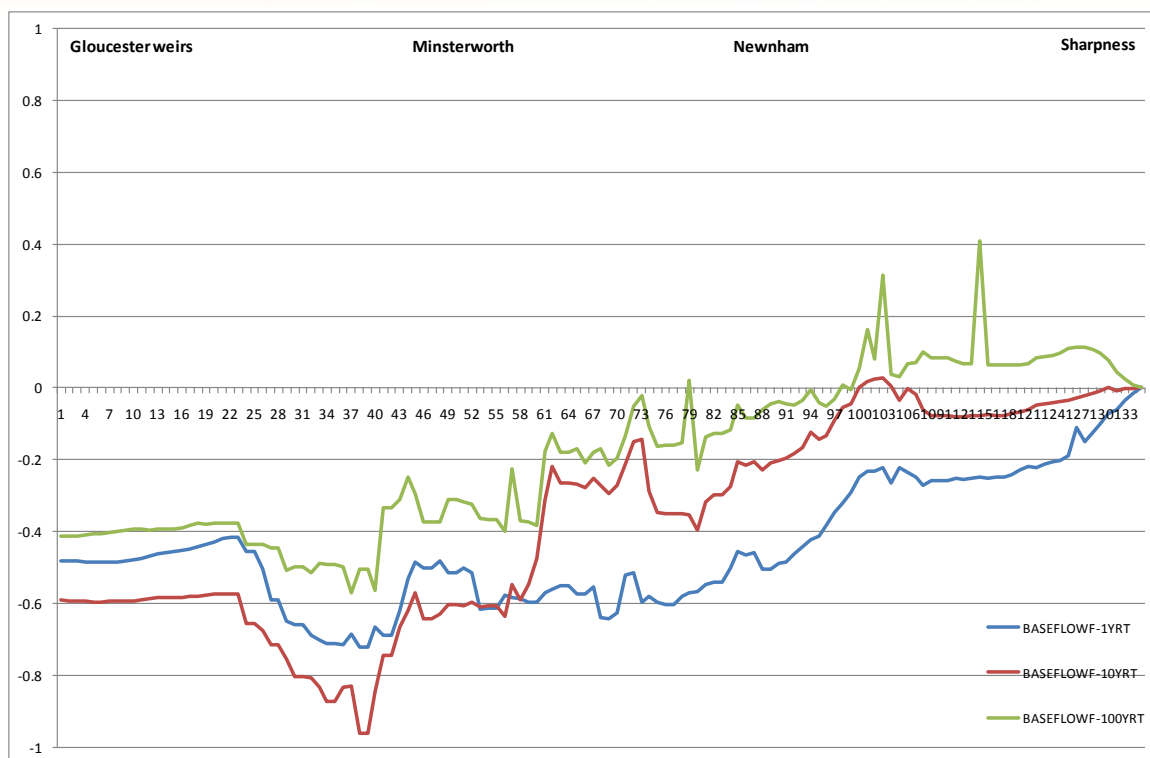
F.1 In-channel ISIS Results



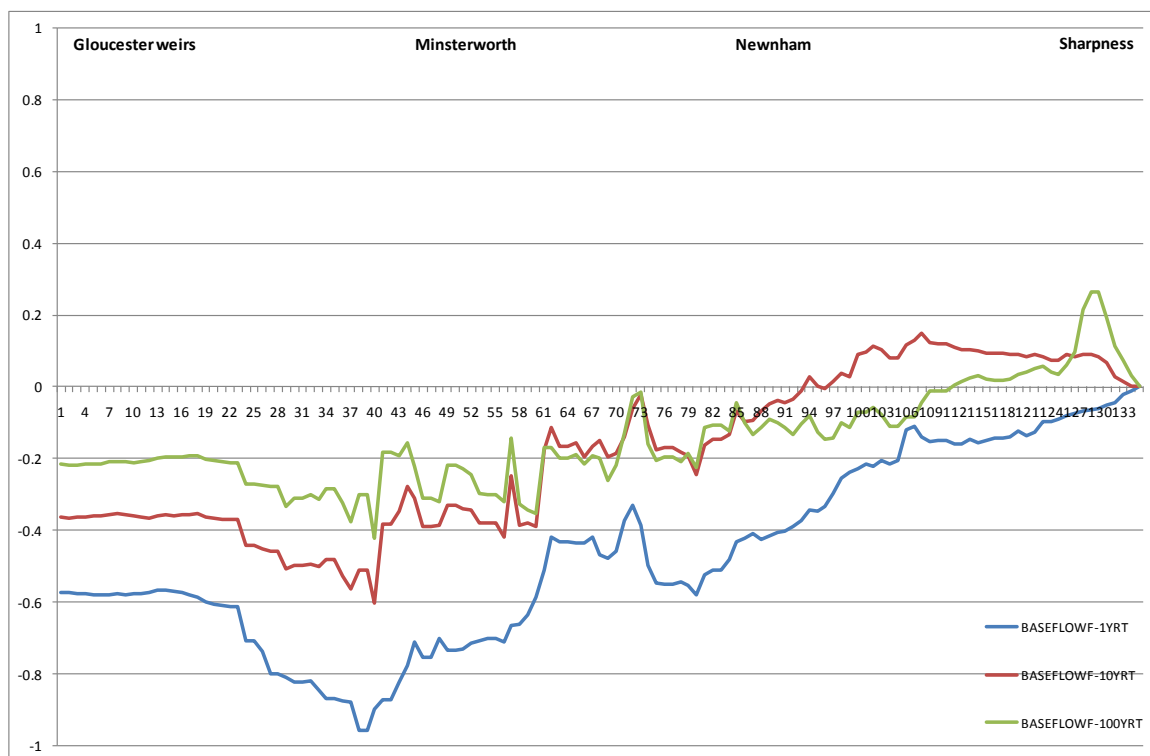
Difference between Extreme Water Levels with (Total Sustain and Improve) minus (Total Maintain) in the short term.



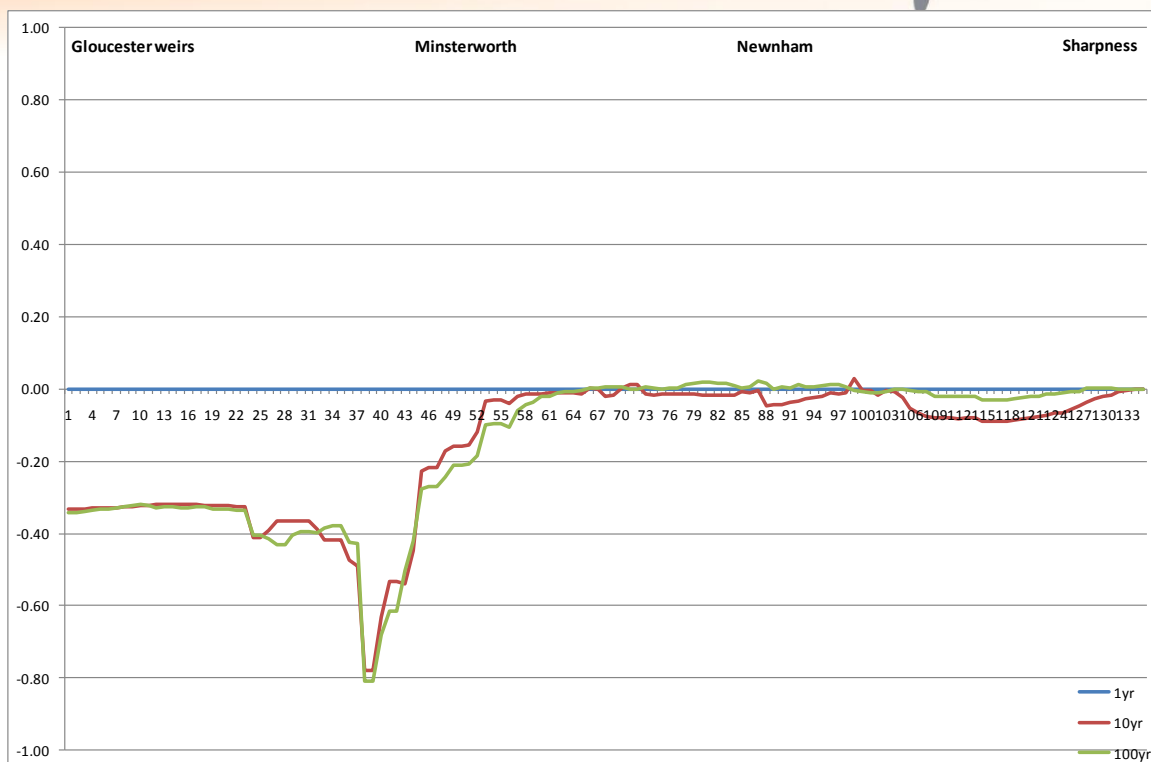
Difference between Extreme Water Levels with (Total Sustain and Improve) minus (Total Maintain) in the long term.



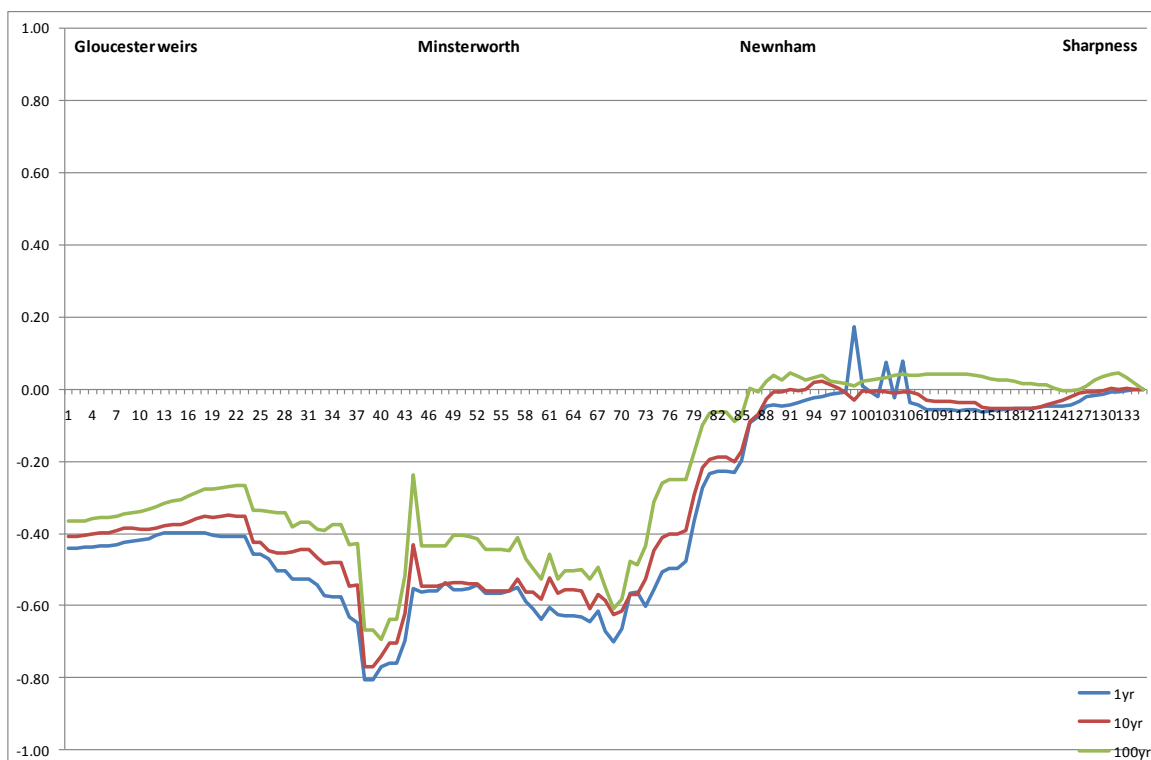
Difference between Extreme Water Levels with (Total Managed Realignment) minus (Total Maintain) in the short term.



Difference between Extreme Water Levels with (Total Managed Realignment) minus (Total Maintain) in the long term.



Difference between Extreme Water Levels with (preferred strategy) minus (Total Maintain) in the short term.

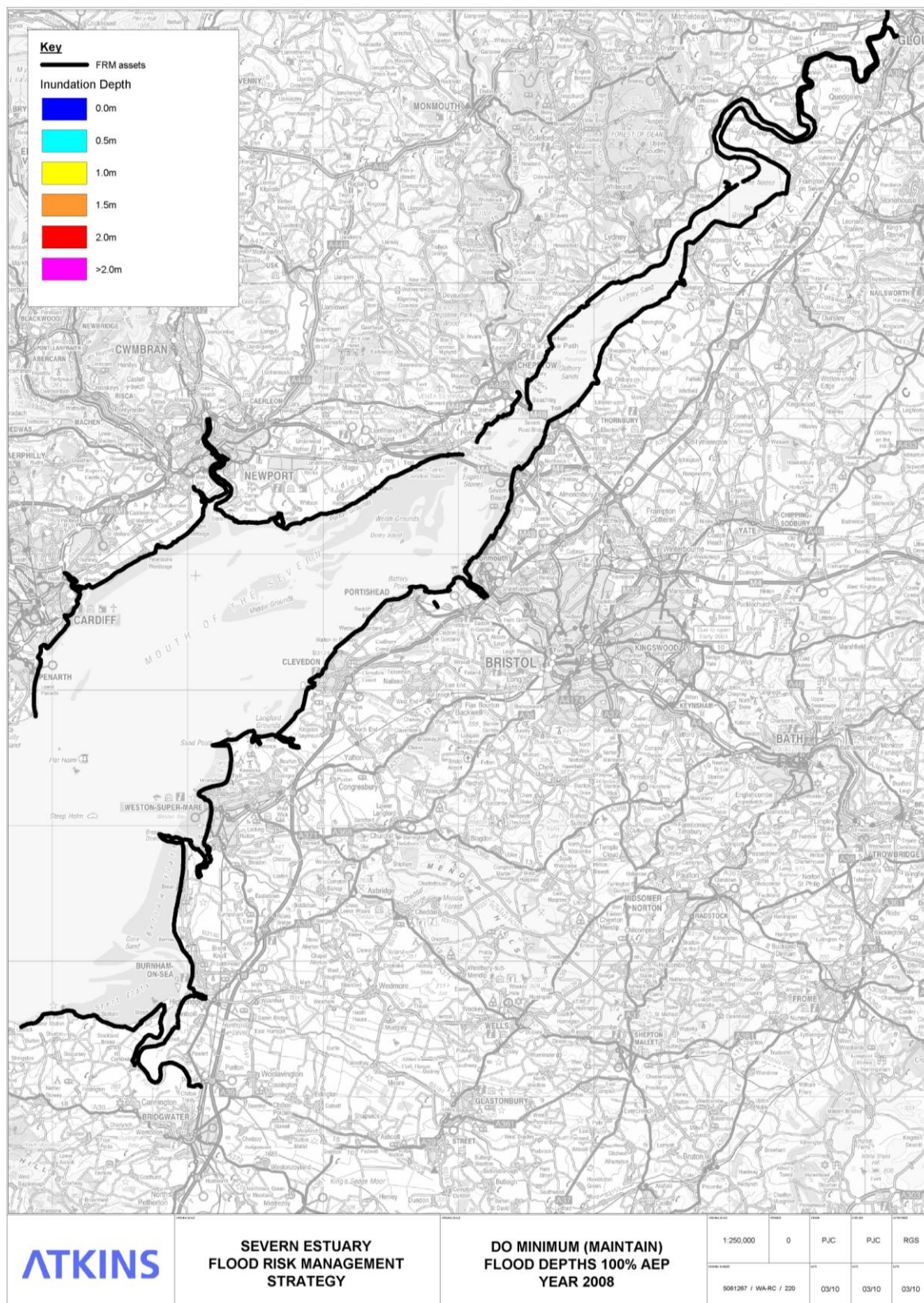


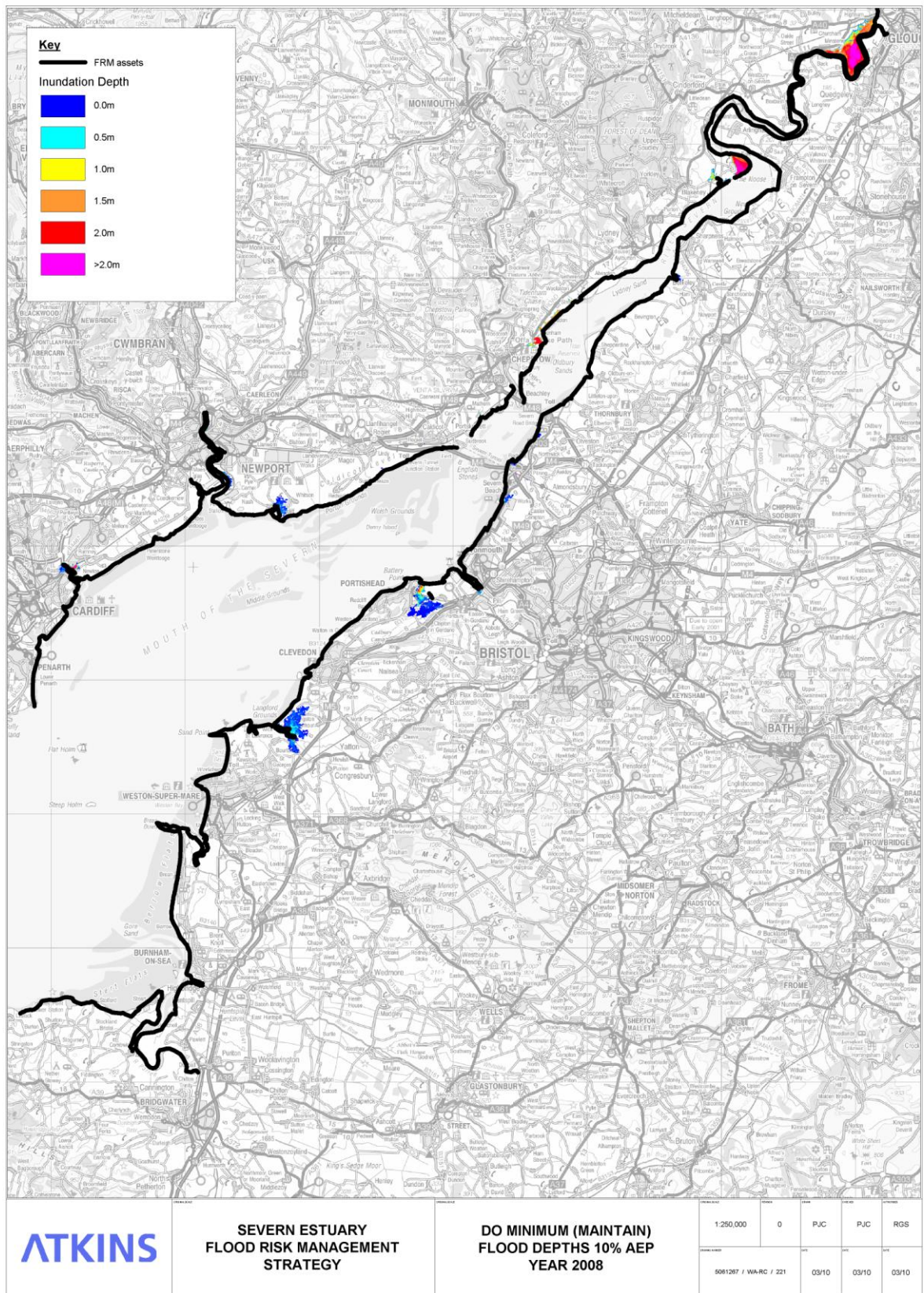
Difference between Extreme Water Levels with (preferred strategy) minus (Total Maintain) in the long term.

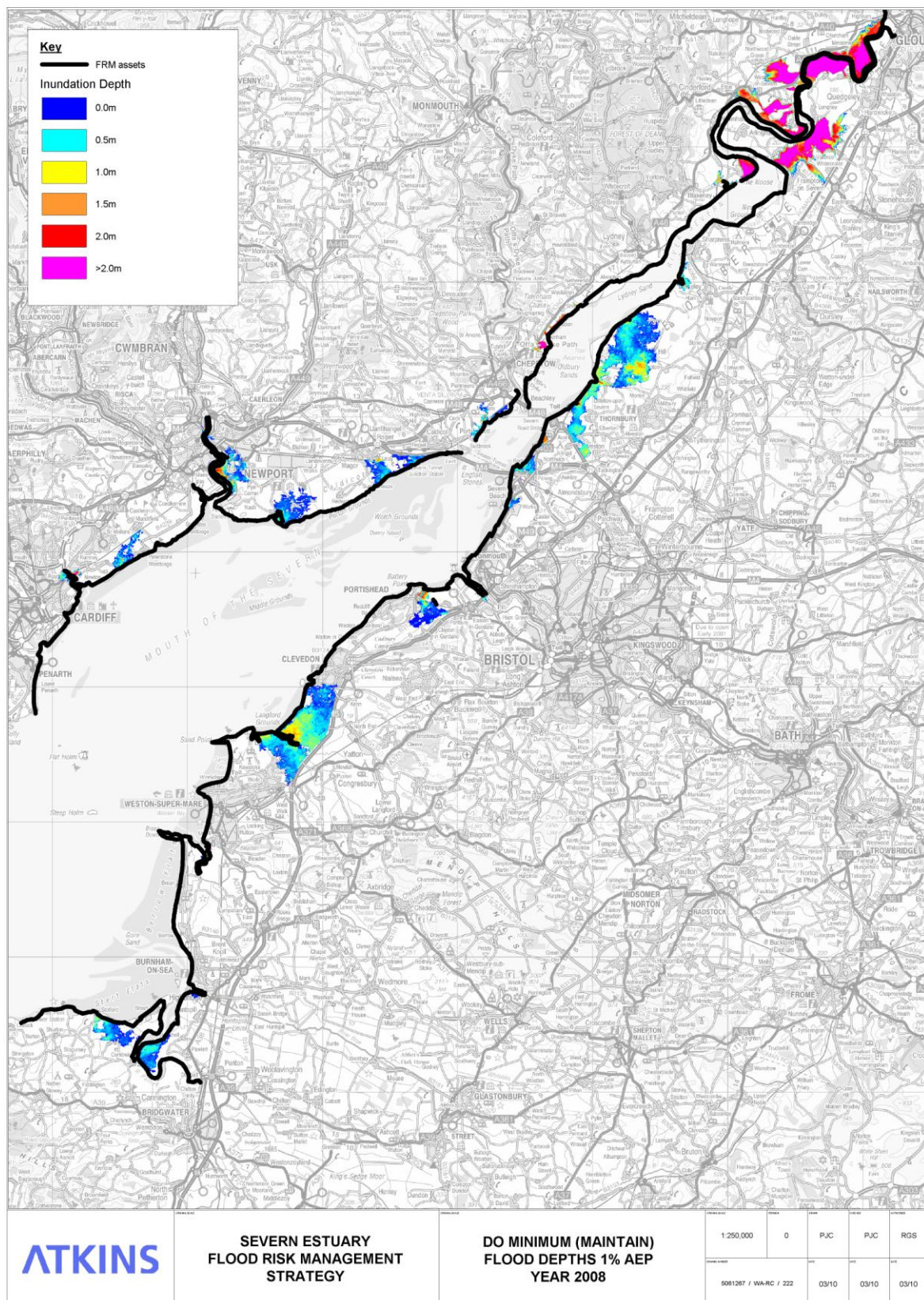


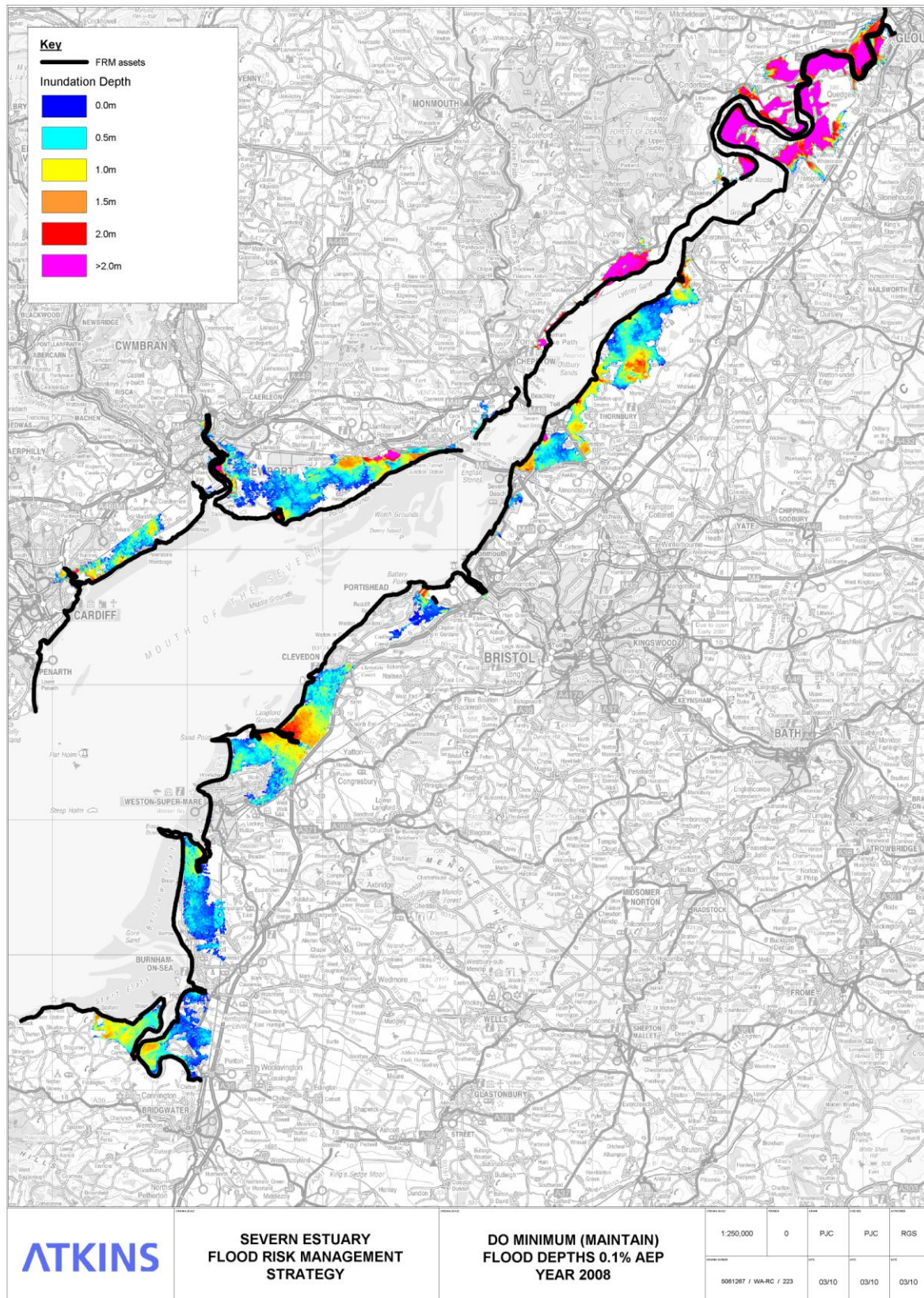


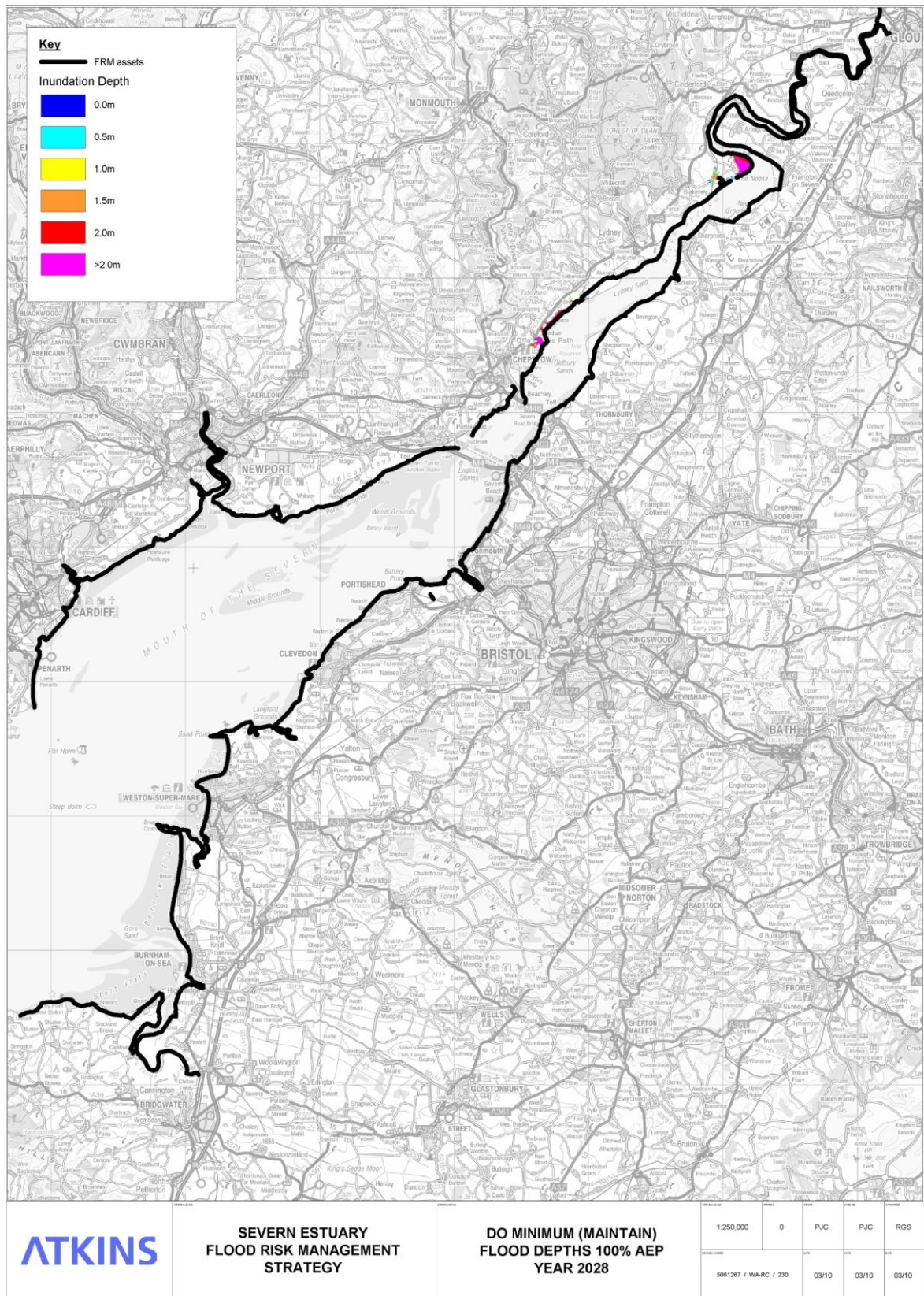
F.2 Floodplain ISIS/TUFLOW Results

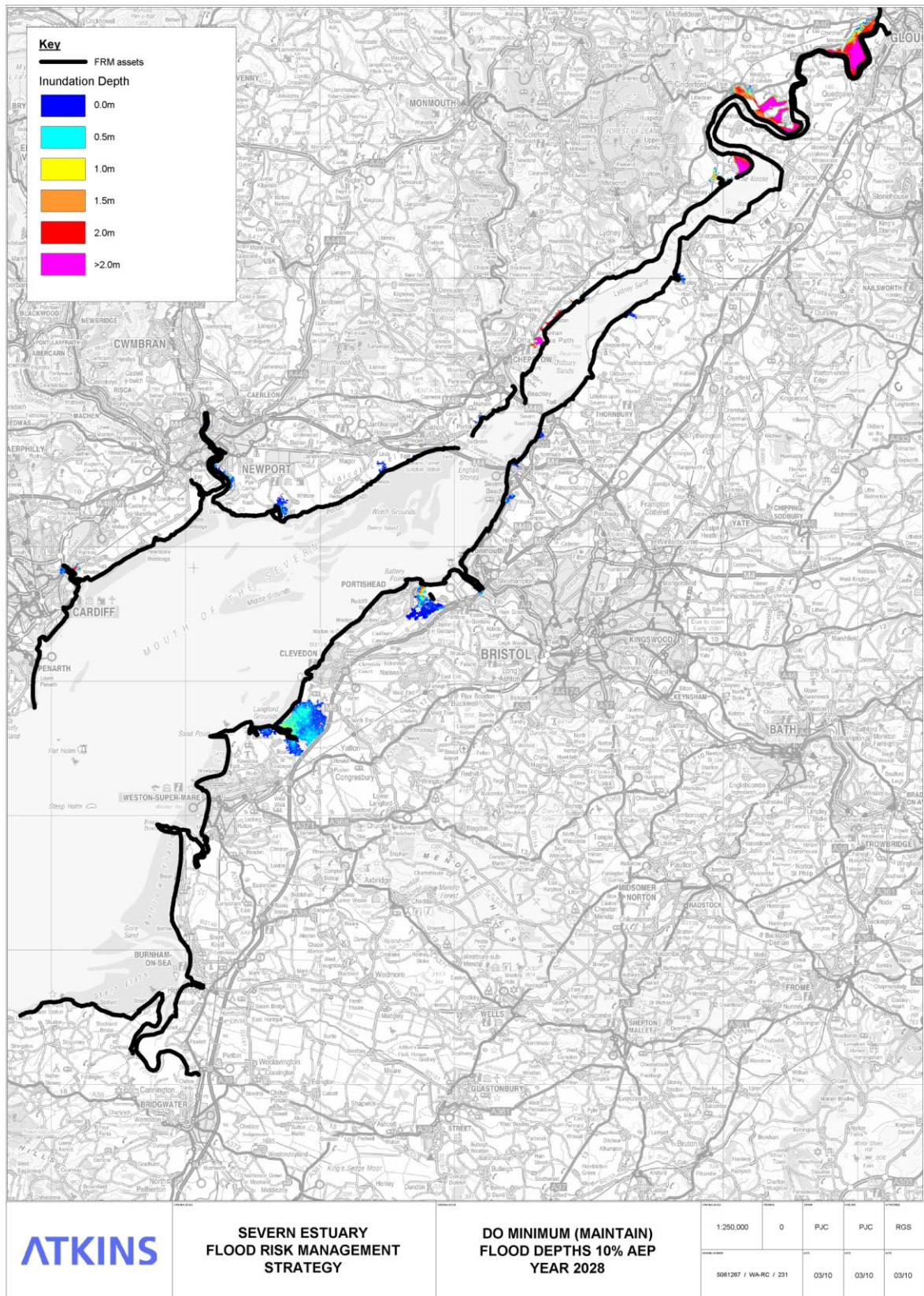


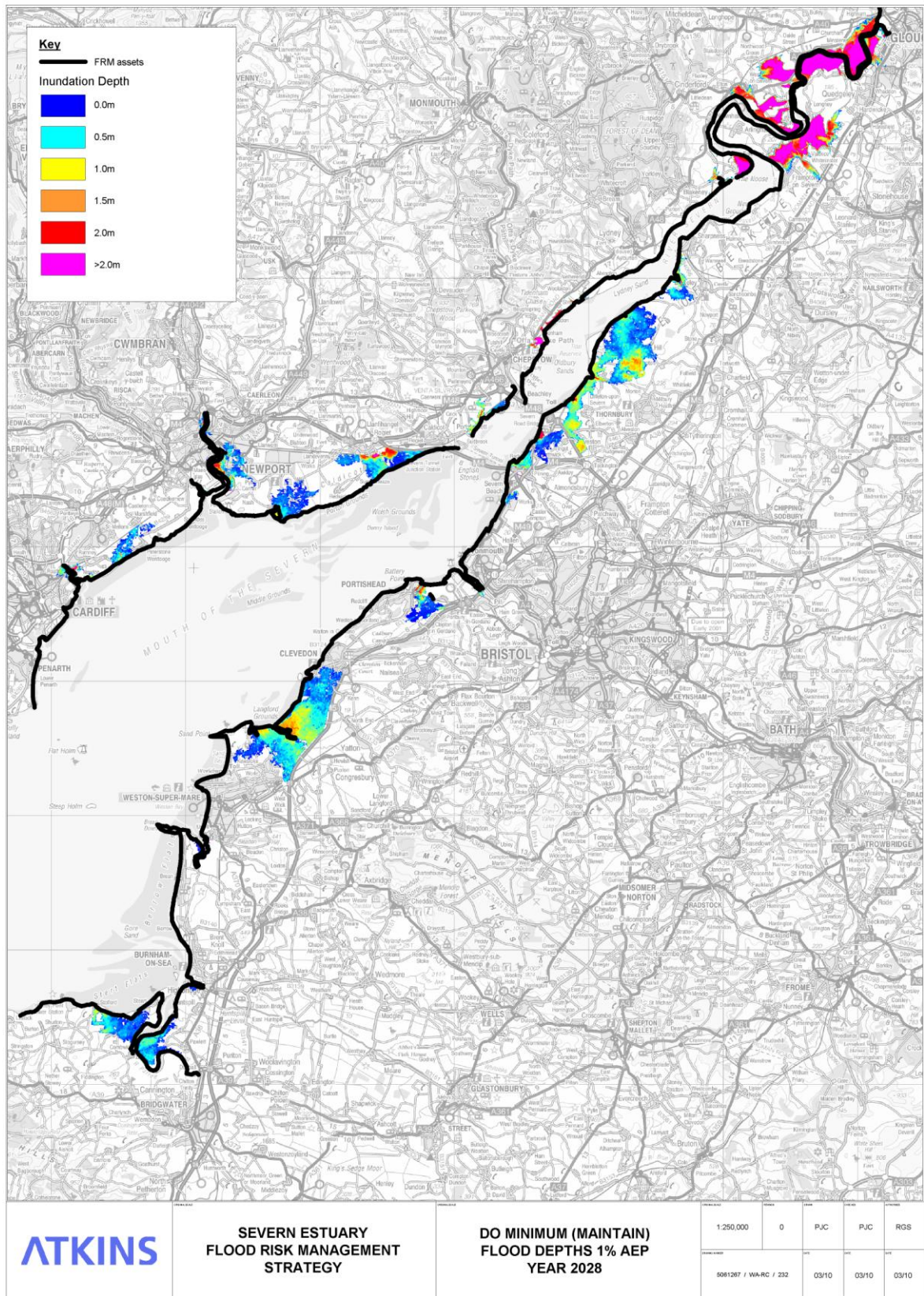


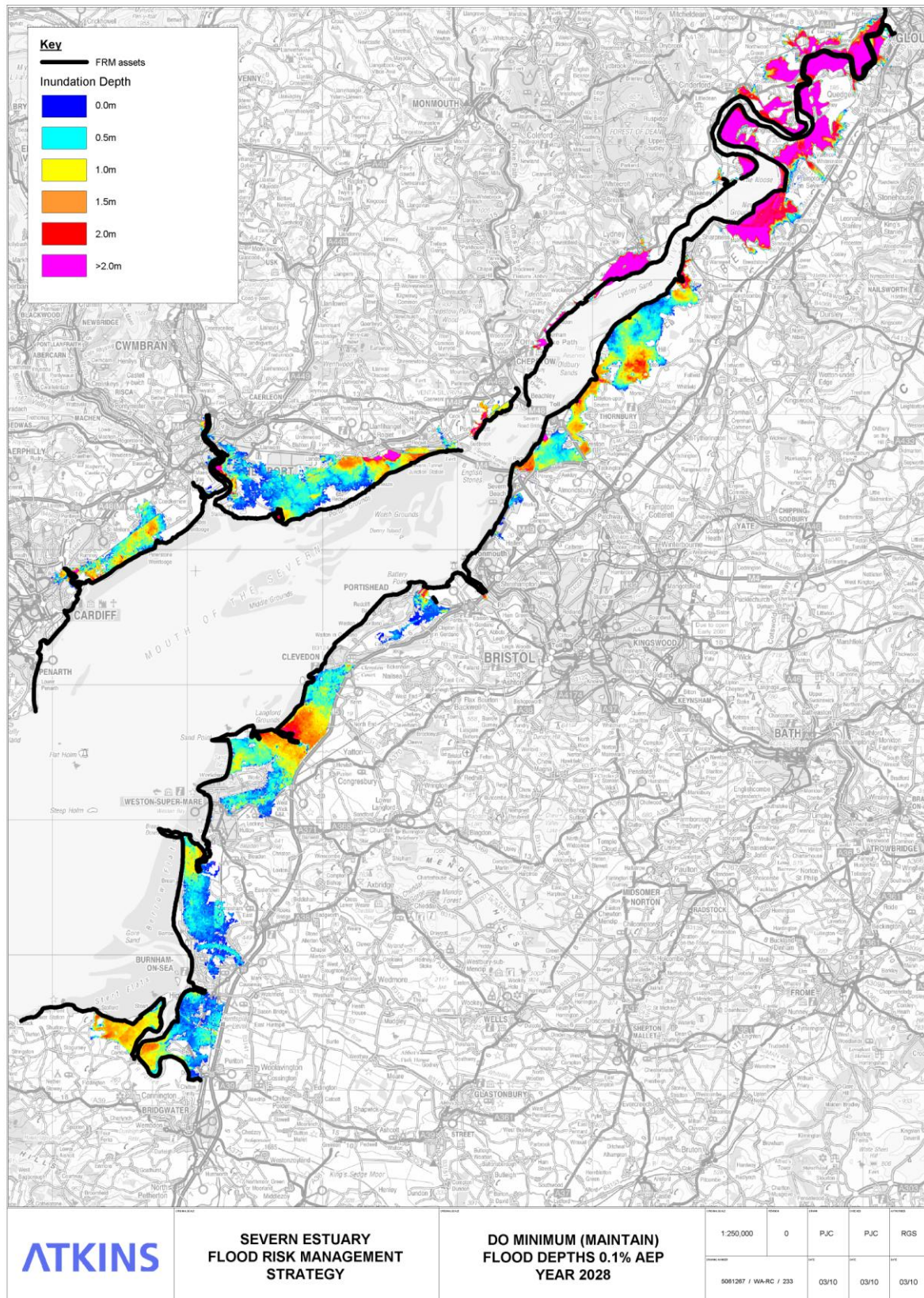


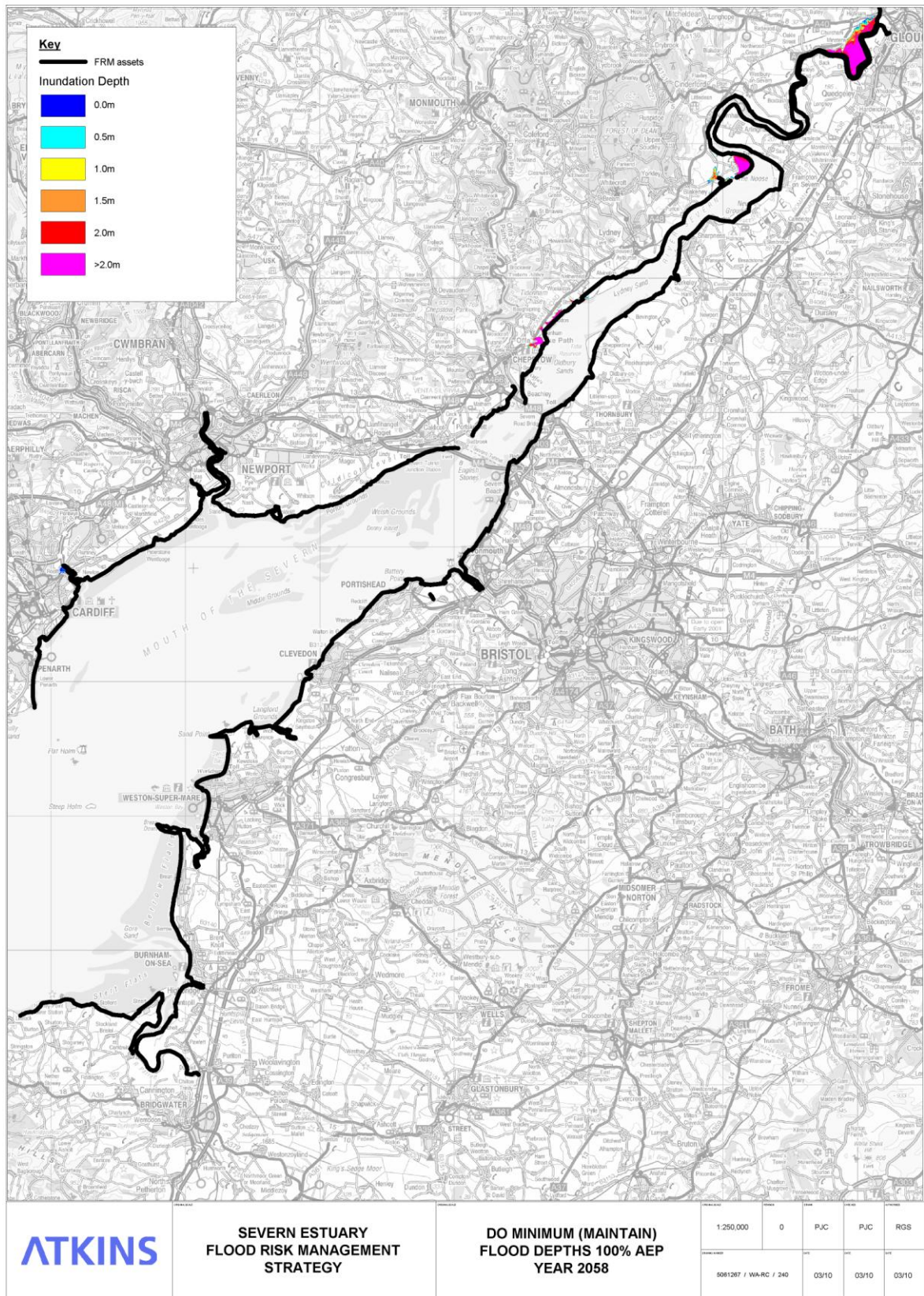


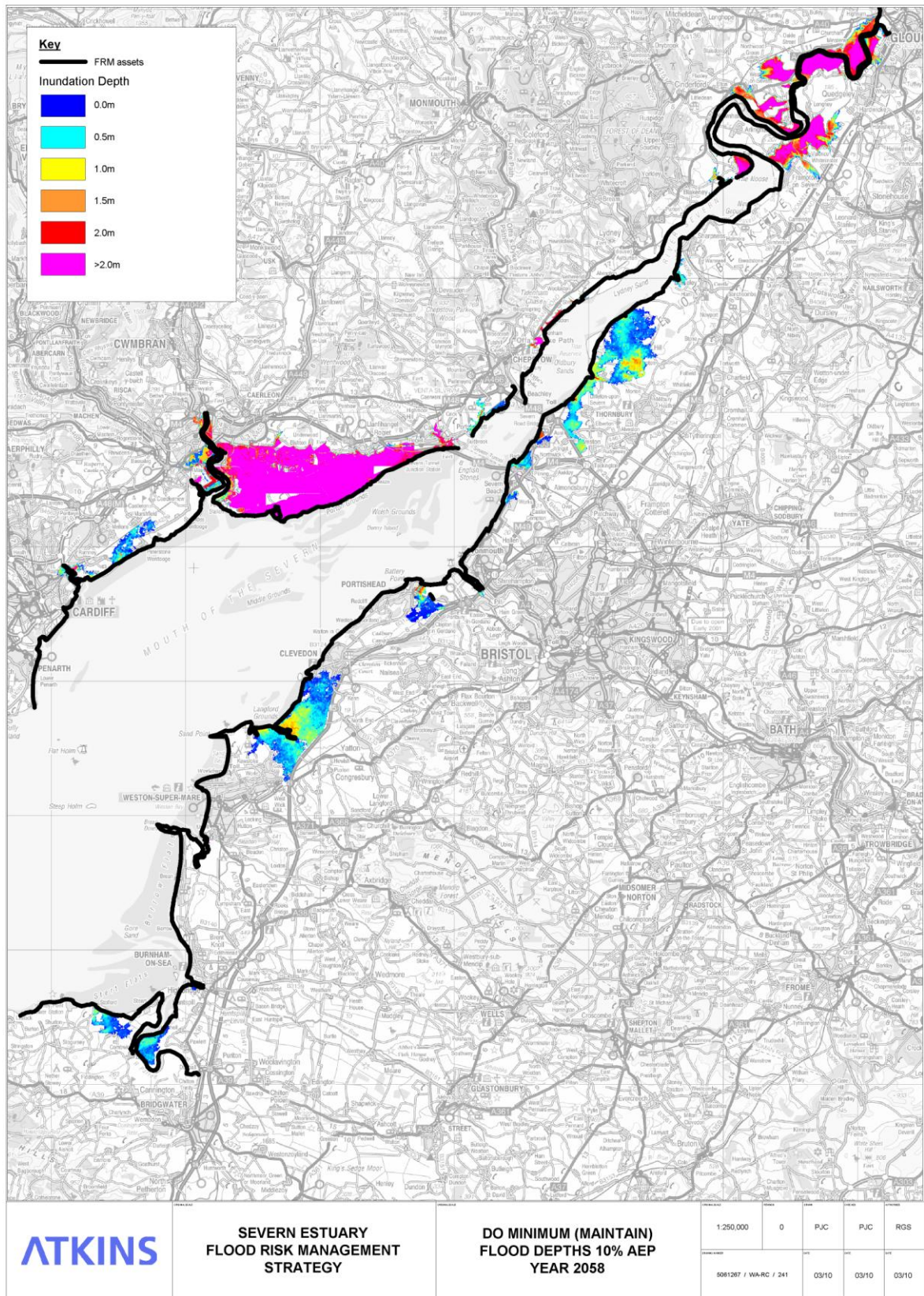


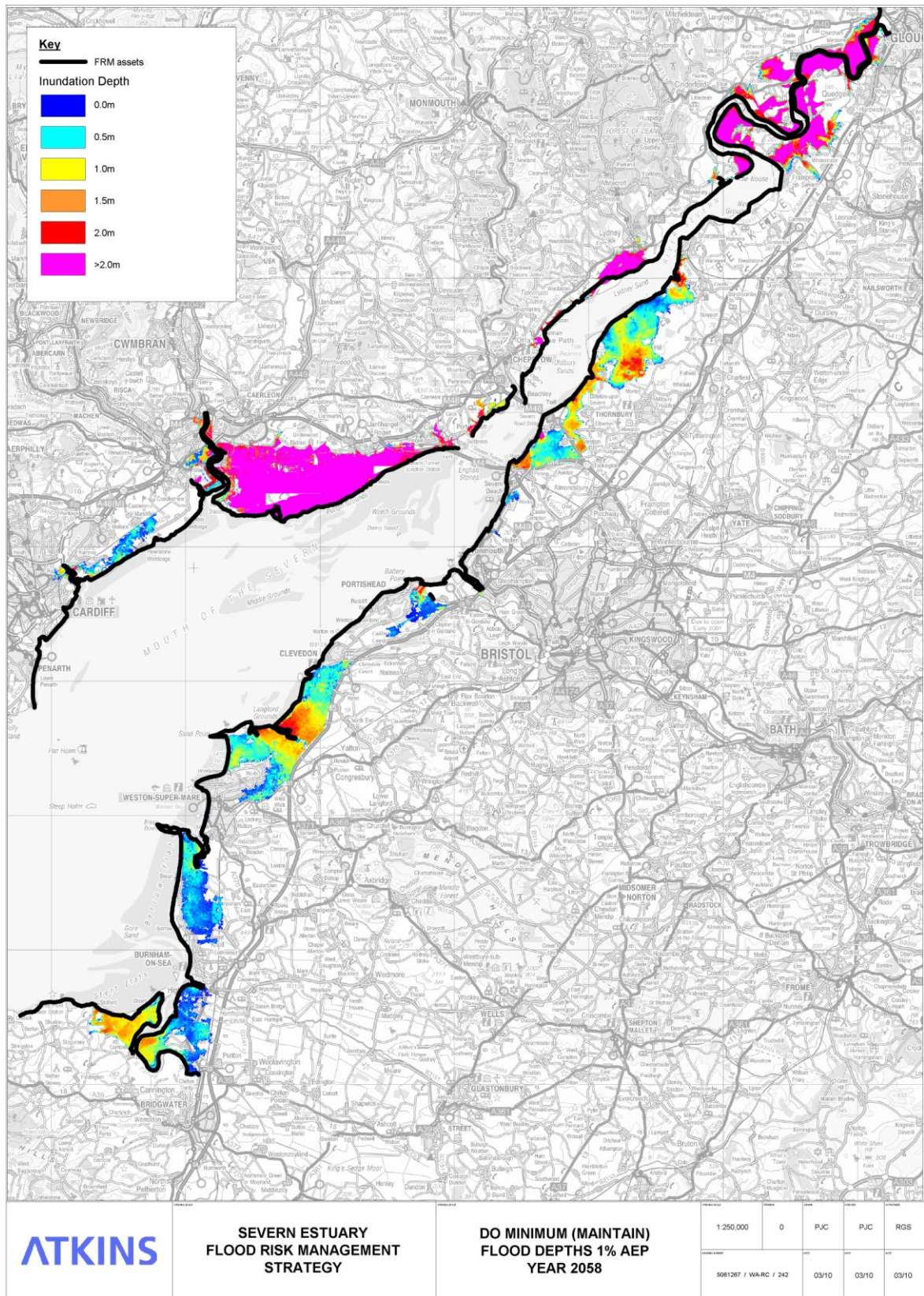


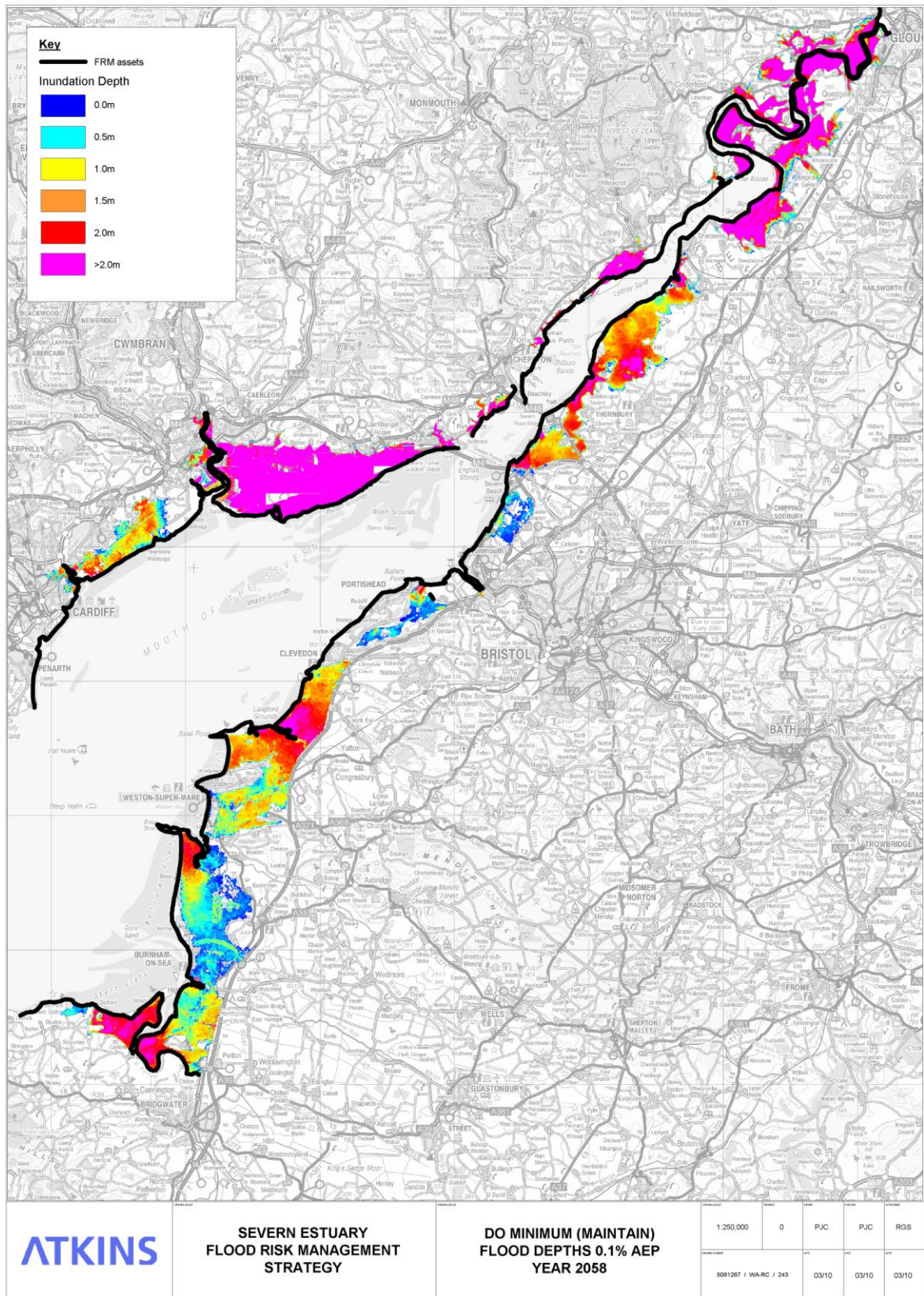


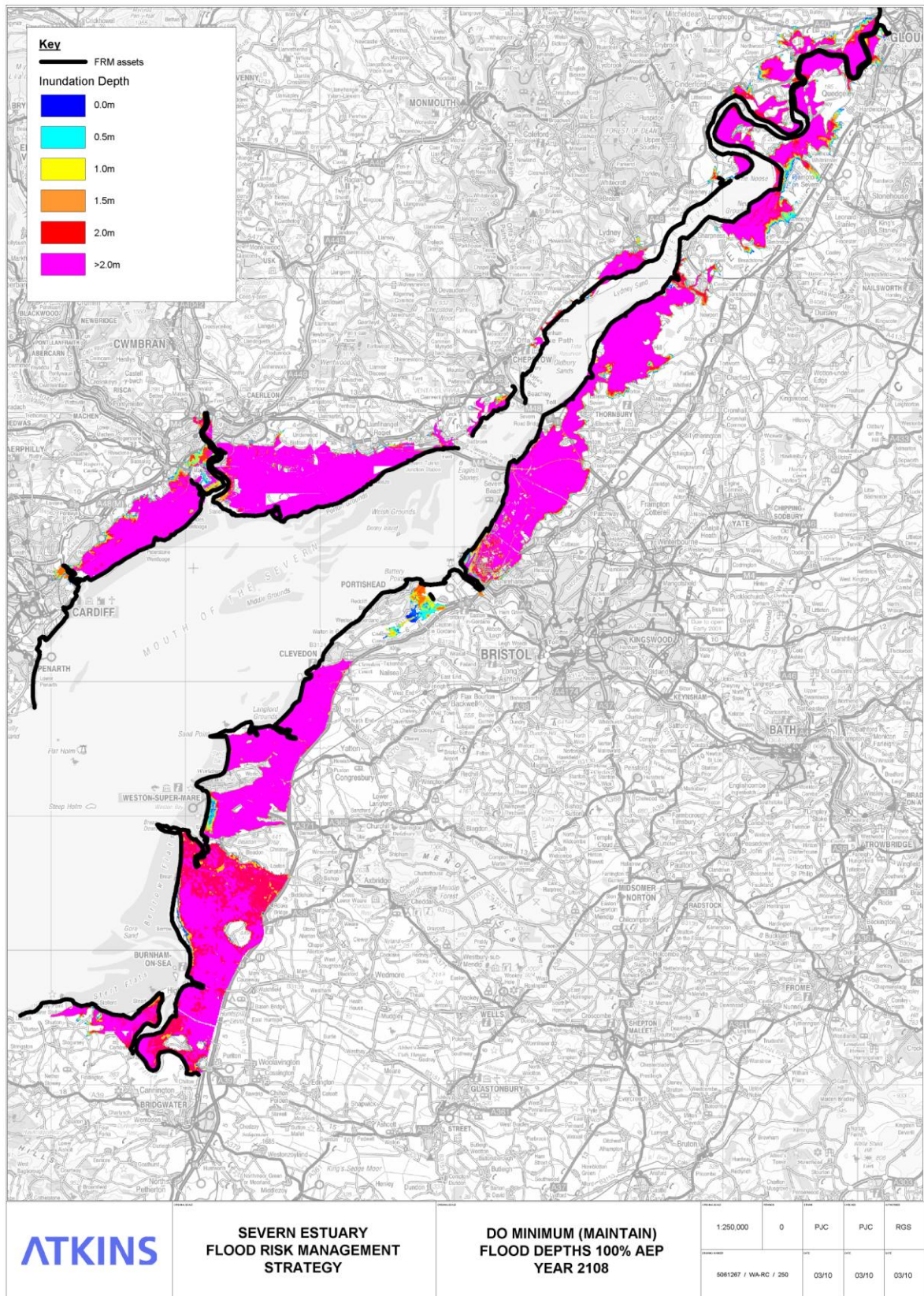


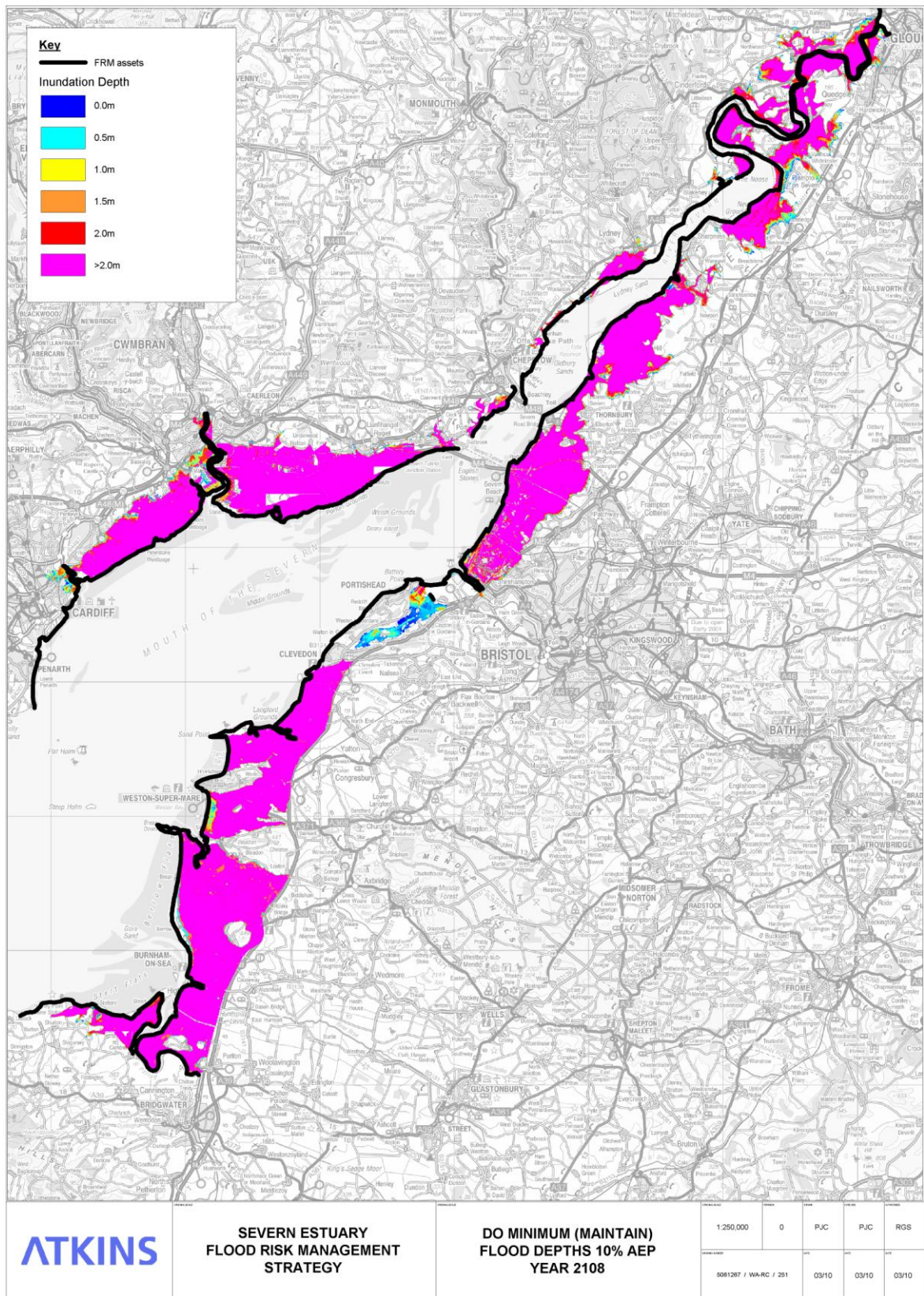


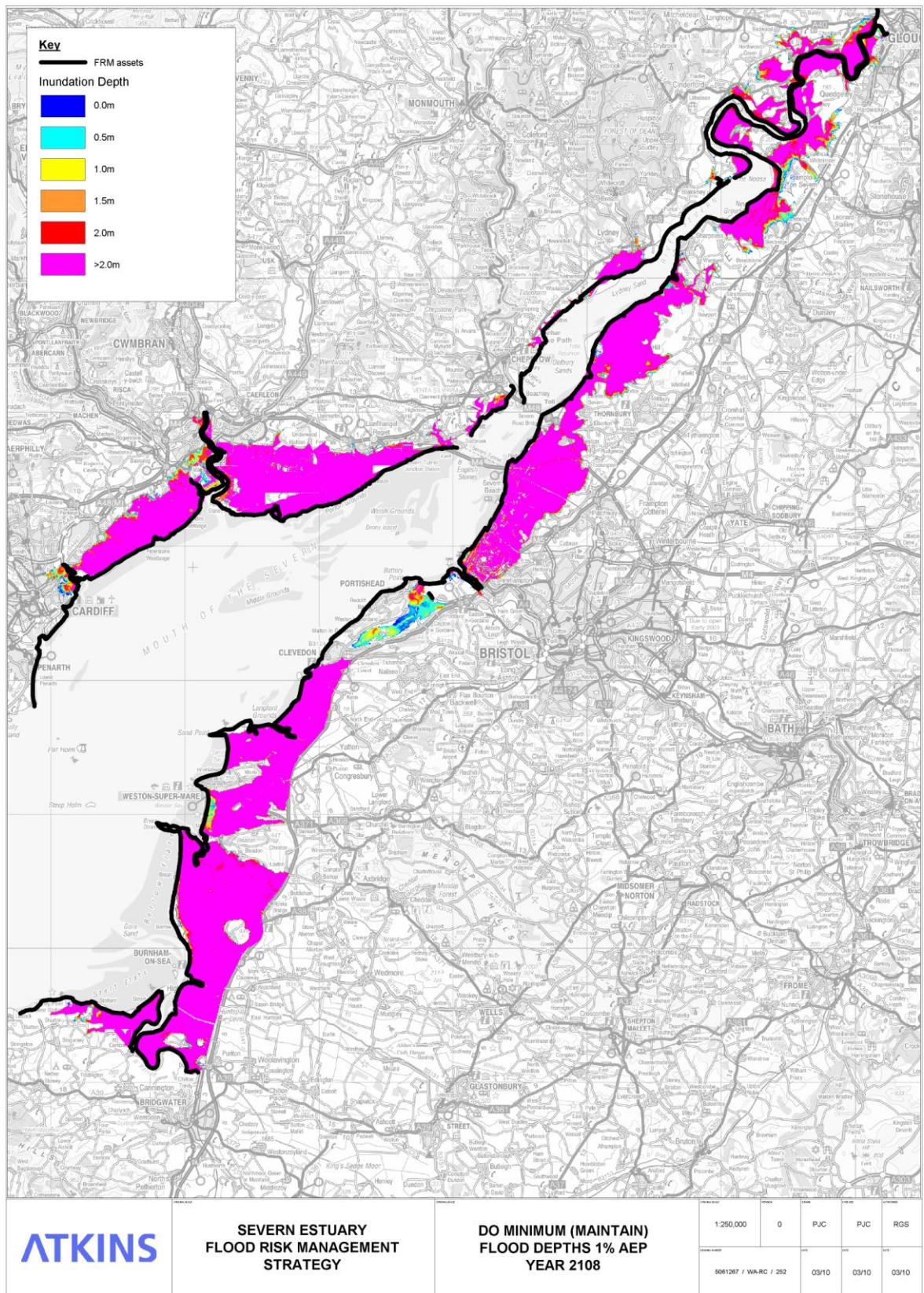


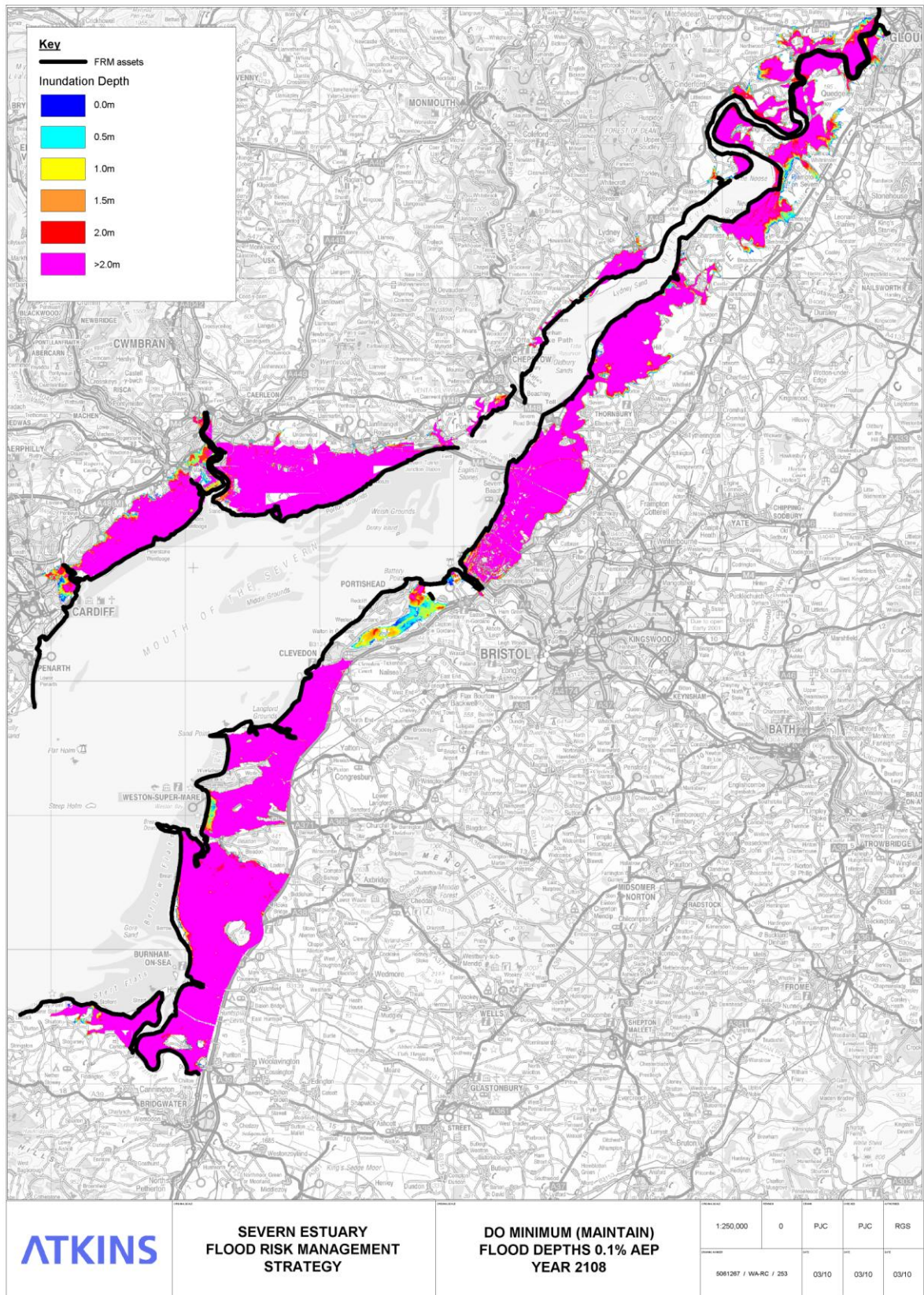














Appendix G : Cost Database





G.1 Cost Database

FRM Response Type	Base price (£) (for rural, fluvial location)	** NOTE ALL PRICES ARE AT JULY 2013 BASEDATE **
New earth embankment (dry construction)		Geometry assumed to be 1/3 front slope, 5m crest width, 1/4 back slope as agreed with GQ. Atkins review using Spons developed a cost of £2130/m for 2m high embankment; this will be used as it is for where material cannot be sourced from a local borrow pit, which from SW experience may not always be possible. In addition to this, the use of non-local material would avoid impact on heritage (noted as an important point by heritage stakeholders). The ratio difference has been applied to all embankment heights.
Height (m)	0.25	
	0.5	
	0.75	
	1.25	
	1.5	
	1.75	
	2	
	2.25	
	2.5	
	3	
	3.25	
	3.5	
	3.75	
	4	
	4.5	
	5	
	5.5	
	6	
Improved earth embankment (dry construction)		EA cost and Atkins review cost agree.
Height increase (m)	0.25	
	0.5	
	0.75	
	1	
	1.25	
	1.5	
	2	
	2.5	
	2.75	
	3	
Concrete revetment to existing embankment (dry construction)		Use of ground anchors for concrete revetments could reduce EA cost by 50%, but cannot be assumed to occur everywhere: higher EA cost used, with further detailed costs consideration to be carried out at scheme level.
Height (m)	0.25	
	0.5	
	0.75	
	1	
	1.25	
	1.5	
	1.75	
	2	
	2.25	
	2.5	
	2.75	
	3	
	3.25	
	3.5	
	4	
	4.5	
	5	
	5.25	
	5.5	
	6	
Freestanding masonry wall (dry construction)		EA cost indicated £467/m for 1m high wall. This is based on masonry walls with no internal reinforcement (i.e. concrete). Atkins review using Spons developed a cost of £1107/m for 1m high wall; this will be used as it is for reinforced, FRM engineered walls. This ratio difference has been applied to all wall heights.
Height (m)	0.25	
	0.5	
	0.75	
	1	
	1.25	
	1.5	
	2	
	2.5	
	3	
Retaining wall (wet construction)		EA cost and Atkins review cost agree.
Height (m)	0.25	
	0.5	
	0.75	
	1.25	
	1.5	
	2	
	2.5	
	3	
	3.25	
	3.5	
	4	
	4.5	
	5	
	5.25	
	5.5	
	6	
Cut-off structure		Costs based on EA data. Atkins review using Spons developed costs within 20% of EA data.
Height (m)	2	
	2.5	
Rock armour of front face/ toe protection (wet construction)		EA cost for the rock armouring of the front face add-on used in lieu of any further data.
Depth (m)	0.25	
	0.5	
	0.75	
	1	
	1.25	
	1.5	
	2	
	2.25	
	2.5	
Wave recurve wall added to existing structure (dry construction)		Single height of wave recurve wall designed for: indicative of similar type to those used in Caldicot Levels SDI.
Height (m)	0.25	
	0.5	
	0.75	
	1	
Vehicle access		EA cost for vehicle access was based on tarmac/concrete access track. Atkins review cost of £48/m is much less and based on a stone track. It is likely the majority of the access tracks would be stone rather than tarmaced, hence the Atkins review rate has been used.
Cost per m		
Polder fields (wet construction)		Polders assumed to be timber stake/willow spiling construction with 1.5m height. Rumney Great Wharf is the only example available.
No. of fields (100mx250m)	1	
	2	
	3	
Foreshore recharge		Final sand/gravel cost taken from Defra R&D project FD1923 looking at costs from a wide range of recharge techniques and beach locations (a range of £18-23/m ³ was found, with an average of £21/m ³ being used). Mud recharge is difficult and rare: Rumney Great Wharf feasibility study on mud recharge found costs and practicalities (at a very viable site) were significant, making mud recharge impractical.
Sediment type (per m ³)		
Flood resilience		Previous estimates include £20000 per property (Atkins estimate) and £2500 per property (for 46 properties in Appleby, Cumbria, quoted at CIWEM10). Obviously a wide potential range; £10000 taken as representative.
Cost per individual property		
Maintenance of existing structures		Embankment maintenance cost sourced from PEFRMS. Hard engineered structures maintenance cost sourced from Clevedon to St. Thomas's Head Strategic Overview. Polder field maintenance from Rumney Great Wharf PAR. Costs are at March 2009 base date. Check with EA Midlands SAMPs data indicates embankment maintenance cost of ~£13.7K/10km=£1.4K/km (Longney to Elmore), ~£1.8K/5km=£0.4K/km (Sharpness to New Grounds). This broadly agrees with used embankment maintenance costs of £1.08/km.
Type (cost per km)		
Refurbishment of Outfalls (£ per item)		Refurbishment costs of outfalls/sluices taken from the Parrett Strategy (January 2009).
Replacement of Outfalls (£ per item)		Replacement costs of outfalls/sluices taken from the Parrett Strategy (January 2009)
Monitoring		Annual visual maintenance estimated as £1000/km, based on PEFRMS and RGW PAR.
Type (cost per km per year)		
Managed realignment works		RTE estimated as £300,000 and breach estimated as £150,000 per 500m, all sourced from Slimbridge MR FS (Atkins, 2009).
Cost per structure		
Flood warning and forecasting		Generation of flood warning system for Gwent Levels, Lympstone and Shaldon indicate a small cost of £5000 per system. This only includes for design and implementation of a system, not notification of residents etc.
Cost per system		





G.2 Cost Assumptions

- Reactive maintenance assumes same annual costs as proactive maintenance but only occur every 5 years.
- No works will be undertaken where addition in defence height is 0.1m or less; in these instances additional raising would occur in previous epoch.
- Assumed access track is required for every construction stage and is equal in length to the defence length.
- Preliminaries are included within the unit costs.
- Managed realignment sites (but not secondary alignment sites) will be constructed in the epoch before they are required to ensure habitats are in place to reach target
- Uplift for tidal work is only included for options that would be constructed 'in the wet'. This is assessed on the sub-reach specific context.
- Standard Contingencies:
 - Uplift for Tidal Work: 24%
 - Uplift for Urban Work: 24%
 - Optimism Bias: 60%
 - Estimate for PAR / Detailed Design / Supervision Costs: 20%
- Land Compensation Costs:
 - Agreement with the EA has been reached to apply a figure of £16k per ha for compensation for loss of land where a secondary or managed alignment is proposed. This compensation fee is a one off cost and will not be applied to other options that may result in loss of land.
 - Legal and land compensation costs for improvement works were applied as 3% of the total cost for costs below £5M, 5% for costs between £1M-£5M, and 7% for costs below £1M.
- Refurbishment of Outfalls
 - Costs for sluice/outfall refurbishment and replacement taken from Parrett Strategy (Jan 2009). Outfalls have been defined as Large if on major tributaries, and Medium on minor tributaries and rhynes.
 - Assumed that refurbishment occurs in year 20, and replacement in year 50 and year 100.





Appendix H : Review of Habitat Site Selection Methodologies used in the UK





H.1 Introduction

This appendix reviews site selection processes previously undertaken to find generic locations potentially suitable for managed realignment or habitat creation. In most instances a two stage methodology has been applied, the first of which is generally a screening process within a GIS framework. The screening has typically been followed with a Multi Criteria Analysis (MCA) process, consultation with stakeholders, or a combination of both. MCA typically involves assigning scores to a number of criteria to establish those sites which might be or more less suitable for habitat creation. The scoring of the different parameters can also be weighted depending on the perceived importance of the respective parameters. The following sections describe the two approaches in more detail, and are structured according to number of phases involved.

H.2 Screening Only Approaches

The Solent CHaMP

Bray and Cottle (2003) identified generic areas suitable for managed realignment during the production of the Solent CHaMP. The following screening criteria were applied within a GIS environment:

- Suitable elevation (based on Environment Agency floodplain, 5m contour as upper limit),
- Exclusion of significant built up areas; and
- Roads were not deemed as constraints (due to possibilities of realignment, raising or culvert/bridge building).

Whilst no further MCA was undertaken as part of the CHaMP, the authors recommended that such an exercise should be mindful of following key constraints: elevation suitability for saltmarsh creation, counterwall length, designated terrestrial habitats, contaminated land and impacts on the estuary regime.

The Thames CHaMP

ABPmer undertook an investigation to identify broad scale generic locations that are potentially suitable for habitat creation within the study area of the Greater Thames CHaMP (ABPmer, 2008). This screening was undertaken using GIS software:

- Suitable elevation (based on tidal levels; 5m contour as upper limit);
- Exclusion of main roads;
- Exclusion of railway lines;
- Exclusion of built up areas (single buildings included); and
- Exclusion of woods.

Nature conservation designations were also considered, but they were not used to exclude potential sites within this generic screening exercise. Whilst a MCA process was not undertaken as part of the CHaMP, it was suggested that the following parameters should be considered when evaluating alternative sites: archaeology, coastal defence quality, preferred flood defence option, counterwall length, access, landuse and ownership, utilities and cost.



H.3 Screening and MCA approaches

Hodge and Johnson (2007)

a) Screening

Hodge and Johnson (2007) did not undertake a specific screening process, but used the results of the basic screening undertaken by Bray and Cottle (2003) to inform the MCA of potential options within the Solent.

b) MCA

Hodge and Johnson developed the following generic criteria, informed by semi-structured interviews and site visits (applying a weighted scoring system on a scale of 0 to 3):

- Agricultural land use (4 scores, e.g. 2 for low grade agricultural land);
- Urban land use (5 scores, e.g. 3 if no adjacent properties at risk);
- Other land use (3 scores, e.g. 1 if road and rail routes present);
- Land ownership (3 scores, e.g. 3 if EA owned);
- Existing nature conservation designations (4 scores, e.g. 3 for none);
- Potential political acceptance (3 scores, e.g. 3 if in line with policy);
- Years embanked (3 scores, e.g. 1 if embanked for 50 years plus);
- Presence of contaminated land (3 scores, e.g. 3 if none adjacent); and
- Need for new/secondary defences (4 scores; e.g. 1 if new needed).

The CEFAS tools

In 2004, Parker et al. presented two decision tools designed to identify sites suitable for managed realignment. This was based on an extensive review of available site suitability tools, and literature related to habitat requirements and restoration.

a) Screening

A GIS screening tool was developed, integrating the following four criteria:

- Suitable elevation (based on tidal levels);
- Suitable slope (derived using gridded elevation data);
- Proximity to existing habitats (i.e. within a 1km buffer of existing); and
- Exclusion of contaminated land.

A composite map was then created showing the degree of suitability per site.

b) MCA

A so-called 'influence diagram model' (run using Analytica software) was then designed to essentially scope each short listed site. Within the tool users are required to input information relating to several criteria from which the software deduces a score. The scores were calculated across a varying scale of between 0 and 100, with 100 meaning 'completely suitable' ('no data' would lead to a score of 0). The criteria for saltmarsh and mudflats were summarised as follows:

- Land pollution;



- Water salinity (2 scores; 0 for below 18ppt, 100 for above);
- Water quality (3 scores, e.g. 0 for 'no pollution');
- Biological/propagule supply (3 scores, e.g. 100 if from nearby habitat);
- Habitat location (3 scores, e.g. 25 for 'sandy estuary');
- Exposure (3 scores, e.g. 50 if medium);
- Connectivity of the site (i.e. homogeneity and implications for drainage) (2 scores per habitat; e.g. mudflat: 25 if 'poor');
- Freshwater flows (2 scores: 0 for 'high', 100 for 'low');
- Bed stability (4 scores, e.g. 100 for 'strong/firm'); and
- Soil type (4 scores, including 100 for clay loam, 75 for clay, 50 for sand).

Before arriving at a final score users are given the opportunity to both weight and attach confidence values to the provided data.

TE2100 – ABPmer site selection process

The Environment Agency clarified that the aim of the site selection process within the TE2100 study area was to identify where it might be possible to create sustainable saltmarsh only. Furthermore, it was also specified that the sites should require minimal engineering and maintenance to deliver this habitat. As such, the overall objective of this task was to identify opportunities for habitat creation rather than consider the implementation of such schemes.

a) Screening

This process was essentially composed of two stages. Firstly, a broad-scale screening of suitable sites was undertaken using a range of datasets. Secondly, the site boundaries of the short listed options were fine-tuned using more detailed datasets (all in a GIS environment, based on Environment Agency and Natural England (NE) steer).

1. Broad scale screening for sites based on:

- Suitable elevation (initially based on NEXTMAP data & 5m contour);
- Exclusion of major industrial and urban areas – using:
- The landuse (land classification 2000) dataset to remove industrial and urban areas; and
- Ordnance Survey (1:50,000) and Aerial Photography to ensure that areas eliminated as a result of the landuse dataset were correctly eliminated.

2. Fine tuning of site boundaries:

The following iterative steps were undertaken:

- Buffering of derived site boundaries by 250m (to compensate for potential inaccuracies);
- Redefining of site boundaries using (higher-accuracy) LiDAR data; and
- Further refining of site boundaries according to infrastructure presence (i.e. inclusion of minor dead end roads, exclusion of railways, exclusion of major industry, inclusion of scattered buildings & 1 or 2 housing units, exclusion of major underground lines).



b) MCA

Following the above process a total of 48 sites were identified for further review. A number of statistics were calculated for these sites to enable comparison between them:

- Distance to the main channel (GIS calculation based on Admiralty Charts) – this was to provide an indication of the effort required to apply additional sediment to a site if required;
- Volume of sediment required to increase elevation to the level of MHWN (GIS calculation) – this provided a relative statistic which could be applied and compared across all sites;
- Average percentage cover of saltmarsh and grassland (GIS calculation based on existing elevation and water levels) – this provided both an indication of habitats the sites could currently provide and also the relative sustainability in relation to future water levels;
- Degree of exposure experienced (automated GIS fetch tool calculation); and
- Current and previous land use of the sites, including evidence of historic creeks (identified from aerial photographs and LiDAR).

The scoring and ultimate ranking of individual sites was undertaken at a workshop which involved the Environment Agency, Phil Shaw, ABPmer and HR Wallingford. Essentially, each of the above factors was scored on a varying scale of 0-4, with the maximum possible score being 20. Scoring both 'volume of sediment required' and 'average percentage cover of saltmarsh and grassland' was an intentional double counting to represent the importance of elevation for the creation and sustainability of a site.

Additional factors qualitatively reviewed/considered at the workshop included:

- Designations;
- Ecological function/position in estuary; and
- Local knowledge/expert opinion (e.g. identification of existing Environment Agency/NE restoration initiatives, including sites earmarked for freshwater habitat creation; furthermore sites earmarked as potential flood storage areas or for development were identified). The above process led to eight sites being chosen for incorporation into the subsequent morphological modelling.

H.4 Screening and Consultation Approaches

Environment Agency Southern Region

a) Screening

used the Atkins GIS-based tool.

b) Consultation

In 2007, the EA's Southern Region followed the above screening process with a round of consultation with local managers to ascertain which sites might suffer least resistance (e.g. in terms of interested landowners).



H.5 Screening, MCA and Consultation Approaches

ABPmer Lappel Bank / Fagbury Flats compensation site selection

A review of potential sites for habitat replacement was undertaken in 1996/97 to identify a suitable location to compensate for the losses incurred at Lappel Bank (Medway Estuary) and Fagbury Flats (Stour and Orwell Estuaries). The site was required to satisfy a number of specific objectives including the overall size and the ratio of saltmarsh to mudflat habitat that developed. Following the first (largely qualitative) site selection process a preferred site was identified but was later rejected by the local community. ABPmer were commissioned in 2003 to undertake a further extended site selection process.

a) Screening

The first phase in the identification of potential compensation sites included a screening exercise against the following criteria:

- Suitable elevation (based on EA floodplain);
- Exclusion of urban areas and buildings/infrastructure;
- Exclusion of nationally and internationally designated sites;
- Exclusion of sites smaller than 40ha (compensation requirement);
- Exclusion of sites providing less than 20ha of mudflat habitat (compensation requirement); and
- Exclusion of sites where new defence would be longer.

b) MCA

Secondly, the following criteria were scoped across a number of scales and scores (shown in brackets). Decisions were made based on a variety of sources, including expert judgement, modelling and consultation with local English Nature (EN, now NE) teams:

- Total area (0 to 5; e.g. 5 if total area exceeded 600ha);
- Morphological functioning (based on expert judgement) (1 to 3);
- Potential effects on adjacent estuarine/coastal habitats (1 to 3);
- Potential effects on terrestrial/freshwater habitats (0 to 3);
- Engineering feasibility and costs (1 to 4);
- Current standard of flood defence (1 to 4; e.g. 4 if in poor condition);
- Preferred flood defence option (0 for hold the line, 1 for realignment);
- Amount of owners per site (0 to 3; e.g. 3 if only one owner); and
- Proximity to Lappel Bank and Fagbury Flats (0 to 3).

c) Consultation

Prior to the MCA phase, but not influencing the process, consultation was undertaken with EN and the Environment Agency to obtain relevant information on the sites identified in the screening process, and to identify potentially significant constraints. Sites were lastly prioritised based on the findings of the MCA exercise and the presence of potential constraints. Two sites were subsequently short-listed, and preliminary modelling and public consultations undertaken. The Defra Wallasea Wetlands Creation Project was consequently realised in 2006. 4.2 Pre-feasibility study of re-alignment opportunities in Essex Ahlhorn and Meyerdirk (2007) provided a summary of the screening, selection and MCA process undertaken as part of the Essex Estuarine



Strategies project (Thomas, 2002). a) Screening Halcrow undertook an initial screening in 1997 based on suitable elevation using LIDAR data. b) Consultation The screening process was followed by a qualitative selection of suitable sites based on discussions with local EA staff. c) MCA Each of the selected sites were scored against five criteria, typically on a scale of 0 to 5, before being weighted according to their perceived importance. The following criteria and weightings were applied:

- Costs (per hectare of habitat created) (weighting: 20);
- Hydrodynamics (likely impact on estuarine processes) (weighting: 25);
- Environment (potential to improve local environment) (weighting: 15);
- Owner interest (weighting: 20); and
- Defence condition (weighting: 20).

The maximum score that could be achieved at a site was 500.

The Solent Dynamic Coast project

a) Screening

Cope et al. (2007) used the following criteria to screen for potentially suitable sites within the Solent Coastal Dynamic Project:

- Suitable elevation (based on tidal levels);
- Exclusion of buildings;
- Exclusion of landfill sites; and
- Exclusion of sites under 0.5ha.

b) Economic viability

Economic viability of each potential site was assessed using a survey of local coastal managers; this was developed in consultation with the EA and NE. Sites were scored based on government economic and environmental criteria across a number of time epochs. c) MCA Lastly, a matrix was applied to rank potential sites in order of importance, addressing detailed issues such as licensed abstraction sites, historic buildings/scheduled monuments, archaeology, land ownership, rights of way and recreational use.

Regional Habitat Creation Programme (Anglian)

a) Screening / MCA

Screening is undertaken using a bespoke GIS tool that overlays a range of set attribute or criteria layers for different habitat types (the combination of which can be changed by the user). The output indicates how many criteria are met by each land parcel and allows the user to interrogate to identify which ones were met or failed.

b) Consultation

Using the output from the GIS tool as a starting point the team uses stakeholder workshops as a means of obtaining local knowledge and insight into potential opportunities and to garner support in progressing particular areas and sites.



H.6 Summary

Tables 1 and 2 summarise the screening and scoping criteria that have been used to identify potentially suitable sites for habitat creation. The tables demonstrate that whilst the criteria that have previously been used to identify suitable locations are broadly similar, there is a surprising variety in the emphasis put on physical and/or anthropogenic factors, and in the stage at which certain criteria were interrogated.

	Solent CHaMP	Thames CHaMP	CEFAS tool	Atkins tool (advisory)	Wallasea	TE2100	Solent Dynamic
Suitable elevation (based on EA floodplain)	X				X		
Suitable elevation (based on 5m contour)	X	X		X		X	
Suitable elevation (based on tidal levels)		X	X		X	X	X
Suitable slope			X	X			
Proximity to existing habitats			X				
Exclusion of contaminated land and/or landfill						X	X
Exclusion of areas within 2km of landfill site				X			
Exclusion of buildings/infrastructure					X		X
Exclusion of urban areas				X	X	X	
Exclusion of major underground utility lines							
Exclusion of built up areas	X	X				X	
Exclusion of main roads		X				X	
Inclusion of scattered buildings & 1-2 housing units						X	
Exclusion of major industry						X	
Inclusion of minor dead-end roads						X	
Exclusion of areas within 25m of main roads				X			
Exclusion of railway lines		X				X	
Exclusion of areas within 25m of railway line				X			
Exclusion of areas within 13km of airports				X			
Exclusion of woods		X					
Exclusion of designated sites					X		
Exclusion of sites with longer defence line					X		
Exclusion of sites smaller than 0.5ha							X
Exclusion of sites smaller than 5ha						X	

Table 1: GIS screening criteria applied by various site selection processes



	CEFAS tool	Hodge & Johnson	ABPmer Wallasea	ABPmer TE2100	Essex Environment Agency
Water salinity, freshwater flows & water quality	X				
Biological/propagule supply	X				
Percentage cover of saltmarsh & grassland				X	
Habitat location (in estuary/along coast)	X				
Exposure and/or connectivity of the site	X			X	
Bed stability & soil type	X				
Volume of sediment required to fill to MHWN				X	
Presence of contaminated land	X	X			
Need for new/secondary defences		X			
Years embanked		X			
Current/previous landuse & evidence of relict creeks				X	
Total Area			X		
Morphological functioning/long-term sustainability			X		
Potential effects on adjacent habitats/hydodynamics			X		X
Engineering feasibility and costs			X		
Costs					X
Current standard of flood defence			X		X
Site distance to main shipping channel (as proxy for ease of affecting recharge)				X	
Realignment preferred flood defence option		X	X		
Agricultural land use		X			
Environmental improvement					X
Urban land & other land use (incl. roads)		X			
Land ownership		X	X		X
Existing nature conservation designations		X			

Table 2: MCA criteria scored and weighted by various site selection processes

H.7 References

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Appendix I : Habitat Creation Sites Assessment Table



Severn Estuary Flood Risk Management Strategy

Screening Phase 1	Screening Phase 2	Screening Phase 3	Qualitative Assessment	Workshop 2 Stakeholder Comments	Assignment of limits	Reason for assignment													
SEFMS site number	Original Area	Stakeholder Comments	Screen Phase 2 Notes	Revised Area	Total cost per ha	Screen Phase 3 Notes	Classification	RMP recommendation	Primary reason for assigning longterm option	Slope	Overlap with designations	Open landscape	Minimum number of footpaths (only based on OS map)	Proximity to designated sites and saltmarsh layer	RMP comments	Workshop 2 Stakeholder Comments	Assignment of limits	Reason for assignment	
1	454	Runway and Petestown - SW end heavily degraded, soil stripping, recycling and stockpiling. Pronounced negative gradient substantial peat shrinkage especially to the North of road. Runway and Petestown - water flows in SW direction. Water level structures and a big drainage pipe. Lundy Way landfill just outside the site. Fly tipping. Trailers on site boundary. New industrial units. Petestown Court - less fly tipping near Runway Petestown - Cuts but not into area of coast. Shower and gravel on road especially. Sheds back in mouth of Runway and part of birdwatcher but mouting birds come to land. New parking on bank of east and west (Wentlogh). Historic landscape (Contact council for British archaeology. John Rippon (East University). Wentlogh land complex still functioning Roman drainage systems. Petestown Court - Newport and more rural in character - lots of small field systems guided by ditches. All Wales coast path. Runway Petestown - owners may not co-operate. Council want a proportion. All Wales coast path. Multiple ownership (check with CCW). Owners may co-operate. Strong RSE influence. Litter problem on mid section of road north of 1.	Site retained. Reduce area by approximately 1/2 to eliminate contaminated land and infrastructure.	1	224.91	4444.61	golf course	Short Term B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Out course. SuP is 1000yrs generally although low spots exist, with no maintenance would fail by 2028.	20+ years	Out course.
2	271	Handovers	Site retained but reduced in size. kept middle third. Site reduced due to contaminated land in the south and railway pylons/ road in the north.	2	101.91	4699.71	Short Term B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
3	18		Site retained but reduced in size. kept middle third. Site reduced due to contaminated land in the south and railway pylons/ road in the north.	3	101.91	4699.71	Short Term B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
4	5		Site retained but reduced in size. kept middle third. Site reduced due to contaminated land in the south and railway pylons/ road in the north.	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
5	5		Site retained but reduced in size. kept middle third. Site reduced due to contaminated land in the south and railway pylons/ road in the north.	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
6	6.9		Site retained but reduced in size. kept middle third. Site reduced due to contaminated land in the south and railway pylons/ road in the north.	6	18.2	4802.73	Short Term B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
7	278		Site retained. We need to check aerial photographs. It is possible unfavourable due to surroundings and lack of ecological potential.	7	109.68	3642.44	Short Term B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
8	1602		Negative gradient. Eastern section is most recently and effectively drained. Newport wetland reserve at west extreme. All aquatic bird interest. Openings or seawall would provide benefits to birds. Some historic landscaping. RSE influence. Subsoil - power station. NW of 8 substation and steel works.	8	1019.53	30735.43	Short Term B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
9	35	Carroll	Site retained but cut in half to the left of the works due to pylons on a road. Note - compensation for Carroll.	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
10	105.1		Site retained but reduced in area due to railway.	10	20.91	4740.71	split into 2 due to river	Long Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
11	N/A	N/A	Site retained but reduced in area due to railway.	10	52.66	17096.86	Long Term A	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
12	N/A	N/A	Site retained but reduced in area due to railway.	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
13	121.9		Site retained but reduced in area due to large number of pylons.	11	32.48	35385.18	split into 2 due to electricity substation	Long Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
14	N/A	N/A	Site retained. Note - potentially a good site because it has high land to the rear so reduces need for defences.	11	14.78	33051.48	split into 2 due to electricity substation	Long Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
15	10.9		Site retained but reduced in area due to large number of pylons.	12	11.27	16000.00	short boundary redesigned to coast	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
16	5.4		Site retained although might reduce in size to eliminate need for excessive new defences. There was a question as to whether the site is currently defensible.	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
17	6.4	Islands	Site retained but reduced in size due to the small size of the site and the overlap with houses and multiple ownership.	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
18	60		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
19	404		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	15	40.37	16070.00	short boundary redesigned to coast	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
20	54		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	15	54.82	15775.28	split into 2 due to railway	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
21	25		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
22	N/A	N/A	Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
23	43.1		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	18	29.84	16075.00	short boundary redesigned to coast	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	Potential drainage issues and presence of constraints. SuP is <1000yrs, with no maintenance would fail by 2028.	20+ years	Out course.	
24	152		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	19	199.84	28038.47	short boundary redesigned to remove works	Short Term A	N/A	generally flat	none	railway near, road north east	front and 2 within	no	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.	
25	43.1		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	20	29.84	16075.00	short boundary redesigned to coast	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
26	180.2		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	20	29.84	16075.00	short boundary redesigned to coast	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
27	152		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	21	152.03	15162.18	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
28	180.2		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	21	152.03	15162.18	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
29	180.2		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
30	180.2		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	23	109.84	29712.42	split into 2 due to railway	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
31	180.2		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	23	63.06	36740.36	split into 2 due to railway	Short Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
32	511		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	24	31.25	32647.87	split into 2 due to railway	Short Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
33	11		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	24	31.25	32647.87	split into 2 due to railway	Short Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
34	11		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	25	318.31	22440.00	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
35	40.1		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	25	16.84	15000.00	short edge redesigned to coast defence	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
36	40.1		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	26	39.4	21838.82	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
37	9.9		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	27	9.87	15000.00	split into 2 due to railway	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
38	223.3		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	28	165.68	36822.75	split into 2 due to railway	Short Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
39	330		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	28	362.23	27737.00	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
40	520		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	29	348.83	26988.18	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
41	N/A	N/A	Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	30	12.65	43564.23	split into 2 due to railway	Short Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
42	N/A	N/A	Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	30	6.88	61801.00	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
43	N/A	N/A	Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	30	19.52	97941.38	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
44	25		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	31	18.19	44452.14	split into 2 due to railway	Long Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
45	40.1		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	32	46.03	30208.89	split into 2 due to railway	Long Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
46	430		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	33	187.36	25451.12	split into 2 due to railway	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
47	131.8		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	34	118.23	28153.83	infrastructure removed	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
48	999		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	35	534.23	27264.50	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
49	88		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	36	88.41	36488.75	split into 2 due to railway	Short Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
50	135		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	37	68.59	35219.30	split into 2 due to railway	Short Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
51	161		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	38	146.3	27154.31	split into 2 due to railway	Long Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
52	260		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	39	203.14	27264.22	split into 2 due to railway	Short Term A	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
53	112		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with landowner on one section on an intertidal habitat creation project. The main area of potential on the SE bank of Ramsey Rd the landowner is not supportive.	Thought to be allocated for flood storage - prejudice against use as MP site.	20+ years	Out course.
54	81		Site retained but reduced in size due to railway and grade 2 agricultural land. Note - potentially a good site, agricultural land could be retained at present level.	41	80.95	36711.22	split into 2 due to railway	Short Term B	< 10% intentional current day	N/A	N/A	N/A	N/A	N/A	N/A	SAWVP is currently working with land			





Appendix J : Potential High Level Options Assessment Tables





LOCATION		FACTUAL CRITERIA					POLICY CONTEXT			ASSESSMENT OF HIGH LEVEL OPTIONS AGAINST FACTUAL CRITERIA AND OBJECTIVES					SUMMARY ASSESSMENT OF HIGH LEVEL OPTIONS	POTENTIAL HIGH LEVEL OPTIONS		
Relevant placename	Strategic flood sub-cell	Salient environmental features at risk	Habitat Creation Potential	FRM performance (AEP)	Socio-economic viability	Potential sources of H&S risks	CFMP policies	SMP2 policies (0/20/50 years)	Previous strategic assessments	NAI	Maintain	Sustain	Improve	Adaptation		0 to 20 years	20 to 50 years	50 to 100 years
Penarth	FC1-P	Severn NZK sites. Pier listed	Very limited potential for habitat creation.	SoPs: 2-5% (2008), 10-20% (2028), 20-100% (2058), 100% (2108).	PVd of £0.2-0.4M, indicative HTL PVc of <1M, BCR<-1.	Close proximity of residents/tourists to any FRM activity (transport, construction or degradation). Possible tidal working conditions for contractors.	Improve FRM (Ogmore and Tawe CFMP, 2007).	HTL/HTL/HTL	None.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short to long term, although limited to wave overtopping rather than tidal weiring. No habitat would be created. Medium level of consequence in the medium term, with significant damage to industry and agriculture in the long term. BCR may support this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. BCR may support this option.	Existing flood risk would be further reduced, above indicative guidance. No habitat would be created. BCR does not support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Active management of assets is constrained due to weak economic viability. SoP will reduce over time as sea levels and storminess increase, although flood risk will be limited to less than 10 properties. Historically minimal beach erosion indicates that the seawall integrity would not be critically endangered in the short term. Reactive maintenance could be undertaken to ensure public H&S and amenity value. Habitat assessment does not support Adaptation in any epoch. In light of this, in the short term potential High Level Option is Maintain FRM, moving to Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Sustain
Tremorfa	FC1-0	Severn NZK sites. Over 10 Listed Buildings. Several historic landfill sites.	Very limited potential for habitat creation.	SoPs: 0.1% (2008), 0.1-1% (2028), 0.1-100% (2058), 2-100% (2108).	PVd of £267-623M, indicative HTL PVc of £9M, BCR>-5.	Close proximity of industry (steel works) and residents to any FRM activity (transport, construction or degradation). Possible tidal/mudflats working conditions for contractors.	Improve FRM (Taff Ely//Eastern Valleys CFMP PU1, 2007).	HTL/HTL/HTL	None.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short to long term, below indicative guidance. No habitat would be created. Medium level of consequence in the medium term, with significant damage to industry and agriculture in the long term. BCR does support this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. Low level of consequence to industry in the long term. BCR does support this option.	Existing flood risk would be further reduced, above indicative guidance. No habitat would be created. Very low level of consequence to industry. BCR does support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Significant industrial and commercial assets at risk and strong economic viability supports Sustain and Improve FRM. Very high SoP (>0.1% AEP) in the short to medium term does not support Sustain or Improve FRM. Habitat assessment does not support Adaptation in any epoch. In light of this, in the short to medium term the potential High Level Option is Maintain, with Sustain FRM in the long term.	Maintain	Maintain, Sustain	Sustain
Wentlooge Levels	FC1-1	Severn NZK sites. Levels are an Historic Landscape. Two SMs. Over 10 Listed Buildings. Several historic landfill sites and 1 existing landfill site.	Potential for 327Ha of habitat creation in the long term (sites 1 and 2).	SoPs: 2% (2008), 2-20% (2028), 10-100% (2058), 20-100% (2108).	PVd of £365-868M, indicative HTL PVc of £15M, BCR>-5.	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible tidal/mudflats working conditions for contractors.	Maintain/Sustain FRM (Eastern Valleys CFMP PUB/7, 2007).	HTL/HTL/HTL	Embankment raising, foreshore management with polders and rock armouring (Gwent Levels FMP, 2004).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short to long term, well below indicative guidance. No habitat creation. Significant level of consequence to industry, properties and infrastructure in the long term. BCR does support this option.	Existing flood risk would continue into the long term, well below indicative guidance. No habitat creation. Significant level of consequence to industry, properties and infrastructure in the long term. BCR does support this option.	Existing flood risk would be reduced to within indicative guidance. No habitat would be created. Low level of consequence in the short to long term, with limited damage to industry, properties and infrastructure. BCR does support this option.	Flood risk would be managed within indicative guidance. Significant habitat creation could occur in the long term. Significant consequences to properties dependent on alignment. BCR may support this option.	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. A range of small communities, environmental aspects, critical infrastructure and strong economic viability support Sustain and Improve FRM. A relatively low existing SoP (2% AEP) supports Improve FRM in the short term. Habitat assessment could support Adaptation in the long term. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Improve	Sustain	Sustain, Adaptation
River Ebbw - River Usk	FC1-2	River Usk SAC. 30-50 Listed Buildings. Historic and existing landfills.	Very limited potential for habitat creation.	SoPs: 20% (2008), 20-100% (2028), 100% (2108).	PVd of £108-333M, indicative HTL PVc of £9M, BCR>-5.	Close proximity of industry (docks) residents to any FRM activity (transport, construction or degradation). Difficult access in built up areas. Possible fluvial-tidal working conditions for contractors.	Improve FRM (Eastern Valleys CFMP, 2007).	HTL/HTL/HTL	Embankment raising, foreshore management with polders and rock armouring (Gwent Levels FMP, 2004). Maintain and improve defences (Tidal Usk FRM Strategy, 2008).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short to long term, well below indicative guidance. No habitat would be created. Significant consequence in the short term to industry, properties and infrastructure. BCR does support this option.	Existing flood risk would continue into the long term, well below indicative guidance. No habitat would be created. Significant consequence in the short term to industry, properties and infrastructure. BCR does support this option.	Existing flood risk would be reduced to within indicative guidance. No habitat would be created. Reduced consequence to industry, properties and infrastructure. BCR does support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy limits options to Maintain, Sustain and Improve FRM. A range of small communities, environmental aspects, critical infrastructure and strong economic viability preclude NAI. A low existing SoP precludes Maintain or Sustain FRM in the short term. Habitat assessment precludes Adaptation in any epoch. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term.	Improve	Sustain	Sustain
Caldicot Levels	FC2-0	Severn NZK sites with terrestrial SSSI behind. Newport Wetlands NNR. Levels are an Historic Landscape. A few SMs. Historic and current landfill sites. Source protection zone.	Potential for 1130Ha of habitat creation in the long term (sites 7 and 8), although possibly 18Ha in the short term (site 6).	SoPs: 10% (2008), 10-100% (2028), 20-100% (2058), 100% (2108).	PVd of £947-1,556M, indicative HTL PVc of £37M, BCR>-5.	Close proximity of industry (docks, power station) residents to any FRM activity (transport, construction or degradation). Overhead power lines present. Difficult access in built up areas. Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Wye and Usk CFMP, 2007).	HTL/HTL/HTL	Embankment raising, foreshore management with bank stabilisation and rock armouring (Gwent Levels FMP, 2004). Improve FRM (Caldicot Levels SDI, 2002)	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short to long term, well below indicative guidance. No habitat creation. Significant level of consequence to industry, properties and infrastructure in the long term. BCR does support this option.	Existing flood risk would continue into the long term, well below indicative guidance. No habitat creation. Significant level of consequence to industry, properties and infrastructure in the long term. BCR does support this option.	Existing flood risk would be reduced to within indicative guidance. No habitat would be created. Low level of consequence in the short to long term, with limited damage to industry, properties and infrastructure. BCR does support this option.	Flood risk would be managed within indicative guidance. Significant habitat creation could occur in the long term. Significant consequences to properties dependent on alignment. BCR may support this option.	SESMP2 HTL policy limits options to Maintain, Sustain and Improve FRM. A range of small communities, environmental aspects, critical infrastructure and strong economic viability preclude NAI. A relatively low existing SoP precludes Maintain or Sustain FRM in the short term. Habitat assessment precludes Adaptation until the long term. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Improve	Sustain	Sustain, Adaptation
Mathern	FC2-1	Severn NZK sites. Levels are an Historic Landscape. Cluster of Listed Buildings. Several current and historic landfill sites.	Potential for 132Ha of habitat creation in the long term (sites 10a-b, 11a-b, 12).	SoPs: 0.5% (2008), 0.5-2% (2028), 1-100% (2058), 5-100% (2108).	PVd of £3.5-12M, indicative HTL PVc of £5M, BCR>-1.	Remote access in rural areas. Mainline railway present. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Wye and Usk CFMP, 2007).	HTL/HTL/HTL	Foreshore management with bank stabilisation and rock armouring. Sustain FRM (Caldicot Levels SDI, 2002)	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the medium to long term, below indicative guidance. No habitat would be created. Significant level of consequence in the long term, with significant damage to industry, properties and infrastructure in the long term. BCR does not supports option.	Existing flood risk would continue into the long term, above indicative guidance. No habitat would be created. Low level of consequence to industry, properties and infrastructure in the long term. BCR does support this option.	Existing flood risk would be further reduced, well above indicative guidance. No habitat would be created. Very low level of consequence to industry, properties and infrastructure. BCR does not support this option.	Flood risk would be managed within indicative guidance. Significant habitat creation could occur in the long term. Significant consequences to properties dependent on alignment. BCR may support this option.	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. A range of small communities, environmental aspects, critical infrastructure and strong economic viability support Sustain, Improve FRM. The relatively high existing SoP (0.5% AEP) could still allow Sustain FRM in the short term. Habitat assessment precludes Adaptation until the long term. In light of this, the potential High Level Option is to Maintain or Sustain FRM in the short term, and then Sustain FRM over the medium and long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Maintain, Sustain	Sustain	Sustain, Adaptation



LOCATION		FACTUAL CRITERIA					POLICY CONTEXT			ASSESSMENT OF HIGH LEVEL OPTIONS AGAINST FACTUAL CRITERIA AND OBJECTIVES					SUMMARY ASSESSMENT OF HIGH LEVEL OPTIONS	POTENTIAL HIGH LEVEL OPTIONS		
Relevant placename	Strategic flood sub-cell	Salient environmental features at risk	Habitat Creation Potential	FRM performance (AEP)	Socio-economic viability	Potential sources of H&S risks	CFMP policies	SMP2 policies (0/20/50 years)	Previous strategic assessments	NAI	Maintain	Sustain	Improve	Adaptation		0 to 20 years	20 to 50 years	50 to 100 years
Tidenham	FC3-1	Severn N2K sites. Some Grade 2 ag land, 2 Scheduled Monuments	Potential for 40Ha of habitat creation in the short term (sites 15 and 16).	Flooding partly constrained by high ground.	Railway line affected.	Remote access in rural areas. Mainline railway present. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI	Continue with current flood warning subject to funding (Tidal Severn FRM Strategy, 2006).	Flood risk would increase slowly in the short to medium term, within indicative guidance. Some habitat could be created in the medium term. Limited consequences, solely impact on the railway. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase slowly in the short to medium term, within indicative guidance. Some habitat could be created in the medium term. Limited consequences, solely impact on the railway. BCR supports this option.	SESMP2 NAI policy focuses options to NAI and Adaptation. Assets at risk are limited to the railway line and the low economic viability does not support active management. The potential High Level Option is NAI or Adaptation in the short to long term.	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation
Stroat	FC3-2	Severn N2K sites. Broadstone and Roman Villa. Two Listed Buildings.	Potential for 61Ha of habitat creation in the short term (site 17b).	Flooding partly constrained by high ground.	Railway line affected.	Remote access in rural areas. Mainline railway present. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI		Flood risk would increase slowly in the short to medium term, within indicative guidance. Some habitat could be created in the medium term. Limited consequences, solely impact on the railway. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase slowly in the short to medium term, within indicative guidance. Some habitat could be created in the medium term. Limited consequences, solely impact on the railway. BCR supports this option.	SESMP2 NAI policy focuses options to NAI and Adaptation. Assets at risk are limited to the railway line and the low economic viability does not support active management. The potential High Level Option is NAI or Adaptation in the short to long term.	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation
Lydney	FC3-3	Severn N2K sites. Lydney Cliff SSSI. Clusters of listed buildings. Some Grade 2 Ag Land, Historic landfill sites.	Potential for 200Ha of habitat creation in the long term (site 19).	SoPs: 0.1% (2008), 0.1-1% (2028), 0.1-100% (2058), 1-100% (2108).	PVd of £7-17M, indicative HTL PVC of £8M, indicative BCR<->1.	Remote access in rural areas although harbour and associated infrastructure is also present. Railway present. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/MR	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	Existing flood and erosion risk would increase slowly through the short and medium term; after this FRM asset failure would result in regular flooding. Unmanaged habitat would be created in the longer term. In the long term significant damages to properties and infrastructure would occur. BCR does not support this option	Existing flood and erosion risk in the short to medium term; in the longer term level of flood risk would be outside indicative guidance. No habitat would be created. Limited damage to properties and infrastructure would occur. BCR supports this option.	Existing flood and erosion risk would be sustained in the short to long term, within indicative guidance. No habitat would be created. Very limited damages to properties and infrastructure would occur. BCR supports this option.	Existing flood and erosion risk would be reduced in the short to long term, well above indicative guidance. No habitat would be created. Extremely limited damages to properties and infrastructure would occur. BCR does not support this option.	Flood risk would be managed within indicative guidance. Managed habitat could be created in the longer term if climate change reaches the upper end scenario or greater. In the long term significant damages to properties and infrastructure would occur. BCR supports this option.	SESMP2 policy focuses options to NAI, Maintain, Sustain, and Adaptation. Some commercial and residential assets at risk with marginal economic viability supports Maintain and Sustain FRM. High SoP in the short to medium term supports Maintain FRM. Habitat assessment supports Adaptation in the long term. In light of this, the potential High Level Option is Maintain in the short term, and Sustain in the medium to long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Maintain	Maintain, Sustain	Sustain, Adaptation
Purton	FC4-1	Severn N2K sites. Cluster of listed buildings & small historic landfill site not at risk of flooding.	Very limited potential for habitat creation.	Very constrained flood risk.	Railway line affected.	Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.	Maintain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI		Flood risk would increase in the short to medium term, within indicative guidance. No habitat would be created. Limited consequences, solely impact on the railway and a few properties. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 NAI policy focuses options to NAI and Adaptation. Limited flood risk and assets at risk give poor economic viability, supporting NAI. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is NAI.	NAI	NAI	NAI
Awre	FC4-3	Severn N2K sites. PRowS	Potential for 153Ha of habitat creation in the short term (site 21).	SoPs: 20% AEP (2008), 100% AEP (2028 to 2108).	PVd of <£1M, indicative HTL PVC of £4M, BCR<1.	Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	MR/HTL/HTL	Continue with current flood warning subject to funding (Tidal Severn FRM Strategy, 2006).	Flood risk would increase in the short to medium term, within indicative guidance. Significant habitat would be created. Consequences limited to agricultural land. BCR supports this option.	Flood risk would increase in the short to medium term, within indicative guidance. No habitat would be created. Consequences limited to agricultural land. BCR does not support this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. Consequences limited to agricultural land. BCR does not support this option.	Existing flood risk would be reduced, above indicative guidance. No habitat would be created. Consequences limited to agricultural land. BCR does not support this option.	Flood risk would be managed within indicative guidance. Significant habitat creation could occur, potentially in the short term. Consequences limited to agricultural land. BCR supports this option.	SESMP2 policy focuses options to NAI and Adaptation. Limited flood risk and assets at risk give poor economic viability, supporting Adaptation. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is Adaptation.	Adaptation	Adaptation	Adaptation
Bullo	FC4-4	4 listed buildings.	Very limited potential for habitat creation.	Very constrained flood risk.	PVd of <£1M, indicative HTL PVC of £1M, BCR<1.	Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI		Flood risk would increase in the short to medium term, within indicative guidance. No habitat would be created. Very limited consequences. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 NAI policy focuses options to NAI and Adaptation. Limited flood risk and assets at risk give poor economic viability, supporting NAI. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is NAI.	NAI	NAI	NAI
Ruddle	FC4-5	3 listed buildings.	Very limited potential for habitat creation.	Very constrained flood risk.	PVd of <£1M, indicative HTL PVC of £1M, BCR<1.	Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	NAI/NAI/NAI		Flood risk would increase in the short to medium term, within indicative guidance. No habitat would be created. Very limited consequences. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 NAI policy focuses options to NAI and Adaptation. Limited flood risk and assets at risk give poor economic viability, supporting NAI. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is NAI.	NAI	NAI	NAI
Newnham-on-Severn	FC4-6	2 or 3 listed buildings present	Very limited potential for habitat creation.	SoPs: 5% (2008), 5-10% (2028), 10-20% (2058), 20-100% (2108).	PVd of £2.3-9M, indicative HTL PVC of £3M, BCR->1.	Close proximity of residents to any FRM activity (transport, construction or degradation). Possible tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Maintain current line of defence to existing standard of protection (Tidal Severn FRM Strategy, 2006).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short to medium term, below indicative guidance. No habitat would be created. Significant consequences to properties and main road. BCR supports this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and main road. BCR supports this option.	Existing flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties and main road. BCR does not support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Flood risk to the town of Newnham gives economic viability, supporting Maintain and Sustain FRM. The relatively high existing SoP could still support Sustain FRM in the medium to long term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is to Maintain FRM in the short term, Maintain/Sustain FRM in the medium term, and then Sustain FRM in the long term.	Maintain	Maintain, Sustain	Sustain
Westbury-on-Severn and Rodley	FC4-7	Approximately 90 listed buildings, PRowS, Westbury House and Gardens.	Potential for 173Ha of habitat creation in the medium to long term (sites 23a-b).	SoPs: 5% (2008), 5-10% (2028), 10-20% (2058), 20-100% (2108).	PVd of £6.3-27M, indicative HTL PVC of £6M, BCR>1.	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL		Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short to medium term, below indicative guidance. No habitat would be created. Significant consequences to properties and railway. BCR does not support this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and railway. BCR may support this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties and railway. BCR may support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. A range of small communities give economic viability, supporting Maintain, Sustain and Improve FRM. The low existing SoP supports Improve FRM from the short term onwards. Habitat assessment supports Adaptation from the medium term onwards. In light of this, the potential High Level Option is Improve or Sustain FRM in the short to long term, with potential for Adaptation in the long term if climate change reaches the upper end or greater scenario.	Improve, Sustain	Sustain	Sustain



LOCATION		FACTUAL CRITERIA					POLICY CONTEXT			ASSESSMENT OF HIGH LEVEL OPTIONS AGAINST FACTUAL CRITERIA AND OBJECTIVES					SUMMARY ASSESSMENT OF HIGH LEVEL OPTIONS	POTENTIAL HIGH LEVEL OPTIONS		
Relevant placename	Strategic flood sub-cell	Salient environmental features at risk	Habitat Creation Potential	FRM performance (AEP)	Socio-economic viability	Potential sources of H&S risks	CFMP policies	SMP2 policies (0/20/50 years)	Previous strategic assessments	NAI	Maintain	Sustain	Improve	Adaptation		0 to 20 years	20 to 50 years	50 to 100 years
Walmore Common	FC4-8	Walmore Common SPA, Ramsar, NNR and SSSI. Approximately 20 listed buildings.	Very limited potential for habitat creation.	SoPs: 0.5% (2008), 1-2% (2028), 2-10% (2058), 10-100% (2108).	PVd of £7.4-10M, indicative HTL PVC of £1M, BCR>5.	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short to medium term, below indicative guidance. No habitat would be created. Significant consequences to properties, main road and railway. BCR supports this option.	Existing flood risk would continue into the long term, above indicative guidance. No habitat would be created. Reduced consequences to properties, main road and railway. BCR does not support this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties, main road and railway. BCR does not support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give strong economic viability, supporting Sustain or Improve FRM. The high existing SoP supports Maintain FRM in the short term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is Maintain FRM in the short term, and Sustain FRM in the medium to long term.	Maintain	Sustain	Sustain
Minsterworth	FC4-9	Few listed buildings, PRoWs inc Gloucestershire Way.	Very limited potential for habitat creation.	SoPs: 0.1% AEP (2008 and 2108)	PVd of £2.4-15M, indicative HTL PVC of £2M, BCR->1.	Rural access for any FRM activity (transport, construction or degradation). Possible fluvial-tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL		Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the medium to long term, within indicative guidance. No habitat would be created. Significant consequences to properties, main road and railway. BCR supports this option.	Existing flood risk would increase in the medium to long term, within indicative guidance. No habitat would be created. Reduced consequences to properties, main road and railway. BCR supports this option.	Existing flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties, main road and railway. BCR does not support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give marginal economic viability, supporting Maintain or Sustain FRM. The high existing SoP supports Maintain FRM in the short term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is Maintain FRM in the short term, and Maintain/Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Maintain, Sustain
Minsterworth Ham	FC4-10	About 10 listed buildings.PRoWs inc Gloucestershire Way	Potential for 349Ha of habitat creation in the short to long term (site 24a-b).	SoPs: 5% AEP (2008), 5-100% (2028), 100% (2058 and 2108).	PVd of £6.6-13M, indicative HTL PVC of £11M, BCR<-1.	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible fluvial-tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	MR/HTL/HTL	Construct new line of defence (Tidal Severn FRM Strategy, 2006).	Flood risk would increase in the short to medium term, below indicative guidance. Significant habitat would be created in the medium term. Significant consequences to properties and main road. BCR supports this option.	Flood risk would increase in the short to medium term, within indicative guidance. No habitat would be created. Significant consequences to properties and main road. BCR does not support this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and main road. BCR does not support this option.	Existing flood risk would be reduced, within indicative guidance. No habitat would be created. Reduced consequences to properties and main road. BCR does not support this option.	Flood risk would be managed within indicative guidance. Significant habitat creation could occur, potentially in the short term. Consequences to properties and main road dependent on alignment. BCR supports this option.	SESMP2 policy focuses options to NAI and Adaptation. Very limited assets at risk give poor economic viability, supporting NAI or Adaptation. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is Adaptation.	Adaptation	Adaptation	Adaptation
The Rea	FC5-3	Approximately 10 Listed Buildings and 2 SMs (not at risk) . Gloucester Refuse tip.	Potential for 39Ha of habitat creation in the short term (site 26).	SoPs: 0.1% AEP (2008), 0.1-2% (2028), 1-20% (2058), 5-100% (2108).	PVd of £2.2-6.6M, indicative HTL PVC of £3M, BCR->1.	Proximity of local communities to any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible fluvial-tidal conditions for contractors.	Reduce FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Raise defences to optimum standard of protection based on current guidance (Tidal Severn FRM Strategy, 2006).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the long term, below indicative guidance. No habitat would be created. Significant consequences to properties and infrastructure. BCR supports this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR supports this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. There is moderate economic viability, supporting Maintain or Sustain FRM. The relatively high existing SoP could still support Sustain FRM in the medium to long term. If habitat losses require, Adaptation could be considered in the medium to long term. In light of this, the potential High Level Option is to Maintain FRM in the short term, Maintain/Sustain FRM in the medium term, and then Sustain FRM in the long term.	Maintain	Maintain, Sustain	Sustain
Stonebench	FC5-4		Potential for 10Ha of habitat creation in the long term (site 27).	SoPs: 0.5% AEP (2008), 0.5-2% (2028), 1-100% (2058), 2-100% (2108).	PVd of £0.1-1.2M, indicative HTL PVC of £2M, BCR<-1.	Proximity of local communities to any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible fluvial-tidal conditions for contractors.	Reduce FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short term, below indicative guidance. No habitat would be created. Limited consequences to properties and roads. BCR does not support this option.	Flood risk would continue into the long term, below indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR does not support this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR does not support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. The weak economic viability and relatively high existing SoP supports Maintain and Sustain FRM. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is to Maintain FRM in the short term, moving to Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Sustain
Elmore Back	FC5-5	Approximately 40 listed buildings. Severn Valley Way	Potential for 156Ha of habitat creation in the medium to long term (site 28).	SoPs: 2% AEP (2008), 2-10% AEP (2028), 10-20% (2058), 20-100% (2108).	PVd of £4.6-7.6M, indicative HTL PVC of £7M, BCR<-1.	Close proximity of residents to any FRM activity (transport, construction or degradation). Remote access in more rural areas. Overhead power lines present. Possible fluvial-tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/MR/MR	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	Flood risk would increase in the short term, below indicative guidance. Significant habitat would be created, although not required or preferred until the long term. Limited consequences to properties and roads. BCR supports this option.	Flood risk would increase in the short term, below indicative guidance. No habitat would be created. Limited consequences to properties and roads. BCR may support this option.	Flood risk would continue into the long term, below indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR does not support this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR does not support this option.	Flood risk would be managed within indicative guidance. Significant habitat creation could occur in the medium to long term, dependent on climate change scenario. Limited consequences to properties roads dependent on alignment. BCR may support this option.	SESMP2 policy focuses options to NAI and Adaptation. Limited assets at flood risk give weak economic viability, supporting NAI or Adaptation. Habitat assessment supports Adaptation in the medium to long term. In light of this, in the short term the potential High Level Option is Maintain FRM, moving to Adaptation in the medium to long term.	Maintain	Maintain, Adaptation	Adaptation
Longney	FC5-6	Approximately 30 listed buildings. Severn Valley Way	Potential for 352Ha of habitat creation in the long term (site 29).	SoPs: 0.1% (2008 to 2028), 0.1-1% (2058), 1-100% (2108).	PVd of £3.7-11.6M, indicative HTL PVC of £4M, BCR->1.	Close proximity of residents to any FRM activity (transport, construction or degradation). Remote access in more rural areas. Overhead power lines present. Possible fluvial-tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/MR/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	Flood risk would increase in the short term, below indicative guidance. Significant habitat would be created, although not required or preferred until the long term. Limited consequences to properties and roads. BCR supports this option.	Flood risk would increase in the short term, within indicative guidance. No habitat would be created. Limited consequences to properties and roads. BCR does not support this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR does not support this option.	Flood risk would continue into the long term, above indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR does not support this option.	Flood risk would be managed within indicative guidance. Significant habitat creation could occur in the long term. Limited consequences to properties roads dependent on alignment. BCR may support this option.	SESMP2 policy focuses options to NAI or Adaptation. However, assets at flood risk give moderate economic viability, supporting Maintain or Sustain FRM. Habitat assessment supports Adaptation in the medium to long term. In light of this, in the short term the potential High Level Option is Maintain and Sustain FRM. If climate change reaches the upper end or greater scenario, then Adaptation may be required in the long term.	Maintain	Maintain, Sustain	Sustain, Adaptation
Upper Framilode	FC5-7	Severn N2K sites. Severn Valley Way, small clusters of listed buildings.	Potential for 18Ha of habitat creation in the long term (sites 31 and 32).	SoPs: 1% (2008), 1-2% (2028), 2-20% (2058), 20-100% (2108).	PVd of £70-92M, indicative HTL PVC of £4M, BCR>5.	Close proximity of residents to any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Raise defences to optimum standard of protection based on current guidance (Tidal Severn FRM Strategy, 2006).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the long term, below indicative guidance. No habitat would be created. Significant consequences to properties and infrastructure. BCR supports this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR supports this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Small communities, critical infrastructure and strong economic viability support Maintain, Sustain or Improve FRM. A relatively low existing SoP supports Sustain or Improve FRM in the short term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is to Sustain or Improve FRM in the short term, and then Sustain FRM over the medium and long term.	Sustain, Improve	Sustain	Sustain
Arlingham	FC5-8	Severn N2K sites. Approximately 30 listed buildings. Small historic landfill site at Arlingham.	Potential for 409Ha of habitat creation in the medium to long term (site 30 and 30a-b-c).	SoPs: 0.1% (2008 to 2028), 0.1-1% (2058), 2-100% (2108).	PVd of £16-24M, indicative HTL PVC of £8M, BCR>1.	Proximity of local communities to any FRM activity (transport, construction or degradation). Limited access routes. Overhead power lines are present. Possible fluvial-tidal conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/MR	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	Flood risk would increase in the medium term, below indicative guidance. Significant habitat would be created. Significant consequences to properties. BCR does not support this option.	Flood risk would increase in the long term, below indicative guidance. No habitat would be created. Significant consequences to properties. BCR supports this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties. BCR supports this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties. BCR does not support this option.	Flood risk would be managed within indicative guidance. Significant habitat creation could occur in the long term. Significant consequences to properties dependent on alignment. BCR may support this option.	SESMP2 policy focuses options to NAI and Adaptation. However, assets at flood risk give moderate economic viability, supporting Maintain or Sustain FRM. Habitat assessment supports Adaptation in the medium to long term. In light of this, in the short term the potential High Level Option is Maintain and Sustain FRM. If climate change reaches the upper end or greater scenario, then Adaptation may be required in the long term.	Maintain	Maintain, Sustain	Sustain, Adaptation



LOCATION		FACTUAL CRITERIA					POLICY CONTEXT			ASSESSMENT OF HIGH LEVEL OPTIONS AGAINST FACTUAL CRITERIA AND OBJECTIVES					SUMMARY ASSESSMENT OF HIGH LEVEL OPTIONS	POTENTIAL HIGH LEVEL OPTIONS		
Relevant placename	Strategic flood sub-cell	Salient environmental features at risk	Habitat Creation Potential	FRM performance (AEP)	Socio-economic viability	Potential sources of H&S risks	CFMP policies	SMP2 policies (0/20/50 years)	Previous strategic assessments	NAI	Maintain	Sustain	Improve	Adaptation		0 to 20 years	20 to 50 years	50 to 100 years
Slimbridge	FC5-9	Severn NZK sites. Severn Estuary SSSI, Purton Passage SSSI, Frampton Pools SSSI. Historic Garden and Park at Frampton. Approximately 100 listed buildings. 2 SMs at Wansfield Court. Three landfill sites.	Potential for 187Ha of habitat creation in the short term (site 33).	SoPs: 0.1% (2008 to 2028), 0.1-1% (2058), 1-100% (2108).	PVd of £8-42M, indicative HTL. PVC of £8M, BCR>1.	Remote access in rural areas. Possible fluvial-tidal working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	MR/HTL/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRM Strategy, 2006).	Flood risk would increase in the medium term, below indicative guidance. Significant habitat would be created. Significant consequences to properties and infrastructure. BCR does not support this option.	Flood risk would increase in the long term, below indicative guidance. No habitat would be created. Significant consequences to properties and infrastructure. BCR supports this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR supports this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR does not support this option.	Flood risk would be managed within indicative guidance. Significant habitat creation would occur in the long term. Significant consequences to properties and infrastructure dependent on alignment. BCR supports this option.	SESMP2 policy focuses options to NAI and Adaptation. However, assets at flood risk give moderate economic viability, supporting Maintain or Sustain FRM. Habitat assessment supports Adaptation in the medium to long term. In light of this, in the short term the potential High Level Option is Maintain and Sustain FRM. If climate change reaches the upper end or greater scenario, then Adaptation may be required in the long term.	Maintain	Maintain, Sustain	Sustain, Adaptation
Berkeley	FC6-1	Severn NZK sites. Berkeley Castle Historic Park and Garden. Approximately 140 listed buildings.	Potential for 118Ha of habitat creation in the short term (site 34).	SoPs: 0.5% (2008), 0.5-5% (2028), 1-100% (2058), 5-100% (2108).	PVd of £4.6-9.3M, indicative HTL. PVC of £2M, BCR>1.	Remote access and working in more rural areas. Nuclear Power Station and overhead powerlines. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Raise defences to optimum standard of protection based on current guidance (Tidal Severn FRMS, 2006).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the long term, below indicative guidance. No habitat would be created. Significant consequences to properties and infrastructure. BCR supports this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR supports this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR does not support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give moderate economic viability, supporting Maintain or Sustain FRM. The high existing SoP supports Maintain FRM in the short term. If habitat losses require, the habitat assessment supports Adaptation in any epoch. In light of this, the potential High Level Option is Maintain FRM in the short term, and Maintain/Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Sustain
Shepperdine	FC6-2	Severn NZK sites. Severn Estuary SSSI. Clusters of Listed Buildings. 1 SM (hill fort). Oldbury on Severn Power Station contaminated land.	Potential for 691Ha of habitat creation in the medium to long term (sites 35, 36 and 37).	SoPs: 10% AEP (2008), 10-20% (2028), 10-100% (2058), 20-100% (2108).	PVd of £25-58M, indicative HTL. PVC of £9M, BCR>1-5.	Remote access and working in more rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Continue with current maintenance practices and provide flood warning subject to funding and environmental constraints (Tidal Severn FRMS, 2006).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short term, below indicative guidance. No habitat would be created. Significant consequences to industry, properties and infrastructure. BCR supports this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to industry, properties and infrastructure. BCR supports this option.	Flood risk would be reduced, within indicative guidance. No habitat would be created. Reduced consequences to industry, properties and infrastructure. BCR does not support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give moderate economic viability, supporting Maintain or Sustain FRM. The relatively low existing SoP supports Sustain or Improve FRM in the short term. If habitat losses require, the habitat assessment supports Adaptation in any epoch. In light of this, the potential High Level Option is Sustain/Improve FRM in the short term, and Maintain/Sustain FRM in the medium to long term.	Sustain, Improve	Sustain	Sustain
Littleton-upon-Severn	FC6-3	Severn NZK sites. Two SSSIs. Approximately 150 listed buildings. Approximately 10 SMs. Three historic and one existing landfill sites.	Potential for 203Ha of habitat creation in the short term (site 39) and 146Ha in the long term (site 38).	SoPs: 0.1% (2008), 0.1-2% (2028), 0.5-100% (2058), 5-100% (2108).	PVd of £8-14M, indicative HTL. PVC of £4M, BCR>1.	Remote access and working in more rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	Raise defences to optimum standard of protection based on current guidance (Tidal Severn FRMS, 2006).	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the short term, below indicative guidance. No habitat would be created. Significant consequences to properties and roads. BCR supports this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR supports this option.	Flood risk would be reduced, within indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR does not support this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Distributed communities give moderate economic viability, supporting Maintain or Sustain FRM. The high existing SoP supports Maintain FRM in the short term. If habitat losses require, the habitat assessment supports Adaptation in any epoch. In light of this, the potential High Level Option is Maintain FRM in the short term, and Maintain/Sustain FRM in the medium to long term.	Maintain	Maintain, Sustain	Maintain, Sustain
Avonmouth to Aust	FC7-0	Severn NZK sites. Two SSSIs. Clusters of Listed Buildings. Two SMs. Approximately 10 historic and 6 existing landfill sites.	Potential for 81Ha of habitat creation in the long term (site 41).	SoPs: 0.5% (2008), 1-5% (2028), 2-20% (2058), 20-100% (2108).	PVd of £493-913M, indicative HTL. PVC of £13M, BCR>5.	Close proximity of industry and residents to any FRM activity (transport, construction or degradation). Significant range of overhead and underground services, particularly in the south. Contaminated land sites are also present. Unexploded UXOs could be present. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL		Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the medium term, below indicative guidance. No habitat would be created. Significant consequences to industry, properties and infrastructure. BCR supports this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to industry, properties and infrastructure. BCR supports this option.	Flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to industry, properties and infrastructure. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy limits options to Maintain, Sustain and Improve FRM. A range of communities, environmental aspects, critical infrastructure and strong economic viability supports Sustain or Improve FRM. A relatively low existing SoP supports Improve FRM in the short term. Habitat assessment does not support Adaptation in any epoch. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term.	Improve	Sustain	Sustain
Portbury	FC8-0	Severn NZK sites. Gordano Valley NNR. 11 SSSIs. Approximately 35 listed buildings.	Potential for 9Ha of habitat creation in the medium term (site 45).	SoPs: 0.1% AEP (2008 to 2058), 0.1-5% (2108).	PVd of £11-296M, indicative HTL. PVC of £6M, BCR>5.	Remote access and working in more rural areas. Possible tidal/mudflats working conditions for contractors.	Sustain FRM (Severn Tidal Tributaries CFMP, 2007).	HTL/HTL/HTL	None.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would increase in the medium term, within indicative guidance. No habitat would be created. Significant consequences to industry, properties and infrastructure. BCR supports this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to industry, properties and infrastructure. BCR supports this option.	Existing flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to industry, properties and infrastructure. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. Significant industrial and commercial assets at risk and strong economic viability support Sustain and Improve FRM. Very high SoP in the short to medium term supports Maintain FRM. Habitat assessment does not support Adaptation in any epoch. In light of this, in the short to medium term the potential High Level Option is Maintain, with Sustain FRM in the long term.	Maintain	Maintain	Maintain
Woodhill	FC8-1	Severn NZK sites.	Very limited potential for habitat creation.	SoPs: 0.1% AEP (2008), 0.5-20% (2028), 20-100% AEP (2058 to 2108).	Non-critical road and park affected.	Remote access and working in more rural areas. Possible tidal/mudflats working conditions for contractors.	None.	NAI/NAI/NAI	None.	Flood risk would increase in the medium term, within indicative guidance. No habitat would be created. Very limited consequences. BCR supports this option.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	SESMP2 NAI policy limits options to NAI and Adaptation. Limited assets at flood risk give poor economic viability, supporting NAI. Habitat assessment does not support Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is NAI.	NAI	NAI	NAI



LOCATION		FACTUAL CRITERIA					POLICY CONTEXT			ASSESSMENT OF HIGH LEVEL OPTIONS AGAINST FACTUAL CRITERIA AND OBJECTIVES					SUMMARY ASSESSMENT OF HIGH LEVEL OPTIONS	POTENTIAL HIGH LEVEL OPTIONS		
Relevant placename	Strategic flood sub-cell	Salient environmental features at risk	Habitat Creation Potential	FRM performance (AEP)	Socio-economic viability	Potential sources of H&S risks	CFMP policies	SMP2 policies (0/20/50 years)	Previous strategic assessments	NAI	Maintain	Sustain	Improve	Adaptation		0 to 20 years	20 to 50 years	50 to 100 years
Clevedon to Weston-Super-Mare	FC9-0	Severn NZK sites. Two cSACs. Many SSSIs. Mendips AONB. Approximately 150 listed buildings. Two small landfill sites. Three Source Protection Zones.	Potential for 865Ha of habitat creation in the medium term (sites 46, 47a-b).	SoPs: 5% (2008), 5-20% (2028), 10-100% (2058), 100% (2108).	PVd of £1,910-5,223M, indicative HTL PVC of £42M, BCR>5.	Close proximity of residents in urban frontages, with remote access in rural locations, for any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.	None.	MR/MR/MR	None.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would be managed within indicative guidance. Some habitat creation could occur in the long term. Significant consequences to properties and infrastructure dependent on alignment. BCR supports this option.	SE/NDASSMP2 policy does not limit FRM options at a flood cell scale. A range of communities, environmental aspects, critical infrastructure and strong economic viability support Sustain and Improve FRM. A relatively low existing SoP supports Improve FRM in the short term. Habitat assessment supports Adaptation in any epoch. In light of this, the potential High Level Option is to Improve FRM in the short term, and then Sustain FRM over the medium and long term. If climate change reaches the upper end scenario, Adaptation may be required in the long term	Improve	Sustain	Sustain, Adaptation
Brean to Burnham-on-Sea	FC10-0	Severn NZK sites. Three SSSIs. Bridgwater Bay NNR. Over 20 listed buildings. Three SMs.	Potential for 235Ha of habitat creation in the long term (site 49a).	SoPs: 0.1% (2008), 0.1-1% (2028), 0.5-10% (2058), 20-100% (2108).	PVd of £944-2,163M, indicative HTL PVC of £36M, BCR>5.	Close proximity of residents in urban frontages, with remote access in rural locations, for any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.	None.	HTL/MR/MR	None.	Flood risk would increase in the medium term, below indicative guidance. Some habitat would be created, although not required or preferred until the long term. Significant consequences to properties and infrastructure. BCR does not support this option.	Flood risk would increase in the long term, below indicative guidance. No habitat would be created. Significant consequences to properties and infrastructure. BCR supports this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR supports this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties and infrastructure. BCR supports this option.	Flood risk would be managed within indicative guidance. Some habitat creation could occur in the medium-long term. Significant consequences to properties and infrastructure dependent on alignment. BCR supports this option.	NDASSMP2 HTL policy focuses options to Maintain, Sustain and Improve FRM. A range of communities, environmental aspects, critical infrastructure and strong economic viability supports Sustain or Improve FRM. A high existing SoP supports Maintain or Sustain in the short term. Habitat assessment supports Adaptation in the long term. In light of this, the potential High Level Option is to Sustain FRM through all epochs, with the option for Adaptation in the medium to long term.	Maintain, Sustain	Sustain, Adaptation	Sustain, Adaptation
Huntpill	FC10-1	Severn NZK sites. Huntpill River NNR, Bridgwater Bay SSSI. Over 10 Listed Buildings. One SM.	Potential for 200Ha of habitat creation in the long term (site 52).	SoPs: 0.1% (2008), 0.1-0.5% (2028), 0.1-20% (2058), 1-100% (2108).	PVd of £21-66M, indicative HTL PVC of £8M, BCR>1.	Remote access and working in more rural areas. Droque and UXOs could be present. Possible tidal/mudflats working conditions for contractors.	None.	HTL/HTL/MR	Hold the Line by re-engineering and improving banks, Managed Realignment in the medium to long term (PEFRMS, 2009).	Flood risk would increase in the medium term, below indicative guidance. Some habitat would be created, although not required or preferred until the long term. Significant consequences to properties and roads. BCR does not support this option.	Flood risk would increase in the long term, below indicative guidance. No habitat would be created. Significant consequences to properties and roads. BCR supports this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR supports this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR supports this option.	Flood risk would be managed within indicative guidance. Some habitat creation could occur in the long term. Significant consequences to properties and roads dependent on alignment. BCR supports this option.	NDASSMP2 HTL/MR policy focuses options to Maintain, Sustain, Improve and Adaptation. A range of communities, environmental aspects, critical infrastructure and strong economic viability support Sustain or Improve FRM. A high existing SoP supports Maintain FRM in the short to medium term. Habitat assessment precludes Adaptation until the long term. In light of this, the potential High Level Option is to Maintain FRM through all epochs, with the option for Adaptation in the long term.	Maintain	Maintain	Sustain, Adaptation
Pawlett	FC10-2	Severn NZK sites. Bridgwater Bay NNR. Two Listed Buildings in Pawlett. One SM.	Potential for 593Ha of habitat creation in the medium term (site 53).	SoPs: 1% (2008), 2-10% (2028), 2-100% (2058), 10-100% (2108).	PVd of £20-51M, indicative HTL PVC of £18M, BCR>1.	Remote access and working in more rural areas. Droque and UXOs could be present. Possible tidal/mudflats working conditions for contractors.	None.	HTL/MR/MR		Flood risk would increase in the short to medium term, below indicative guidance. Some habitat would be created, although not required or preferred until the medium term. Significant consequences to properties and roads. BCR does not support this option.	Flood risk would increase in the short to medium term, below indicative guidance. No habitat would be created. Significant consequences to properties and roads. BCR supports this option.	Existing flood risk would continue into the long term, within indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR supports this option.	Flood risk would be reduced, above indicative guidance. No habitat would be created. Reduced consequences to properties and roads. BCR does not support this option.	Flood risk would be managed within indicative guidance. Some habitat creation could occur in the long term. Significant consequences to properties and roads dependent on alignment. BCR supports this option.	NDASSMP2 policy does not limit options at a flood cell scale. A range of communities, environmental aspects, critical infrastructure and strong economic viability supports Maintain, Sustain or Improve FRM. A high existing SoP supports Maintain FRM in the short term. Habitat assessment supports Adaptation in the medium to long term. In light of this, the potential High Level Option is to Maintain and Sustain FRM in the short to medium term, then Adaptation in the long term.	Maintain	Sustain	Sustain, Adaptation
Stear Peninsula	FC11-0	Severn NZK sites. Bridgwater Bay NNR. Approximately 10 Listed Buildings. Six SMs.	Potential for 77Ha of habitat creation in the short to medium term (site 57 and Steart habitat creation).	SoPs: 10% (2008), 10-20% (2028), 20-100% (2058 to 2108).	PVd of £9-25M, indicative HTL PVC of £20M, BCR<-1.	Remote access and working in more rural areas. Droque and UXOs could be present. Possible tidal/mudflats working conditions for contractors.	None.	MR/MR/MR	None.	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Not within scope of SMP2 policy and no reason to disagree with SMP2 policy	Flood risk would be managed within indicative guidance. Significant habitat creation could occur, potentially in the short term. Consequences to properties and main road dependent on alignment. BCR supports this option.	NDASSMP2 policy does not limit options at a flood cell scale. Limited assets at risk give weak economic viability, precluding Sustain or Improve FRM. Habitat assessment supports Adaptation in any epoch. In light of this, in the short to long term the potential High Level Option is Adaptation.	Adaptation	Adaptation	Adaptation



Appendix K : Potential Alignments and Types Assessment Tables







LOCATION				BASELINE FCA PERFORMANCE (STRUCTURAL INTEGRITY MAINTAINED)					HIGH LEVEL OPTIONS			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES		
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	FRM asset description	2008	2028	2058	2108	Failure epoch from SMP2	Short term	Medium term	Long term	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term
Penarth	FC1-P	SR1-P	Penarth sea defence/high ground	2	5	20	100	Short	Maintain	Maintain, Sustain	Sustain	Maintain	Sustain	Sustain	No sensible realignment or habitat opportunity possible due to adjacent significant conurbation and local road. Moderate BCR supports Reduce, Maintain or Sustain FRM: funding may need to come from non-central sources. Any improvement of the existing seawall would require similar construction type as existing. Beach erosion risks in the medium to long term may also require foreshore management in the medium to long term.	Existing			Maintenance	Hard foreshore management, Improve Existing Defence	
Tremorfa	FC1-0	SR1-CF	Rock armoured high made ground	0.1	0.1	0.1	0.1	Short	Maintain	Maintain, Sustain	Sustain	Maintain	Maintain	Maintain	No sensible realignment possible due to adjacent significant industry and conurbation. Strong BCR supports Maintain/Sustain FRM on the existing alignment. High ground levels mean that ground raising is not required, although continued maintenance of the fronting rock armouring and toe protection would be required to manage erosion risks.				Maintenance, Hard Foreshore Management		
		SR1-RRWB	Coastal frontage and river Rhymney West Bank, general hard top ground level.	0.1	0.1	0.1	20	Medium				Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant industry and conurbation. Strong BCR supports Maintain/Sustain FRM on the existing alignment. The existing road levels provide a high SoP into the medium term; in the long term further engineering works would be required to sustain the SoP. Continued maintenance of the fronting rock armouring and toe protection would be required to manage erosion risks.				Maintenance, Hard Foreshore Management		Hard Foreshore Management, Improve Existing Defence
		SR1-RRWB1	River Rhymney West Bank, variable FRM assets.	0.1	0.1	1	10	Short				Maintain	Sustain	Sustain	No sensible realignment possible due to adjacent significant industry and conurbation. Strong BCR supports Maintain/Sustain FRM on the existing alignment. The existing defences have a low SoP and therefore need improvements, or new defences in places, in the short term: in the medium to long term continued engineering works would be required to sustain the SoP.				Improve Existing Defence, New Linear Defence	Improve Existing Defence	
Wentlooge Levels	FC1-1	SR1-RREB	Grassed embankment	2	5	20	100	Short	Improve	Sustain	Sustain, Adaptation	Improve	Sustain	Sustain	No sensible realignment possible due to adjacent significant landfill and landraising. Realignment is not supported by habitat assessments. Strong BCR supports Improve FRM on the existing alignment. The existing earth embankment gives a very low SoP and therefore in the short term improvements or reconstruction is required. In the medium to long term further improvements would be required to sustain the SoP.	Existing			Improve Existing Defence, New Linear Defence	Improve Existing Defence	
		SR1-0	Rock armoured embankment (clay core)	0.1	0.1	2	100	Medium				Maintain	Sustain	Sustain	No sensible realignment possible due to adjacent significant landfill and landraising. Strong BCR supports Maintain/Sustain FRM on the existing alignment. The existing high SoP means that only maintenance works are required in the short to medium term, although continued wharf retreat risk would require foreshore management. Due to the relatively sheltered aspect and low scarp height, soft foreshore management would be more appropriate than hard (supported by GL FMP, Atkins, 2004). Embankment raising, hardening (wave recurve, rock armour, revetment) and/or continued foreshore management would be required to sustain SoP in the medium to long term.				Maintenance, Soft Foreshore Management	Soft Foreshore Management, Improve Existing Defence	
		SR1-1	Grass embankment (clay core) with managed foreshore	0.1	0.1	0.1	10	Medium				Maintain	Maintain	Sustain					Maintenance, Soft Foreshore Management		Soft Foreshore Management, Improve Existing Defence
		SR1-2	Grass embankment (clay core) with managed foreshore	2	5	20	100	Short				Improve	Sustain	Sustain, Adaptation	Alignment Options include existing line and along/near B2439 road (~300m inland), within the HTL policy. SoP and asset residual life support maintaining the existing line in the short to medium term. Dependent on climate change impacts, defence hardening, secondary defence line (B2439), and/or wider foreshore management would be required to Maintain/Sustain FRM, and possibly managed realignment in the long term. The existing polders and rock armour have been successful in managing the foreshore; this should be continued from the short to long term, although polders may not be viable due to sea level rise in the long term (supported by RGW PAR, Atkins, 2006). Habitat assessment does not support landward realignment. Strong BCR supports any of the alignments: detailed costing will determine best value.	Existing	Existing, secondary line	Soft Foreshore Management, Improve Existing Defence	Soft Foreshore Management, Improve Existing Defence, Secondary Defence		
		SR1-3	Grass embankment (clay core)	0.1	0.1	0.5	20	Medium				Maintain	Sustain	Sustain, Adaptation		Existing	Existing, secondary line		Maintenance		Maintenance, Hard Foreshore Management, Secondary Defence
		SR1-4	Concrete revetment	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain, Adaptation	Alignment Options include existing line and along/near B2439 road (~1km inland), within the HTL policy. SoP and asset residual life support maintaining the existing line in the short to medium term. Dependent on climate change impacts, defence raising, hardening (wave recurve, rock armour and revetment) and/or secondary defence line (B2439), may be required to Maintain/Sustain FRM, and possibly managed realignment in the long term. Whilst erosion risk is low in the short to medium term (supported by GL FMP, Atkins, 2004), soft and/or foreshore management may be required in the long term. Habitat assessment does support landward realignment in the long term. Strong BCR supports any of the alignments: detailed costing will determine best value.				Soft Foreshore Management, Hard Foreshore Management, Secondary Defence		
		SR1-5	Concrete revetment	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain, Adaptation							
		SR1-6	Grass embankment (clay core)	0.1	0.1	0.1	2	Medium				Maintain	Maintain	Sustain, Adaptation							
		SR1-REWB	Grass embankment (clay core)	0.1	0.1	0.1	1	Medium				Maintain	Maintain	Sustain, Adaptation							
River Ebbw - River Usk	FC1-2	SR1-REEB	Grass embankment (clay core)	0.1	0.1	0.5	20	Medium	Improve	Sustain	Sustain	Maintain	Sustain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. A weak length north of the Transporter Bridge requires new defences (supported by Tidal Usk Strategy, Halcrow, 2008), whereas the wider defence length requires maintenance work in the short term, and further engineering works in the medium to long term to sustain the SoP.				Maintenance	Improve Existing Defence, New Linear Defence	
		SR1-RUWB1	General ground level (Ebbw to Transporter bridge)	0.1	0.1	0.5	20	Medium				Maintain	Sustain	Sustain					New Linear Defence		
		SR1-RUWB2	Non flood defence wall, to SDR bridge	20	100	100	100	Short				Improve	Sustain	Sustain					Maintenance		
		SR1-RUWB3	SDR bridge to Clarence Place Bridge	0.5	1	2	100	Medium				Maintain	Sustain	Sustain					Maintenance		Hard Foreshore Management, Improve Existing Defence
Caldicot Levels	FC2-0	SR2-RUEB1	Usknoth power station, high made ground levels	0.1	0.1	0.1	100	Medium	Improve	Sustain	Sustain, Adaptation	Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. Erosion risks are limited in the short to medium term (supported by GL FMP, Atkins, 2004). General high ground precludes breaching, therefore continued maintenance is preferred in the short to medium term. In the long term ground/defence raising and further toe protection may be required.	Existing			Maintenance		Hard Foreshore Management, Improve Existing Defence
		SR2-RUEB2	Julians Pill to Transporter Bridge	10	20	100	100	Short				Improve	Sustain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. A weak length south of the Transporter Bridge requires new defences (supported by Tidal Usk Strategy, Halcrow, 2008), whereas the wider defence length requires maintenance work in the short term, and raising in the medium to long term to sustain the SoP.				Improve Existing Defence, New Linear Defence		
		SR2-RUEB3	Transporter Bridge to Clarence Place Bridge	0.1	0.1	0.1	20	Medium				Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. General high ground precludes breaching, therefore continued maintenance is preferred in the short to medium term: in the long term further works may be required.				Maintenance		Improve Existing Defence, New Linear Defence
		SR2-RUEB4	CP Bridge to flood defence	20	20	100	100	Short				Improve	Sustain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. A weak length requires urgent new defences (supported by Tidal Usk Strategy, Halcrow, 2009), whereas the wider defence length requires maintenance work in the short term, and further engineering works in the medium to long term to sustain the SoP.				New Linear Defence	Improve Existing Defence, New Linear Defence	
		SR2-RUEB5	Glebelands	0.1	0.1	0.1	10	Medium				Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant conurbation and industrial development. Strong BCR supports Maintain/Sustain/Improve FRM on the existing alignment. General high ground precludes breaching, therefore continued maintenance is preferred in the short to medium term: in the long term further works may be required.				Maintenance		Improve Existing Defence, New Linear Defence
		SR2-0	Revetment with seawall	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain, Adaptation	Alignment Options include existing line and along/near road (Goldcliff Road/Saltmarsh Lane/Mead Lane/South Row, ~800m inland), within the context of HTL policy. SoP and asset residual life support maintaining the existing line in the short to medium term. Dependent on climate change impacts, defence raising, hardening (wave recurve, rock armouring, revetment) or secondary defence line may be required to Maintain/Sustain FRM, and possibly managed realignment in the long term. Ongoing erosion would require hard foreshore management rather than soft due to lack of fronting saltmarsh and wave exposure (supported by GL FMP, Atkins, 2004). Strong BCR supports any of the alignments: detailed costing will determine best value.	Existing	Existing, secondary line	Maintenance, Hard Foreshore Management	Hard Foreshore Management, Improve Existing Defence, New Linear Defence, Secondary Defence		
		SR2-1	Concrete revetment	0.1	0.1	0.5	10	Medium				Maintain	Maintain	Sustain, Adaptation							
		SR2-2	Concrete revetment	0.1	0.1	0.5	10	Medium				Maintain	Maintain	Sustain, Adaptation							
		SR2-3	Grass embankment (clay core)	0.1	0.1	0.5	5	Medium				Maintain	Maintain	Sustain, Adaptation							
		SR2-4	Rock armoured embankment	1	1	5	100	Medium				Improve	Sustain	Sustain	Alignment Options include existing line, no sensible secondary defence line, within the context of HTL policy. A weaker section of defence with a sub-standard SoP requires improvements in the short term. Strong BCR supports Maintain/Sustain FRM on the existing alignment. Dependent on climate change impacts, defence raising or hardening (wave recurve, rock armouring, revetment) to Maintain/Sustain FRM, and possibly managed realignment in the long term. Erosion risks increase in the medium term, which would require hard foreshore management rather than soft due to wave exposure (supported by GL FMP, Atkins, 2004).	Existing			Improve Existing Defence	Hard Foreshore Management, Improve Existing Defence, New Linear Defence	
SR2-5	Rock armoured embankment	0.5	0.5	2	100	Medium	Sustain	Sustain	Sustain	Alignment Options include existing line, no sensible secondary defence line, within the context of HTL policy. Dependent on climate change impacts, defence raising or hardening (wave recurve, rock armouring, revetment) may be required to Maintain/Sustain FRM, and possibly managed realignment in the long term. Erosion risks increase in the medium term, which would require hard foreshore management rather than soft due to wave exposure (supported by GL FMP, Atkins, 2004). Strong BCR supports Maintain/Sustain FRM on the existing alignment.	Existing			Maintenance	Hard Foreshore Management, Improve Existing Defence	Hard Foreshore Management, Improve Existing Defence, New Linear Defence					
SR2-6	Grass embankment (clay core)	0.5	0.5	5	100	Medium	Sustain	Sustain	Sustain												
Mathern	FC2-1	SR2-7	Rock armoured embankment	0.5	0.5	2	100	Medium	Maintain, Sustain	Sustain	Sustain, Adaptation	Maintain, Sustain	Sustain	Sustain, Adaptation	Alignment Options include existing line and along/near main line railway (~300m inland), within the context of HTL policy. SoP and asset residual life support maintaining the existing line in the short to medium term. Dependent on climate change impacts, defence raising, hardening (wave recurve, rock armouring, revetment) and/or secondary defence line may be required to Maintain/Sustain FRM, and possibly managed realignment in the long term. Saltmarsh erosion risk is variable (supported by GL FMP, Atkins, 2004), but likely to require foreshore management in the medium to long term. Strong BCR supports any of the alignments: detailed costing will determine best value.	Existing			Improve Existing Defence, Maintenance	Hard Foreshore Management, Improve Existing Defence, Secondary Defence	
		SR2-8	Grass embankment (clay core)	0.1	0.1	0.5	100	Medium				Maintain	Maintain, Sustain	Sustain, Adaptation					Maintenance		



LOCATION				BASELINE FCA PERFORMANCE (STRUCTURAL INTEGRITY MAINTAINED)					HIGH LEVEL OPTIONS			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES		
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	FRM asset description	2008	2028	2058	2108	Failure epoch from SMP2	Short term	Medium term	Long term	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term
Tidenham	FC3-1	SR3-0	High ground (MU 9C west)	0.1	0.1	0.1	0.1	NA	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation	NAI	NAI	NAI	Localised realignment possible with habitat creation potential. This would result in realignment to high ground (~800m inland) or to the railway line. Monitoring and flood awareness activities should continue.	Existing	High ground	Do Nothing, Monitoring, Flood Awareness			
		SR3-1	Sturch Pill embankment (MU 9C west)	0.1	0.1	2	100	Short				NAI, Adaptation	NAI, Adaptation	NAI, Adaptation							
		SR3-2	High ground (MU 9B west)	0.1	0.1	0.1	0.1	NA				NAI	NAI	NAI							
Stroat	FC3-2	SR3-3	Railway embankment (failed tide flaps) (MU 9B west)	0.1	0.5	2	100	NA	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation	NAI	NAI	NAI							
		SR3-4	High ground (MU9B west)	0.1	0.5	2	100	NA				NAI, Adaptation	NAI	NAI, Adaptation							
Lydney	FC3-3	SR3-5	Grassed embankment with lower rock armouring (MU 9A west)	0.1	0.1	1	100	Medium	Maintain	Maintain, Sustain	Sustain, Adaptation	Maintain	Maintain, Sustain	Sustain, Adaptation	Alignment Options include existing line, along/near main line railway (~300m inland) or to high ground (~1.7km inland), within the context of MR policy. SoP and asset residual life support maintaining the existing line in the short to medium term. Habitat assessment supports the main line railway alignment option: detailed costing will determine best value. Maintenance work would continue in the short to long term, with monitoring and flood awareness prior to any potential option for managed realignment.	Existing, secondary line		Monitoring, Flood Wareness, Maintenance, Improve Existing Defence, Secondary Defence			
Purton	FC4-1	SR4-0	High ground/short lengths of railway retaining wall (MU 10B, 10A, 11A west)	100	100	100	100	Medium	NAI	NAI	NAI	NAI	NAI	NAI	No active realignment possible due to high ground.	Existing		Do Nothing, Monitoring, Flood Awareness			
Awre	FC4-3	SR4-2	Grassed embankment with some masonry (MU 12E west)	20	100	100	100	Short	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Alignment Options include existing line and to high ground (up to 1.1km inland), within the context of MR policy. Low SoP, asset residual life and BCR supports the high ground Alignment Option.	High ground		Do Nothing, Monitoring, Flood Awareness			
Bullo	FC4-4	SR4-3	Medium level ground/embankment (MU 12D, 12C west)	100	100	100	100	NA	NAI	NAI	NAI	NAI	NAI	NAI	No active realignment possible due to high cliffs.		Existing	Do Nothing, Monitoring, Flood Awareness			
Ruddle	FC4-5	SR4-3	Medium level ground/embankment (MU 12D, 12C west)	100	100	100	100	NA	NAI	NAI	NAI	NAI	NAI	NAI							
Newnham-on-Severn	FC4-6	SR4-3	Medium level ground/embankment (MU 12D, 12C west)	2	5	20	100	Short	Maintain	Maintain, Sustain	Sustain	Maintain	Maintain, Sustain	Sustain	No sensible realignment possible due to adjacent conurbation and medium level ground. Strong BCR supports Maintain/Sustain FRM on the existing alignment. A sub-standard SoP in the longer term would require improvement works in the longer term.	Existing		Maintenance	Improve Existing Defence		
Westbury-on-Severn and Rodley	FC4-7	SR4-4	Grassed embankment (MU 12B west)	5	10	20	100	Short	Improve, Sustain	Sustain	Sustain	Improve, Sustain	Sustain	Sustain	Alignment Options include existing line (no sensible secondary line), within the context of HTL policy. Marginal BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the medium to long term supports engineering improvement works on the existing alignment to sustain the SoP.	Existing		Maintenance	Improve Existing Defence		
		SR4-5	High ground (MU 12B west)	0.1	0.1	0.1	0.1	NA				NAI	NAI	NAI	No active realignment possible due to high cliffs.	High ground		Do Nothing			
		SR4-6	Grassed embankment (MU 12A west)	0.1	0.1	0.1	2	Short				Maintain	Maintain	Sustain	Alignment Options include existing line and local road secondary line (~500m inland), within the context of HTL policy. Marginal BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the long term would require improvement works on the existing alignment to sustain the SoP.	Existing, secondary line		Maintenance	Improve Existing Defence, Secondary Defence		
FC4-8		SR4-8	Grassed embankment (MU 13E west)	0.5	1	10	100	Medium				Maintain	Sustain	Sustain	Maintain	Sustain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Strong BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the medium term would require improvement works on the existing alignment to sustain the SoP.	Existing		Maintenance
Minsterworth	FC4-9	SR4-9	Grassed embankment/high ground (MU 13D, 13C west)	0.1	0.1	0.5	0.5	Short	Maintain	Maintain, Sustain	Maintain, Sustain	Maintain	Maintain, Sustain	Maintain, Sustain	Alignment Options include existing line and local road secondary line (~500m inland), within the context of HTL policy. Marginal BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the long term would require improvement works on the existing alignment to sustain the SoP.	Existing		Maintenance	Improve Existing Defence, Individual Property Protection, Flood Storage		
Minsterworth Ham	FC4-10	SR4-10	Grassed embankment (MU 13B west)	5	20	100	100	Short	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Alignment Options include existing line, field boundaries near pylons (~1.3km inland) or to high ground (~2.0km inland), within the context of MR policy. Low SoP and BCR do not support existing alignment, but could support landward alignments. Habitat assessment supports field boundaries alignment. Landward realignment would require new linear defence with point structures, and may provide some wider flood storage benefit.	Field boundaries, high ground		New Linear Defence, Point Structures, Individual Property Protection, Flood Storage	Maintenance, Improve Existing Defence		
The Rea	FC5-3	SR5-0	High ground/grassed embankment (MU 13A east)	0.1	1	20	100	Short	Maintain	Maintain, Sustain	Sustain	Maintain	Maintain, Sustain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Strong BCR supports Maintain/Sustain FRM on the existing alignment. Continuing climate change impact in the medium term would require improvement works to sustain the SoP.	Existing		Maintenance	Improve Existing Defence		
Stonebench	FC5-4	SR5-1	High ground/grassed embankment (MU 13B&C east)	0.5	0.5	2	100	Short	Maintain	Maintain, Sustain	Sustain	Maintain	Maintain, Sustain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Moderate BCR supports Maintain/Sustain FRM on the existing alignment. Within this context, maintenance activity could become increasing reactive.	Existing		Maintenance		Improve Existing Defence	
Elmore Back	FC5-5	SR5-2	Grassed embankment (MU 13D east)	2	5	20	100	Medium	Maintain	Maintain, Adaptation	Adaptation	Maintain	Maintain, Adaptation	Adaptation	Alignment Options include existing line, field boundaries near pylons (~800m inland) or to high ground (~1.3km inland), within the context of MR policy. Low BCR does not support existing alignment, but could support landward alignments. Habitat assessment supports field boundaries alignment: detailed costing will determine best value. In the short term activity would include for increasingly reactive maintenance, and in the medium to long term landward alignments would require new linear defences and potentially individual property protection.	Existing	Field boundaries, high ground		Maintenance	New Linear Defence, Point Structures, Individual Property Protection	
Longney	FC5-6	SR5-3	Grassed embankment (MU 13E east)	0.1	0.1	1	20	Short	Maintain	Maintain, Sustain	Sustain, Adaptation	Maintain	Maintain, Sustain	Sustain, Adaptation	Alignment Options include existing line, field boundaries near pylons (~500m inland) or to intermittent high ground (~800m inland), within the context of MR policy. Moderate BCR supports Maintain/Sustain FRM on the existing alignment. Within this context, maintenance activity could become increasing reactive. Habitat assessment supports intermittent high ground alignment: detailed costing will determine best value.	Existing		Existing, secondary line	Maintenance		Improve Existing Defence
Upper Framilode	FC5-7	SR5-4	Grassed embankment (MU 12A&B east)	1	2	20	100	Medium	Sustain, Improve	Sustain	Sustain	Sustain, Improve	Sustain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Strong BCR supports Sustain FRM on the existing alignment. Continuing climate change impacts require improvement works on the existing alignment to sustain or improve the SoP.	Existing		Improve Existing Defence			
		SR5-6	Grassed embankment (MU 12C east)	0.1	0.1	0.5	20	Medium				Maintain	Maintain	Sustain	Alignment Options include existing line, no sensible secondary line, within the context of HTL policy. Strong BCR supports Sustain FRM on the existing alignment. Continuing climate change impacts require improvement works on the existing alignment to sustain the SoP.	Existing		Maintenance		Improve Existing Defence	
Arlingham	FC5-8	SR5-5	Grassed embankment	0.1	0.5	1	20	Medium	Maintain	Maintain, Sustain	Sustain, Adaptation	Maintain	Maintain	Sustain, Adaptation	Alignment Options include existing line or field boundaries near Arlingham village (~1.2km inland), within the context of MR policy. Weak BCR does support existing alignment, but could also support landward alignments. Habitat assessment supports intermittent alignment with banks and to high ground: detailed costing will determine best value. Within this context, maintenance activity could become increasing reactive.	Existing		Existing, secondary line	Maintenance		Improve Existing Defence, Secondary Defence
Slimbridge	FC5-9	SR5-7	Canal banks (MU 11A est)	0.1	0.1	0.5	20	Medium	Maintain	Maintain, Sustain	Sustain, Adaptation	Maintain	Sustain	Sustain	No sensible realignment possible due to adjacent canal.	Existing		Maintenance	Improve Existing Defence		
		SR5-8	Grassed embankment, Slimbridge (MU 11B east)	0.1	0.1	0.1	0.1	Medium				Maintain	Sustain	Sustain, Adaptation	Alignment Options include existing line and alignments investigated in ongoing feasibility study, within the context of MR policy. Strong BCR supports existing or landward alignment. Habitat assessment supports landward alignment: detailed costing will determine best value. Landward realignment in the short term could require new linear defences, potentially with point structures and individual property protection.	Existing		Existing, secondary line	Maintenance	Improve Existing Defence, Secondary Defence	



LOCATION				BASELINE FCA PERFORMANCE (STRUCTURAL INTEGRITY MAINTAINED,					HIGH LEVEL OPTIONS			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES			
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	FRM asset description	2008	2028	2058	2108	Failure epoch from SMP2	Short term	Medium term	Long term	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term	
Berkeley	FC6-1	SR6-0	Grassed embankment (MU 9A east)	0.5	1	5	100	Medium	Maintain	Maintain, Sustain	Sustain	Maintain	Sustain	Sustain	Alignment Options include existing line and secondary alignment along field boundaries, within the context of HTL policy. Strong BCR supports either alignment option. Habitat assessment supports landward alignment in the medium term. The existing alignment has a weak spot that would need raising and/or hardening (wave recurve, rock armouring, revetment). In the medium term improvement works would be required, potentially with foreshore management if along the existing alignment, to sustain the existing SoP. Alternatively, if a secondary alignment is followed, new linear defences would be required.	Existing	Existing, secondary line	Maintenance	Soft Foreshore Management, Hard Foreshore Management, Improve Existing Defence	Soft Foreshore Management, Hard Foreshore Management, Improve Existing Defence, New linear defence		
Shepperdine	FC6-2	SR6-1	Grassed embankment (MU 9B east)	10	10	20	100	Short	Sustain, Improve	Sustain	Sustain	Improve	Sustain	Sustain								
		SR6-2a	Grassed embankment (MU 9C east)	0.5	1	20	100	Medium				Maintain	Sustain	Sustain								
		SR6-2b	Grassed embankment (MU 9C east)	0.1	0.1	0.1	10	Medium				Maintain	Sustain	Sustain								
		SR6-2c	Grassed embankment (MU 9C east)	0.1	0.5	2	100	Medium				Maintain	Sustain	Sustain								
Littleton-upon-Severn	FC6-3	SR6-3	Grassed embankment (MU 9D east)	0.1	0.5	2	100	Medium	Maintain	Maintain, Sustain	Maintain, Sustain	Maintain	Sustain	Sustain								
		SR6-4	Grassed embankment/high ground (MU 7A east)	0.1	0.5	2	100	Medium				Maintain	Sustain	Sustain								
Avonmouth to Aust	FC7-0	SR7-0	Grass embankment (clay core)	1	1	10	100	Medium	Improve	Sustain	Sustain	Improve	Sustain	Sustain	Alignment Options include existing line and minor realignment around Pining rifle range. The seaward saltmarsh has been historically stable (supported by A-A TDS, Atkins, 2006), and there is a strong BCR that supports the existing alignment. The habitat assessment does not support landward realignment at a strategic scale. The existing SoP is below guidance, supporting raising or hardening (wave recurve, rock armouring, revetment) in the short term; with climate change impacts this would need to be sustained in the medium to long term, potentially with foreshore management.	Existing		Improve Existing Defence	Soft Foreshore Management, Hard Foreshore Management, Improve Existing Defence			
		SR7-1	Severn Beach wave wall	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain								
		SR7-2	Rock armoured embankment	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain	No sensible realignment possible due to adjacent significant conurbation and industry. Strong BCR supports Maintain/Sustain FRM on the existing alignment. High existing SoP only supports improvements in the longer term. The seaward saltmarsh has been historically slowly eroding (supported by A-A TDS, Atkins, 2006), which may require foreshore management in the short term onwards.	Existing		Maintenance, Hard Foreshore Management		Hard Foreshore Management, Improve Existing Defences		
		SR7-3	Wave wall	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain								
		SR7-4	Railway embankment	0.1	0.1	0.1	20	Medium				Maintain	Maintain	Sustain								
		SR7-5	BPC defences, variable types (steep)	0.1	0.1	0.5	5	Short				Maintain	Maintain, Sustain	Sustain	Alignment Options include existing line and alignments investigated in A-ATDS. Strong BCR supports seaward or landward alignment around the dock perimeter. Habitat assessment does not support realignment. Both alignments would require new linear defences, with the seaward alignment potentially requiring foreshore management (supported by A-A TDS, Atkins, 2006).	Seaward or landward boundary of docks		Hard Foreshore Management, Improve Existing Defence, New linear defence				
		SR7-6	BPC defences, variable types (shallow)	0.1	0.1	0.1	1	Short				Maintain	Maintain	Sustain								
		SR7-7	BPC defences, variable types (steep)	5	5	10	20	Short				Improve	Sustain	Sustain								
SR7-8	Grass embankment (clay core)	0.5	1	10	100	Short	Improve	Sustain	Sustain													
Portbury	FC8-0	SR8-0	Grass embankment (clay core), Portbury Wharf	0.1	0.1	0.1	0.1	Medium	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	No sensible realignment possible due to adjacent significant conurbation and industry. High SoP throughout the epochs only requires maintenance.	Existing		Maintenance				
Woodhill	FC8-1	SR8-1	Concrete wall/slope, Woodhill	0.1	0.1	0.5	20	Medium	NAI	NAI	NAI	NAI	NAI	NAI	Alignment Options include existing line and high ground landward of lake and park. Weak BCR supports high ground alignment. Habitat assessment does support landward realignment. With no further maintenance, monitoring and flood awareness activities would be required.	Existing	To high ground		Do Nothing, Monitoring, Flood Awareness			
Clevedon to Weston-Super-Mare	FC9-0	SR9-0	High vertical wall and ground	0.1	0.1	0.1	0.1	Medium	Improve	Sustain	Sustain, Adaptation	Maintain	Maintain	Maintain	No sensible realignment possible due to adjacent significant conurbation and local road. High SoP along some lengths through to the long term only requires maintenance activity, whilst other lengths require improvements to the existing FRM asset. Limited erosion risk (Clevedon Strategy Review, Atkins, 2005) does not require foreshore management.	Existing		Maintenance				
		SR9-1	Steep wall with small recurve	0.5	2	5	20	Medium				Sustain	Sustain	Sustain				Improve Existing Defence, New linear defence				
		SR9-2	Grass embankment (clay core)	0.1	0.1	0.1	10	Medium				Maintain	Maintain	Sustain				Maintenance		Improve Existing Defence		
		SR9-3	High ground and embankment	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain	No realignment or FRM improvements viable due to high ground.	Existing		Maintenance				
		SR9-4	Lower rock revetment, upper grassed embankment	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain	Alignment Options include the existing line or a secondary line along the landward earth embankment. Strong BCR supports existing or secondary alignment. Habitat assessment does not support further landward realignment. High SoP only requires improvements in the long term due to climate change, potentially with foreshore management. Erosion risks (supported by Clevedon Strategy Review, Atkins, 2005) may require foreshore management in the short to long term.	Existing		Maintenance, Soft Foreshore Management, Hard Foreshore Management				
		SR9-5	Lower asphalt revetment, upper grassed embankment	0.1	0.1	0.1	5	Medium				Maintain	Maintain	Sustain, Adaptation				Maintenance, Soft Foreshore Management, Hard Foreshore Management		Maintenance, Soft Foreshore Management, Hard Foreshore Management, Improve Existing Defence		
		SR9-6	Asphalt revetment with middle berm	0.1	0.1	2	20	Medium				Maintain	Sustain	Sustain, Adaptation				New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection				
		SR9-7	Lower rock revetment, upper grassed embankment	0.1	0.1	1	20	Medium				Maintain	Sustain	Sustain, Adaptation	Alignment Options include the existing line, landward along historic earth embankment, or landward along field boundaries. Strong BCR supports existing or landward alignments. Habitat assessment supports landward realignments. Weak SoP along some lengths near Congresbury Yeo supports new linear defences (or re-use of historic embankments) on a landward alignment, potentially with point structures and individual property protection. Erosion risks in the short to medium term (supported by Clevedon Strategy Review, Atkins, 2005) would be avoided by landward realignment.	Minor realignment from existing	Existing, Commissioners Bank or other	Improve Existign Defence, New Linear Defence		New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection		
		SR9-CYRB	Congresbury Yeo right bank, Grass embankment (clay core)	5	10	20	100	Short				Improve	Sustain	Sustain, Adaptation								
		SR9-CYLB	Congresbury Yeo left bank, Grass embankment (clay core)	1	2	10	100	Short				Improve	Sustain	Sustain, Adaptation								
		SR9-8	Upper asphalt revetment, lower rock armour	0.1	0.1	0.1	2	Medium				Maintain	Sustain	Sustain, Adaptation								
		SR9-RBRB	River Banwell right bank, Grass embankment (clay core)	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain, Adaptation								
		SR9-RBLB	River Banwell left bank, Grass embankment (clay core)	0.1	0.1	1	100	Medium				Maintain	Sustain	Sustain, Adaptation	No sensible realignment possible due to adjacent conurbation and local road. Generally high SoP only requires maintenance work, whilst a weaker length would require improvement works along the existing alignment. The beach recharge in the 1980s still provides a viable beach-dune system, although sea level rise and storminess increase may require further beach recharges in the medium and long term.	Existing		Maintenance			Soft Foreshore Management	
		SR9-9LS	Wide sand dunes (Sand Bay)	0.1	0.1	2	20	Medium				Maintain	Sustain	Sustain								
		SR9-9	Wide sand dunes (Sand Bay)	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain								
		SR9-10	New vertical concrete wall defences (W-S-M)	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain								
		SR9-11	High level vegetated dunes	0.1	0.1	0.1	0.1	NA				Maintain	Maintain	Maintain								



LOCATION				BASELINE FCA PERFORMANCE (STRUCTURAL INTEGRITY MAINTAINED,					HIGH LEVEL OPTIONS			SUB-REACH MANAGEMENT			ALIGNMENT AND TYPE ASSESSMENT (SOCIO-ECONOMIC, TECHNICAL AND HABITAT APPROPRIATENESS)	POTENTIAL ALIGNMENTS			POTENTIAL TYPES					
Relevant place-name	Strategic flood sub-cell	Strategic sub-reach	FRM asset description	2008	2028	2058	2108	Failure epoch from SMP2	Short term	Medium term	Long term	Short term	Medium term	Long term		Short term	Medium term	Long term	Short term	Medium term	Long term			
Brean to Burnham-on-Sea	FC10-0	SR9-12	River Axe right bank, Grass embankment (clay core)	0.1	0.1	0.1	2	Medium	Maintain, Sustain	Sustain, Adaptation	Sustain, Adaptation	Maintain	Maintain, Adaptation	Sustain, Adaptation	Alignment Options include the existing line, or landward along field boundaries and the M5, within the context of MR policy. Strong BCR supports existing or landward alignments. Habitat assessment supports landward realignments. In the short term to medium term, maintenance (and potentially foreshore management) activity could become increasingly reactive, and in the medium to long term landward realignment could require new linear defences, point structures and individual property protection.	Existing	Field boundaries/M5		Maintenance	New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection				
		SR9-13	River Axe left bank, Grass embankment (clay core)	0.1	0.1	1	20	Medium				Maintain	Sustain, Adaptation	Sustain, Adaptation			Existing	Field boundaries						
		SR10-0	Rock armour with vertical wall	0.1	0.1	2	20	Short				Maintain	Sustain, Adaptation	Sustain, Adaptation				Maintenance, Soft Foreshore Management, Hard Foreshore Management		New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection				
		SR10-1	Gabion/masonry wall	0.1	0.1	1	100	Short				Maintain	Sustain, Adaptation	Sustain, Adaptation										
		SR10-2	Ancient wide dunes	0.1	0.1	0.1	0.1	NA				Maintain	Maintain	Maintain	Do Nothing									
		SR10-3	Modern thin dunes	0.1	1	10	100	Short				Maintain	Sustain	Sustain	Alignment Options include the existing modern dunes line, or the ancient dune secondary line (~300m inland), within the context of HTL policy. Dune management should continue into the future, dependent on the alignment chosen (supported by B-B Coastal Study, Black and Veatch, 2008).	Existing, ancient dune line		Maintenance, Soft Foreshore Management, Hard Foreshore Management						
		SR10-4	Ancient wide dunes	0.1	0.1	0.1	20	NA				Maintain	Maintain	Sustain	No sensible realignment possible due to adjacent significant conurbation and local road. Strong BCR supports existing alignment. High SoP in the short and medium term only requires maintenance and foreshore management to address ongoing beach erosion. In the longer term, improvement works would be required to sustain the SoP.	Existing			Maintenance, Soft Foreshore Management, Hard Foreshore Management		Maintenance, Soft Foreshore Management, Hard Foreshore Management			
		SR10-5	Concrete wall	0.1	0.1	0.1	1	Short				Maintain	Maintain	Sustain					Maintenance, Soft Foreshore Management, Hard Foreshore Management					
		SR10-6	Revetment with 3.2m wave wall	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Maintain					Maintenance, Soft Foreshore Management, Hard Foreshore Management					
		SR10-7	River Brue right bank, Brick wall	0.1	0.1	0.1	0.5	Short				Maintain	Maintain	Sustain					Maintenance		Improve Existing Defence			
		SR10-8	River Brue right bank, Grass embankment (clay core)	0.1	0.1	0.1	10	Short				Maintain	Maintain	Sustain										
Huntspill	FC10-1	SR10-9a	River Brue left bank, grassed embankment	0.1	0.1	0.5	20	Medium	Maintain	Maintain	Sustain, Adaptation	Maintain	Maintain	Sustain, Adaptation	Alignment Options include the existing line, or landward along field boundaries. Medium to strong BCR supports landward alignments. Habitat assessment supports landward realignments. High SoP in the short and medium term supports maintenance and foreshore management activities only, with landward realignments requiring new linear defences, point structures and individual property protection.	Existing	Existing	As per PEFRMS	Maintenance		New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection			
		SR10-9b	River Brue left bank, grassed embankment	0.1	0.1	0.1	1	Medium				Maintain	Maintain	Sustain, Adaptation					Maintenance, Soft Foreshore Management, Hard Foreshore Management					
		SR10-9c	Huntspill, revetment/embankment	0.1	0.1	0.1	0.1	Medium				Maintain	Maintain	Sustain, Adaptation										
Pawlett	FC10-2	SR10-RPRBa	River Parrett right bank, Grass embankment (clay core)	0.1	0.1	0.1	20	Short	Maintain	Sustain	Sustain, Adaptation	Maintain	Maintain	Sustain, Adaptation			As per PEFRMS		Maintenance	New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection				
		SR10-RPRBb	River Parrett right bank, Grass embankment (clay core)	1	2	10	100	Short				Maintain	Sustain	Sustain, Adaptation										
		SR10-RPRBc	River Parrett right bank, Grass embankment (clay core)	0.1	0.1	0.5	20	Short				Maintain	Maintain	Sustain, Adaptation										
Steart Peninsula	FC11-0	SR11-RPLB	River Parrett left bank, grassed embankment	0.1	0.1	2	100	Short	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Alignment Options are being assessed in detail in the Steart Peninsula project. Maintenance activity will become increasingly reactive, with no further maintenance in the medium to long term.	As per Steart MR			Maintenance	Do Nothing, Monitoring, Flood Awareness				
		SR11-0	Low bank on ground	0.1	0.5	2	100	Short				Adaptation	Adaptation	Adaptation	Alignment Options are being assessed in detail in the Steart Peninsula project. Landward realignment in the short term would require new linear defences. In the medium term, maintenance of the landward realignment will become increasingly reactive, with no further maintenance in the long term.				New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection	Maintenance				
		SR11-1	Informal embankment	10	20	20	100	Short				Adaptation	Adaptation	Adaptation										
		SR11-2	Shingle bank	0.1	0.5	2	100	Short				Adaptation	Adaptation	Adaptation										
		SR11-3	Grass embankment (clay core)	1	2	10	100	Medium				Adaptation	Adaptation	Adaptation	Alignment Options are being assessed in detail in the Steart Peninsula project. In the short term, maintenance activity will become increasingly reactive, with landward realignment occurring in the medium term. This would be maintained through to the long term.				Maintenance	New Linear Defence, Secondary Defences, Point Structures, Individual Property Protection				
		SR11-4	Grass embankment (clay core) with fronting rock armour	0.1	0.1	2	10	Medium				Maintain	Adaptation	Adaptation										
		SR11-5	Grass embankment (clay core) with fronting rock armour	0.1	0.1	1	20	Medium				Maintain	Adaptation	Adaptation							Maintenance			



Appendix L : Potential FRM Responses Assessment Tables





LOCATION			BASELINE FCA PERFORMANCE (STRUCTURAL INTEGRITY MAINTAINED, BREACH % AEP)				HIGH LEVEL OPTIONS			SUB-REACH MANAGEMENT			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach	2008	2028	2058	2108	Short term	Medium term	Long term	Short term	Medium term	Long term		Economically preferred option	Technical solution and epochal timing
Penarth	FC1-P	SR1-P	2	5	20	100	Maintain	Maintain, Sustain	Sustain	Maintain	Sustain	Sustain	Maintenance and improvement of the existing wall is socio-economically marginal. Above 2% SoP the BCR is <1, with 2% SoP having a marginal BCR. Inclusion of foreshore management in the medium to long term would reduce the BCR<1.	2% SoP with defences improved in their current form when and where necessary. BCR of 1.3, with iBCR of 4.	Penarth sea wall raised with a 1m wave recurve in the medium to long term, with toe maintained/protected.
Tremorfa	FC1-0	SR1-CF	0.1	0.1	0.1	0.1	Maintain	Maintain, Sustain	Sustain	Maintain	Maintain	Maintain	Maintenance and improvement of the existing structures (BCR of 244 to 412 dependent on SoP) does not require further hardening, with continued toe protection required.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 304, with iBCR of 248.	Cardiff Flats frontage maintained with rock armouring on front face and toe.
		SR1-RRWB	0.1	0.1	0.1	20				Maintain	Maintain	Sustain			Cardiff Flats frontage maintained with rock armouring and man made ground levels.
		SR1-RRWB1	0.1	0.1	1	10				Maintain	Sustain	Sustain			River Rhymney west bank embankments being maintained generally and a short length raised in the short term. Embankments raised by up to 0.8m in the medium to long term.
Wentlooge Levels	FC1-1	SR1-RREB	2	5	20	100	Improve	Sustain	Sustain, Adaptation	Improve	Sustain	Sustain	Assessment of potential alignment options of primary defence line (BCR of 70 to 235 dependent on SoP and type) or realigned (BCR of 93 to 104 dependent on SoP) indicates the primary line is socio-economically preferred. Assessment of the types of primary defence (embankments, rock armouring, revetments, polders, wave recurve walls, toe protection) indicates that improvements of the current type are preferred (BCR of 169 to 235, in comparison to a BCR of 70 to 80), with wider foreshore management in the form of polders and toe protection being required.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 169, with iBCR of 58.	River Rhymney east bank embankments being maintained generally and a short length raised in the short term. Embankments raised by up to 0.6m in the medium to long term.
		SR1-0	0.1	0.1	2	100				Maintain	Sustain	Sustain			Maintenance of armoured earth embankment at Little Wharf in the short to medium term, with potential for polder development. Raising by up to 0.6m in the long term.
		SR1-1	0.1	0.1	0.1	10				Maintain	Maintain	Sustain			Continued maintenance of polders, rock armouring and earth embankment at Rumney Great Wharf in the short to medium term. Raising of embankment by up to 1m in the long term.
		SR1-2	2	5	20	100				Improve	Sustain	Sustain, Adaptation			Continued maintenance of polders and rock armouring, and earth embankment raising by up to 0.6m, at Sluice Farm in the short term. Raising of earth embankment by up to 1m in the long term.
		SR1-3	0.1	0.1	0.5	20				Maintain	Sustain	Sustain, Adaptation			Continued maintenance of earth embankment and rock armouring in the short term. Raising of earth embankment by up to 1.3m in the medium to long term.
		SR1-4	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain, Adaptation			Continued maintenance of concrete revetment in the short to long term. No raising required.
		SR1-5	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain, Adaptation			Continued maintenance of concrete revetment in the short to long term. No raising required.
		SR1-6	0.1	0.1	0.1	2				Maintain	Maintain	Sustain, Adaptation			Continued maintenance of earth embankment and rock armouring in the short to medium term. Raising of earth embankment by up to 0.6m in the long term.
		SR1-REWB	0.1	0.1	0.1	1				Maintain	Maintain	Sustain, Adaptation			Continued maintenance of earth embankment in the short to medium term. Raising of earth embankment by up to 0.5m in the long term.
River Ebbw - River Usk	FC1-2	SR1-REEB	0.1	0.1	0.5	20	Improve	Sustain	Sustain	Maintain	Sustain	Sustain	Assessment of the types of primary defence (embankments, rock armouring, revetments, vertical walls) indicates that improvements in the current type, along with new wall construction along the River Usk, are preferred (BCR of 31 to 44, compared to BCR of 15 to 16).	0.1% SoP with defences improved in their current form when and where necessary. BCR of 31, with iBCR of 10.	Continued maintenance of earth embankment in the short term. Raising of earth embankment by up to 1m in the medium to long term.
		SR1-RUWB1	0.1	0.1	0.5	20				Maintain	Sustain	Sustain			Continued maintenance of dock defences; no raising required.
		SR1-RUWB2	20	100	100	100				Improve	Sustain	Sustain			New wall constructed near Transporter Bridge on River Usk west bank in the short term, with wider raising in the medium and long term.
		SR1-RUWB3	0.5	1	2	100				Maintain	Sustain	Sustain			Continued maintenance of various defences in the short to medium term. Raising of defences by up to 0.9m in the long term.



LOCATION			BASELINE FCA PERFORMANCE (STRUCTURAL INTEGRITY MAINTAINED, BREACH % AEP)				HIGH LEVEL OPTIONS			SUB-REACH MANAGEMENT			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach	2008	2028	2058	2108	Short term	Medium term	Long term	Short term	Medium term	Long term		Economically preferred option	Technical solution and epochal timing
Caldicot Levels	FC2-0	SR2-RUEB1	0.1	0.1	0.1	100	Improve	Sustain	Sustain, Adaptation	Maintain	Maintain	Sustain	Assessment of potential alignment options of primary defence line (BCR of 47 to 93 dependent on SoP and type) or realigned (BCR of 55 to 71 dependent on SoP) indicates the primary line is socio-economically preferred. Assessment of the types of primary defence (embankments, rock armouring, revetments, polders, wave recurve walls, toe protection) indicates that improvements in the current type are preferred (BCR of 66 to 93, in comparison to a BCR of 47 to 86), with wider foreshore management in the form of toe protection being required.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 66, with iBCR of 18, although marginal with defence hardening, and also long term realignment.	Variable level of ground raising/defences in long term.
		SR2-RUEB2	10	20	100	100				Improve	Sustain	Sustain			Raising of earth embankment by up to 0.6m (near Transporter Bridge on the River Usk east bank) in the short term. Continued raising in the medium to long term up to 1m.
		SR2-RUEB3	0.1	0.1	0.1	20				Maintain	Maintain	Sustain			Maintenance in the short to medium term. Raising of wall by up to 0.6m in the long term.
		SR2-RUEB4	20	20	100	100				Improve	Sustain	Sustain			Riverside scheme recently constructed.
		SR2-RUEB5	0.1	0.1	0.1	10				Maintain	Maintain	Sustain			Maintenance in the short to long term.
		SR2-0	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain, Adaptation			Continued maintenance of revetment and wave recurve in the short to long term. No raising required.
		SR2-1	0.1	0.1	0.5	10				Maintain	Maintain, Sustain	Sustain, Adaptation			Continued maintenance of revetment in the short to medium term. Up to 0.4m revetment raising in the long term.
		SR2-2	0.1	0.1	0.5	10				Maintain	Maintain, Sustain	Sustain, Adaptation			Continued maintenance of revetment in the short to medium term. Up to 0.4m revetment raising in the long term.
		SR2-3	0.1	0.1	0.5	5				Maintain	Maintain, Sustain	Sustain, Adaptation			Continued maintenance of earth embankment in the short to medium term. Raising of earth embankment, with toe protection, by up to 0.7m in the long term.
		SR2-4	1	1	5	100				Improve	Sustain	Sustain			Continued maintenance of earth embankment and rock armouring in the short term, with raising of up to 0.2m. Further raising of up to 1m in the medium to long term.
		SR2-5	0.5	0.5	2	100				Sustain	Sustain	Sustain			Continued maintenance of earth embankment in the short term, with raising of up to 0.1m. Further raising of up to 1m in the medium to long term, with rock armouring.
		SR2-6	0.5	0.5	5	100				Sustain	Sustain	Sustain			Continued maintenance of earth embankment in the short term, with raising of up to 0.4m. Further raising of up to 1m in the medium to long term.
Mathern	FC2-1	SR2-7	0.5	0.5	2	100	Maintain, Sustain	Sustain	Sustain, Adaptation	Maintain, Sustain	Sustain	Sustain, Adaptation	Assessment of potential alignment options of primary defence line (BCR of 1 to 3 dependent on SoP and type) or realigned (BCR of 1 to 2 dependent on SoP) indicates there is little difference between these options although the primary defence line is marginally preferred. Assessment of the types of primary defence (embankments, rock armouring, revetments, wave recurve walls, toe protection) indicates that defence hardening when necessary is marginally preferred (BCR of 1.2 to 2.6, in comparison to a BCR of 1.3 to 2.2).	2% SoP with defence hardening when and where necessary, although marginal with improvements in current form or secondary alignment. BCR of 2.2, with iBCR of 1.	Maintenance of rock armoured embankment in the short term, with raising of up to 0.8m in the medium to long term.
		SR2-8	0.1	0.1	0.5	100				Maintain	Maintain, Sustain	Sustain, Adaptation			Maintenance of earth embankment in the short to medium term, with raising of up to 0.7m in long term.
Tidenham	FC3-1	SR3-0	0.1	0.1	0.1	0.1	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation	NAI	NAI	NAI	No maintenance. Railway embankment is present with failing tide flaps.	No maintenance. Railway embankment is present with failing tide flaps.	No maintenance. Railway embankment is present with failing tide flaps.
		SR3-1	0.1	0.1	2	100				NAI	NAI	NAI			
		SR3-2	0.1	0.1	0.1	0.1				NAI	NAI	NAI			
Stroat	FC3-2	SR3-3	0.1	0.5	2	100	NAI, Adaptation	NAI, Adaptation	NAI, Adaptation	NAI	NAI	NAI	No maintenance. Railway embankment is present with failing tide flaps.	No maintenance. Railway embankment is present with failing tide flaps. Fronting FRM embankments were breached for local BAP scheme.	No maintenance. Railway embankment is present with failing tide flaps. Fronting FRM embankments were breached for local BAP scheme.
		SR3-4	0.1	0.5	2	100				NAI, Adaptation	NAI	NAI, Adaptation			
Lydney	FC3-3	SR3-5	0.1	0.1	1	100	Maintain	Maintain, Sustain	Sustain, Adaptation	Maintain	Maintain, Sustain	Sustain, Adaptation	Assessment of potential alignment options of primary defence line (BCR of 14 to 23 dependent on SoP and type) or realigned (BCR of 9 to 11 dependent on SoP) indicates the realignment is socio-economically preferred, and supported in the long term by the habitat assessment.	0.1% SoP with defences maintained in their current form. BCR of 13, with iBCR of 6.	Maintenance of earth embankment, with raising of up to 1.3m in the medium to long term
Purton	FC4-1	SR4-0	100	100	100	100	NAI	NAI	NAI	NAI	NAI	NAI	No maintenance of defences.	No maintenance of defences.	No maintenance of defences.
Awre	FC4-3	SR4-2	20	100	100	100	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Assessment of potential alignment options of primary defence line or realigned to high ground indicates that the primary defence line is not socio-economically viable with the decision rule.	Potential adaptation at Awre, to high ground. Full GIA funding for realignment.	Potential adaptation in the short to medium term to high ground.
Bullo	FC4-4	SR4-3	100	100	100	100	NAI	NAI	NAI	NAI	NAI	NAI	No maintenance of defences.	No maintenance of defences.	No maintenance of defences. High ground present.
Ruddle	FC4-5	SR4-3	100	100	100	100	NAI	NAI	NAI	NAI	NAI	NAI	No maintenance of defences.	No maintenance of defences.	No maintenance of defences. High ground present.
Newnham-on-Severn	FC4-6	SR4-3	2	5	20	100	Maintain	Maintain, Sustain	Sustain	Maintain	Maintain, Sustain	Sustain	Assessment of the existing defence indicates that improvements in the current type have a BCR of 4 to 8. Sustaining 2% SoP with raising of the embankment is economically supported.	2% SoP with defences maintained in their current form when and where necessary. BCR of 8, with iBCR of 2.	Maintenance of earth embankment from the short term, with raising in the medium to long term.
Westbury-on-Severn and Rodley	FC4-7	SR4-4	5	10	20	100	Improve, Sustain	Sustain	Sustain	Improve, Sustain	Sustain	Sustain	Assessment of potential alignment options of existing line (BCR of 13 to 17 dependent on SoP) or realigned at Westbury (BCR of 6 to 7 dependent on SoP) indicates the existing alignment is socio-economically preferred.	1% SoP with defences improved in their current form when and where necessary. BCR of 16, with iBCR of 5. Partial GIA funding in the short term.	Raising of earth embankment by 0.3m in the short term, with further raising of up to 0.8m in the medium to long term.
		SR4-5	0.1	0.1	0.1	0.1				NAI	NAI	NAI			No maintenance of defences. High ground present.
		SR4-6	0.1	0.1	0.1	2				Maintain	Maintain	Sustain			Maintenance of earth embankment into the future.
Wallmore Common	FC4-8	SR4-8	0.5	1	10	100	Maintain	Sustain	Sustain	Maintain	Sustain	Sustain	Assessment of the existing defence indicates that improvements in the current type have a BCR of 31 to 35. Sustaining 0.1% SoP with raising of the embankment is economically supported.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 31, with iBCR of 12.	Raising of earth embankment by up to 0.4m in the medium to long term.
Minsterworth	FC4-9	SR4-9	0.1	0.1	0.5	0.5	Maintain	Maintain, Sustain	Maintain, Sustain	Maintain	Maintain, Sustain	Maintain, Sustain	Assessment of the existing defence indicates that improvements in the current type have a BCR of 49. Sustaining 0.1% SoP with raising of the embankment is economically supported.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 49 with iBCR of 7.	Raising of earth embankment by up to 0.3m in the long term.
Minsterworth Ham	FC4-10	SR4-10	5	20	100	100	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Assessment of potential alignment options of existing line (BCR of 3 to 14 dependent on SoP) or realigned with resilience measures (BCR of 29 to 38 dependent on SoP) indicates the realignment is socio-economically preferred, as well as being supported by the habitat assessment.	Potential adaptation at Minsterworth Ham with 1% SoP into the future, BCR of 38 and iBCR of 1. Full GIA funding for realignment.	Potential adaptation with cut off embankments or property protection.





LOCATION			BASELINE FCA PERFORMANCE (STRUCTURAL INTEGRITY MAINTAINED, BREACH % AEP)				HIGH LEVEL OPTIONS			SUB-REACH MANAGEMENT			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach	2008	2028	2058	2108	Short term	Medium term	Long term	Short term	Medium term	Long term		Economically preferred option	Technical solution and epochal timing
The Rea	FC5-3	SR5-0	0.1	1	20	100	Maintain	Maintain, Sustain	Sustain	Maintain	Maintain, Sustain	Sustain	Assessment of the existing defence indicates that improvements in the current type have a BCR of 3 to 15 dependent on BCR. Sustaining 0.5% SoP with raising of the embankment is economically supported.	0.5% SoP with defences improved in their current form when and where necessary. BCR of 18, with no iBCR.	Raising of earth embankment by up to 0.9m in the medium to long term.
Stonebench	FC5-4	SR5-1	0.5	0.5	2	100	Maintain	Maintain, Sustain	Sustain	Maintain	Maintain, Sustain	Sustain	Assessment of the existing defence indicates that improvements in the current type have a BCR of 1 to 4 dependent on BCR. Sustaining 1% SoP with raising of the embankment is economically supported.	1% SoP with defences improved in their current form when and where necessary. BCR of 4, with no iBCR.	Raising of earth embankment by up to 1.1m in the long term.
Elmore Back	FC5-5	SR5-2	2	5	20	100	Maintain	Maintain, Adaptation	Adaptation	Maintain	Maintain, Adaptation	Adaptation	Assessment of potential alignment options of existing line (BCR 1 to 2 dependent on SoP) or realigned (BCR of 1 to 2 dependent on SoP) indicates that either option is socio-economically preferred, and are marginally viable.	2% SoP with defences maintained in their current form, with potential adaptation in the medium term. BCR of 1.7, with no iBCR.	Maintenance of earth embankment in the short term. Potential adaptation with construction of ring banks around the main access road with property protection in the medium term.
Longney	FC5-6	SR5-3	0.1	0.1	1	20	Maintain	Maintain, Sustain	Sustain, Adaptation	Maintain	Maintain, Sustain	Sustain, Adaptation	Assessment of potential alignment options of existing line (BCR of 17 to 18) or realigned (BCR of 6 to 7 dependent on SoP) indicates that improvements along the existing line are economically preferred.	0.1% SoP with defences maintained in their current form. BCR of 17, with iBCR of 10.	Maintenance of earth embankment in the short term. Raising of earth embankment by up to 0.5m in the medium to long term.
Upper Framilode	FC5-7	SR5-4	1	2	20	100	Sustain, Improve	Sustain	Sustain	Sustain, Improve	Sustain	Sustain	Assessment of the existing defence indicates that improvements in the current type have a BCR of 35 to 85 dependent on SoP. Improving 0.1% SoP with raising of the embankment is the preferred option.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 35, with iBCR of 29. Full to partial GIA funding for short term works.	Raising of earth embankment by 0.6m in the short to long term.
		SR5-6	0.1	0.1	0.5	20									Raising of earth embankment by 0.1m in the long term.
Arlingham	FC5-8	SR5-5	0.1	0.5	1	20	Maintain	Maintain, Sustain	Sustain, Adaptation	Maintain	Maintain	Sustain, Adaptation	Assessment of potential alignment options of existing line (BCR of 32 to 47) or realigned (BCR of 25) indicates the existing alignment is economically preferred over realignment in the long term.	0.1% SoP with defences improved in their current form. BCR of 11, with iBCR of 11.	Raising of earth embankment by up to 0.9m in the long term.
Slimbridge	FC5-9	SR5-7	0.1	0.1	0.5	20	Maintain	Maintain, Sustain	Sustain, Adaptation	Maintain	Sustain	Sustain	Assessment of potential alignment options of existing line (BCR of 20) or realigned (BCR of 3 to 7 dependent on SoP) indicates the existing alignment is socio-economically preferred, over realignment in the short term.	0.1% SoP with defences improved in their current form when and where necessary. BCR of 11, with iBCR of 83.	Maintenance of canal bank into the future.
		SR5-8	0.1	0.1	0.1	0.1									Raising of earth embankment by up to 0.5m in the long term.
Berkeley	FC6-1	SR6-0	0.5	1	5	100	Maintain	Maintain, Sustain	Sustain	Maintain	Sustain	Sustain	Assessment of the types of primary defence (embankments, rock armouring, revetments, wave recurve walls, toe protection) indicates that improvements to the existing form when necessary are preferred (BCR of 7 to 21, in comparison to a BCR of 4 to 9, dependent on SoP). The BCRs support a 1% SoP socio-economically.	1% SoP with defences improved in their current form when and where necessary. BCR of 8, with iBCR of 3. Partial FDGiA funding for short term works.	Raising of 0.3m in the short term. Further raising of earth embankment in the medium to long term by 1m.
Shepperdine	FC6-2	SR6-1	10	10	20	100	Sustain, Improve	Sustain	Sustain	Improve	Sustain	Sustain			Raising of short lower section by 0.6m in the short term. Further raising of earth embankment in the medium to long term by 1m.
		SR6-2a	0.5	1	20	100				Maintain	Sustain	Sustain			Raising of 0.3m in the short term. Further raising of earth embankment in the medium to long term by 1m.
		SR6-2b	0.1	0.1	0.1	10				Maintain	Sustain	Sustain			Raising of earth embankment in the medium to long term by 0.7m.
		SR6-2c	0.1	0.5	2	100				Maintain	Sustain	Sustain			Raising of 0.1m in the short term. Further raising of earth embankment in the medium to long term by 1m.
Littleton-upon-Severn	FC6-3	SR6-3	0.1	0.5	2	100	Maintain	Maintain, Sustain	Maintain, Sustain	Maintain	Sustain	Sustain			Raising of 0.1m in the short term. Further raising of earth embankment in the medium to long term by 1m.
		SR6-4	0.1	0.5	2	100									Raising of 0.1m in the short term. Further raising of earth embankment in the medium to long term by 1m.
Avonmouth to Aust	FC7-0	SR7-0	1	1	10	100	Improve	Sustain	Sustain	Improve	Sustain	Sustain	Assessment of the types of primary defence (embankments, rock armouring, revetments, wave recurve walls, toe protection) indicates that defence hardening (with wave recurve walls) when necessary is marginally preferred (BCR of 41 to 85, in comparison to a BCR of 53 to 82). Assessment of potential alignment options around the docks (using the proposed dock expansion quay level as a defence, or constructing a new defence along the landward dock perimeter) indicates the seaward alignment is marginally socio-economically preferred. The preferred option will be dependent on the partnering approach with BPC.	0.1% SoP with defence hardening when and where necessary, although marginal with back line around Avonmouth Docks. BCR of 58, with iBCR of 17. Partial GIA funding for short term works.	Raising of earth embankment by 0.4m in the short term, with a further raising of 1.4m or 1m wave recurve wall in the medium to long term.
		SR7-1	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Maintenance of wave wall and revetment into the future.
		SR7-2	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Maintenance of revetment into the future.
		SR7-3	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Maintenance of wave wall and revetment into the future.
		SR7-4	0.1	0.1	0.1	20				Maintain	Maintain	Sustain			Maintenance of railway embankment in the short to medium term. Addition of 0.6m wave recurve wall in the long term, by agreement.
		SR7-5	0.1	0.1	0.5	5				Maintain	Maintain, Sustain	Sustain			Dependent on partnership with BPC deep water expansion. High quay level would provide flood defence. Otherwise landward wall constructed in short term.
		SR7-6	0.1	0.1	0.1	1				Maintain	Maintain	Sustain			Dependent on partnership with BPC. New seaward embankment construction, 0.7m above ground level in short term, then with up to 1.7m raising in medium to long term. Otherwise landward wall constructed in short term.
		SR7-7	5	5	10	20				Improve	Sustain	Sustain			
		SR7-8	0.5	1	10	100				Improve	Sustain	Sustain			



LOCATION			BASELINE FCA PERFORMANCE (STRUCTURAL INTEGRITY MAINTAINED. BREACH % AEP)				HIGH LEVEL OPTIONS			SUB-REACH MANAGEMENT			FRM RESPONSE ASSESSMENT	POTENTIAL FRM RESPONSE	
Relevant placename	Strategic flood sub-cell	Strategic sub-reach	2008	2028	2058	2108	Short term	Medium term	Long term	Short term	Medium term	Long term		Economically preferred option	Technical solution and epochal timing
Portbury	FC8-0	SR8-0	0.1	0.1	0.1	0.1	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Assessment of the existing defence indicates that improvements in the current type have an extremely high BCR. Sustaining 0.1% SoP with maintenance in the long term is the preferred option.	Existing SoP with defences maintained in their current form when and where necessary. BCR of 188, with no iBCR.	Maintenance of defences from the short to long term.
Woodhill	FC8-1	SR8-1	0.1	0.1	0.5	20	NAI	NAI	NAI	NAI	NAI	NAI	No maintenance of defences.	No maintenance of defences.	No maintenance of low wall and promenade.
Clevedon to Weston-Super-Mare	FC9-0	SR9-0	0.1	0.1	0.1	0.1	Improve	Sustain	Sustain, Adaptation	Maintain	Maintain	Maintain	Assessment of potential alignment options of primary defence line (BCR of 172 to 431 dependent on SoP and type) or realigned (BCR of 109 to 309 dependent on SoP) indicates the existing alignment is marginally socio-economically preferred. Assessment of the types of primary defence (embankments, rock armouring, revetments, polders, wave recurve walls, toe protection) indicates that defence hardening is very marginally preferred (BCR of 172 to 431, in comparison to a BCR of 172 to 430) where the existing alignment is maintained, with foreshore management in the form of sand beach recharge and toe protection being required.	0.1% SoP with defence hardening when and where necessary. BCR of 311, with iBCR of 82. Full GIA funding for short term works.	Maintenance of vertical wall into the future.
		SR9-1	0.5	2	5	20				Sustain	Sustain	Sustain			Raising of vertical wall by 1m in the medium to long term.
		SR9-2	0.1	0.1	0.1	10				Maintain	Maintain	Sustain			Wave recurve wall addition of 0.6m in the long term.
		SR9-3	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Maintenance of high ground into the future.
		SR9-4	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Rock armouring and raising of embankment by 0.5m in the long term.
		SR9-5	0.1	0.1	0.1	5				Maintain	Maintain	Sustain, Adaptation			Revetment raising by up to 1.8m in the long term.
		SR9-6	0.1	0.1	2	20				Maintain	Sustain	Sustain, Adaptation			Revetment raising by up to 2m in the medium to long term.
		SR9-7	0.1	0.1	1	20				Maintain	Sustain	Sustain, Adaptation			Revetment raising by up to 2m in the medium to long term.
		SR9-CYRB	5	10	20	100				Improve	Sustain	Sustain, Adaptation			Recent scheme has addressed low spots with minor realignment in the short term. Further embankment raising by up to 1m in the medium to long term.
		SR9-CYLB	1	2	10	100				Improve	Sustain	Sustain, Adaptation			Recent scheme has addressed low spots with minor realignment in the short term. Further embankment raising by up to 1m in the medium to long term.
		SR9-8	0.1	0.1	0.1	2				Maintain	Sustain	Sustain, Adaptation			Revetment raising by up to 0.4m in the short term. Further raising by up to 1.4m in the medium to long term.
		SR9-RBRB	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain, Adaptation			Embankment raising by up to 0.5m in the short term. Further raising by up to 0.7m in the medium to long term.
		SR9-RBLB	0.1	0.1	1	100				Maintain	Sustain	Sustain, Adaptation			Embankment raising by up to 0.3m in the short term. Further raising by up to 0.7m in the medium to long term.
		SR9-9LS	0.1	0.1	2	20				Maintain	Sustain	Sustain			Beach recharge and raising at Sand Bay in the medium to long term
		SR9-9	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Maintenance of beach into the future.
		SR9-10	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Maintenance of vertical wall into the future.
		SR9-11	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Maintenance of dunes into the future.
Brean to Burnham-on-Sea	FC10-0	SR9-12	0.1	0.1	0.1	2	Maintain, Sustain	Sustain, Adaptation	Sustain, Adaptation	Maintain	Maintain, Adaptation	Sustain, Adaptation	Assessment of potential alignment options of primary defence line (BCR of 556 to 1657 dependent on SoP and type) or realignment around River Axe/Brean (BCR of 477 to 505 dependent on SoP) indicates the partial realignment is socio-economically preferred in the medium to long term, and supported by the habitat assessment. Assessment of the types of primary defence (embankments, rock armouring, revetments, polders, wave recurve walls, toe protection) indicates that defence hardening is marginally preferred (BCR of 567 to 1657, in comparison to a BCR of 556 to 1609), with foreshore management in the form of dune management and toe protection being required.	0.1% SoP with defence hardening when and where necessary, with localised realignment around River Axe and Brean in the medium to long term. BCR of 505, with iBCR of 734.	Maintenance of embankment in the short term, with potential adaptation and landward realignment in the medium to long term with earth embankments.
		SR9-13	0.1	0.1	1	20				Maintain	Sustain, Adaptation	Sustain, Adaptation			Reducing maintenance in the short to medium term, with potential adaptation and landward realignment and property protection in the long term.
		SR10-0	0.1	0.1	2	20				Maintain	Sustain, Adaptation	Sustain, Adaptation			Reducing maintenance in the short to medium term, with potential adaptation and landward realignment and property protection in the long term.
		SR10-1	0.1	0.1	1	100				Maintain	Sustain, Adaptation	Sustain, Adaptation			Reducing maintenance in the short to medium term, with potential adaptation and landward realignment and property protection in the long term.
		SR10-2	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Maintenance of dunes into the future.
		SR10-3	0.1	1	10	100				Maintain	Sustain	Sustain			Maintenance of dunes into the future.
		SR10-4	0.1	0.1	0.1	20				Maintain	Maintain	Sustain			Maintenance of dunes into the future.
		SR10-5	0.1	0.1	0.1	1				Maintain	Maintain	Sustain			Wall raising of up to 1m in the long term, with beach management in the long term.
		SR10-6	0.1	0.1	0.1	0.1				Maintain	Maintain	Maintain			Maintenance of revetment and wave wall into the future, with beach management in the long term.
		SR10-7	0.1	0.1	0.1	0.5				Maintain	Maintain	Sustain			Wall raising of up to 0.3m in the long term.
		SR10-8	0.1	0.1	0.1	10				Maintain	Maintain	Sustain			Embankment raising of up to 0.7m in the long term.
Huntspill	FC10-1	SR10-9a	0.1	0.1	0.5	20	Maintain	Maintain	Sustain, Adaptation	Maintain	Maintain	Sustain, Adaptation	Assessment of potential alignment options of primary defence line (BCR of 369 to 513 dependent on SoP and type) or realignment south of Huntspill river (BCR of 46 to 54 dependent on SoP) indicates the existing alignment is socio-economically preferred. However, the habitat assessment, and legal need for compensatory habitat, supports long term realignment. The BCRs support a 0.1% SoP socio-economically.	0.1% SoP with defence hardening when and where necessary. BCR of 369, with iBCR of 17.	Maintenance of embankments in the short to medium term. Embankment raising by up to 0.2m in the long term
		SR10-9b	0.1	0.1	0.1	1				Maintain	Maintain	Sustain, Adaptation			
		SR10-9c	0.1	0.1	0.1	0.1				Maintain	Maintain	Sustain, Adaptation			
Pawlett	FC10-2	SR10-RPRBa	0.1	0.1	0.1	20	Maintain	Sustain	Sustain, Adaptation	Maintain	Maintain	Sustain, Adaptation	Assessment of potential alignment options of primary defence line (BCR of 27 to 64 dependent on SoP and type) or realignment around Pawlett Ham (BCR of 20 to 23 dependent on SoP) indicates the realignment is socio-economically preferred. However, PEFRMS has identified MR here for the long term, and this is supported by the habitat assessment.	0.1% SoP with defences maintained in their current form, with managed realignment in the long term. BCR of 23, high iBCR.	Maintenance of embankment in the short term. Potential adaptation, with landward realignment with earth embankment and to high ground in the long term.
		SR10-RPRBb	1	2	10	100				Maintain	Sustain	Sustain, Adaptation			
		SR10-RPRBc	0.1	0.1	0.5	20				Maintain	Maintain	Sustain, Adaptation			
Stearat Peninsula	FC11-0	SR11-RPLB	0.1	0.1	2	100	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Adaptation	Assessment of potential alignment options of primary defence line (BCR of 1 to 2 dependent on SoP) or realignment across Stearat Peninsula (BCR of 3) indicates realignment is socio-economically preferred, and also viable. The realignment details are being worked up to greater detail in the Stearat project.	Managed realignment site at Stearat in the short term with SoP of 2-5%. BCR of 3, no iBCR. Full GIA funding for realignment.	Landward realignment in the short term, with individual property protection and earth embankments.
		SR11-0	0.1	0.5	2	100				Adaptation	Adaptation	Adaptation			Maintenance into the short term only.
		SR11-1	10	20	20	100				Adaptation	Adaptation	Adaptation			Landward realignment in the short term, with individual property protection and earth embankments protecting main access road in the short term.
		SR11-2	0.1	0.5	2	100				Adaptation	Adaptation	Adaptation			Landward realignment in the short term, with individual property protection and earth embankments.
		SR11-3	1	2	10	100				Adaptation	Adaptation	Adaptation			
		SR11-4	0.1	0.1	2	10				Maintain	Adaptation	Adaptation			
		SR11-5	0.1	0.1	1	20				Maintain	Adaptation	Adaptation			



Appendix M : Outline Option Designs and Detailed Socio-Economic Option Costs





Do Minimum Costs							
Strategic flood sub-cell	Strategic sub-reach	FRM asset description	Generic Type	Defence Length (km)	Annual Maintenance (£)	Present Value Cost (100yr Appraisal Period) (£)	Flood Cell PVC (£)
FC1-P	SR1-P	Penarth sea defence/high ground	Wall	0.44	£485	£14,469	£14,469
FC1-0	SR1-CF	Rock armoured high made ground	Armour	5.3	£29,230	£871,421	£1,139,424
	SR1-RRWB	Coastal frontage and river Rhymney West Bank, general hard top ground level.	Wall	1.3	£7,170	£213,745	
	SR1-RRWB1	River Rhymney West Bank, variable FRM assets.	Embankment	1.65	£1,820	£54,258	
FC1-1	SR1-RREB	Grassed embankment	Embankment	0.99	£1,092	£32,555	£899,044
	SR1-0	Rock armoured embankment (clay core)	Rock Armour	0.74	£4,081	£121,670	
	SR1-1	Grass embankment (clay core) with managed foreshore	Embankment	1.78	£1,963	£58,533	
	SR1-2	Grass embankment (clay core) with managed foreshore	Embankment	0.74	£816	£24,334	
	SR1-3	Grass embankment (clay core)	Embankment	2.55	£2,813	£83,854	
	SR1-4	Concrete revetment	Revetment	1.71	£9,431	£281,157	
	SR1-5	Concrete revetment	Revetment	0.78	£4,302	£128,247	
	SR1-6	Grass embankment (clay core)	Embankment	3.33	£3,673	£109,503	
	SR1-REWB	Grass embankment (clay core)	Embankment	1.8	£1,985	£59,191	
	SR1-REEB	Grass embankment (clay core)	Embankment	0.83	£916	£27,294	
FC1-2	SR1-RUWB1	General ground level (Ebbw to Transporter bridge)	Embankment	3.64	£4,015	£119,697	£965,798
	SR1-RUWB2	Non flood defence wall, to SDR bridge	Wall	1.12	£6,177	£184,149	
	SR1-RUWB3	SDR bridge to Clarence Place Bridge	Wall	3.86	£21,288	£634,658	
FC2-0	SR2-RUEB1	Uskmouth power station, high made ground levels	Wall	1.45	£7,997	£238,408	£4,013,470
	SR2-RUEB2	Julians Pill to Transporter Bridge	Embankment	2.61	£2,879	£85,827	
	SR2-RUEB3	Transporter Bridge to Clarence Place Bridge	Wall	4.45	£24,542	£731,665	
	SR2-RUEB4	CP Bridge to flood defence	Wall	0.48	£2,647	£78,921	
	SR2-RUEB5	Glebelands	Wall	1.04	£5,736	£170,996	
	SR2-0	Revetment with seawall	Wall	4.87	£26,859	£800,721	
	SR2-1	Concrete revetment	Revetment	2.89	£15,939	£475,171	
	SR2-2	Concrete revetment	Revetment	2.16	£11,913	£355,145	
	SR2-3	Grass embankment (clay core)	Embankment	3.62	£3,993	£119,039	
	SR2-4	Rock armoured embankment	Rock Armour	1.46	£8,052	£240,052	
	SR2-5	Rock armoured embankment	Rock Armour	3.98	£21,950	£654,388	
	SR2-6	Grass embankment (clay core)	Embankment	1.92	£2,118	£63,137	
	SR2-7	Rock armoured embankment	Rock Armour	3.95	£21,785	£649,455	
	SR2-8	Grass embankment (clay core)	Embankment	1.71	£1,886	£56,231	
FC2-1	SR3-0	High ground (MU 9C west)	N/A				£705,687
	SR3-1	Sturch Pill embankment (MU 9C west)	Embankment	0.35	£386	£11,509	
	SR3-2	High ground (MU 9B west)	N/A				
FC3-2	SR3-3	Railway embankment (failed tide flaps) (MU 9B west)	Embankment	2.04	£2,250	£67,083	£67,083
	SR3-4	High ground (MU9B west)	N/A				
FC3-3	SR3-5	Grassed embankment with lower rock armouring (MU 9A west)	Embankment	5.25	£5,791	£172,640	£172,640
FC4-1	SR4-0	High ground/short lengths of railway retaining wall (MU 10B, 10A, 11A west)	N/A				£0
FC4-3	SR4-2	Grassed embankment with some masonry (MU 12E west)	Embankment	3.58	£3,949	£117,724	£117,724
FC4-4	SR4-3	Medium level ground/embankment (MU 12D, 12C west)	Embankment	2	£2,206	£65,768	£65,768
FC4-5	SR4-3	Medium level ground/embankment (MU 12D, 12C west)	Embankment	2	£2,206	£65,768	£65,768
FC4-6	SR4-3	Medium level ground/embankment (MU 12D, 12C west)	Embankment	2	£2,206	£65,768	£65,768
FC4-7	SR4-4	Grassed embankment (MU 12B west)	Embankment	1.09	£1,202	£35,843	£220,979
	SR4-5	High ground (MU 12B west)	N/A		£0		
	SR4-6	Grassed embankment (MU 12A west)	Embankment	5.63	£6,210	£185,136	
FC4-8	SR4-8	Grassed embankment (MU 13E west)	Embankment	2.53	£2,791	£83,196	£83,196
FC4-9	SR4-9	Grassed embankment/high ground (MU 13D, 13C west)	Embankment	2.24	£2,471	£73,660	£73,660
FC4-10	SR4-10	Grassed embankment (MU 13B west)	Embankment	9.85	£10,865	£323,906	£323,906
FC4-11	SR4-11	NA	N/A				
FC5-3	SR5-0	High ground/grassed embankment (MU 13A east)	Embankment	5	£5,515	£164,419	£164,419
FC5-4	SR5-1	High ground/grassed embankment (MU 13B&C east)	Embankment	2.79	£3,077	£91,746	£91,746
FC5-5	SR5-2	Grassed embankment (MU 13D east)	Embankment	6.11	£6,739	£200,920	£200,920
FC5-6	SR5-3	Grassed embankment (MU 13E east)	Embankment	3.78	£4,169	£124,301	£124,301
FC5-7	SR5-4	Grassed embankment (MU 12A&B east)	Embankment	3.97	£4,379	£130,549	£168,365
	SR5-6	Grassed embankment (MU 12C east)	Embankment	1.15	£1,268	£37,816	
FC5-8	SR5-5	Grassed embankment	Embankment	9.47	£10,446	£311,410	£311,410
FC5-9	SR5-7	Canal banks (MU 11A est)	Embankment	2.72	£3,000	£89,444	£253,863
	SR5-8	Grassed embankment, Slimbridge (MU 11B east)	Embankment	5	£5,515	£164,419	



Do Minimum Costs							
Strategic flood sub-cell	Strategic sub-reach	FRM asset description	Generic Type	Defence Length (km)	Annual Maintenance (£)	Present Value Cost (100yr Appraisal Period) (£)	Flood Cell PVC (£)
FC6-1	SR6-0	Grassed embankment (MU 9A east)	Embankment	3.06	£3,375	£100,624	£100,624
	SR6-1	Grassed embankment (MU 9B east)	Embankment	3.89	£4,291	£127,918	
FC6-2	SR6-2a	Grassed embankment (MU 9C east)	Embankment	0.66	£728	£21,703	£272,936
	SR6-2b	Grassed embankment (MU 9C east)	Embankment	1.99	£2,195	£65,439	
	SR6-2c	Grassed embankment (MU 9C east)	Embankment	1.76	£1,941	£57,876	
FC6-3	SR6-3	Grassed embankment (MU 9D east)	Embankment	2.39	£2,636	£78,592	£119,697
	SR6-4	Grassed embankment/high ground (MU 7A east)	Embankment	1.25	£1,379	£41,105	
	SR7-0	Grass embankment (clay core)	Embankment	3.36	£3,706	£110,490	
FC7-0	SR7-1	Severn Beach wave wall	Wall	1	£5,515	£164,419	£1,209,138
	SR7-2	Rock armoured embankment	Embankment	0.26	£287	£8,550	
	SR7-3	Wave wall	Wall	0.82	£4,522	£134,824	
	SR7-4	Railway embankment	Embankment	3.92	£4,324	£128,905	
	SR7-5	BPC defences, variable types (steep)	Armour	1.44	£7,942	£236,764	
	SR7-6	BPC defences, variable types (shallow)	Armour	0.71	£3,916	£116,738	
	SR7-7	BPC defences, variable types (steep)	Armour	1.36	£7,501	£223,610	
	SR7-8	Grass embankment (clay core)	Embankment	2.58	£2,846	£84,840	
FC8-0	SR8-0	Grass embankment (clay core), Portbury Wharf	Embankment	1.64	£1,809	£53,929	£53,929
FC8-1	SR8-1	Concrete wall/slope, Woodhill	Wall	0.44	£2,427	£72,344	£72,344
FC9-0	SR9-0	High vertical wall and ground	Wall	0.32	£1,765	£52,614	£1,732,320
	SR9-1	Steep wall with small recurve	Wall	0.46	£2,537	£75,633	
	SR9-2	Grass embankment (clay core)	Embankment	0.55	£607	£18,086	
	SR9-3	High ground and embankment	Embankment	0.43	£474	£14,140	
	SR9-4	Lower rock revetment, upper grassed embankment	Revetment	0.82	£4,522	£134,824	
	SR9-5	Lower asphalt revetment, upper grassed embankment	Revetment	1.36	£7,501	£223,610	
	SR9-6	Asphalt revetment with middle berm	Revetment	0.72	£3,971	£118,382	
	SR9-7	Lower rock revetment, upper grassed embankment	Revetment	1.32	£7,280	£217,033	
	SR9-CYRB	Congresbury Yeo right bank, Grass embankment (clay core)	Embankment	2.54	£2,802	£83,525	
	SR9-CYLB	Congresbury Yeo left bank, Grass embankment (clay core)	Embankment	2.2	£2,427	£72,344	
	SR9-8	Upper asphalt revetment, lower rock armour	Revetment	1.48	£8,162	£243,340	
	SR9-RBRB	River Banwell right bank, Grass embankment (clay core)	Embankment	0.71	£783	£23,348	
	SR9-RBLB	River Banwell left bank, Grass embankment (clay core)	Embankment	1.1	£1,213	£36,172	
	SR9-9LS	Wide sand dunes (Sand Bay)	N/A				
	SR9-9	Wide sand dunes (Sand Bay)	N/A				
FC10-0	SR9-10	New vertical concrete wall defences (W-S-M)	Wall	2.55	£14,063	£419,269	£835,578
	SR9-11	High level vegetated dunes	N/A				
	SR9-12	River Axe right bank, Grass embankment (clay core)	Embankment	2.87	£3,166	£94,377	
	SR9-13	River Axe left bank, Grass embankment (clay core)	Embankment	3.58	£3,949	£117,724	
	SR10-0	Rock armour with vertical wall	Wall	0.9	£4,964	£147,977	
	SR10-1	Gabion/masonry wall	Wall	0.31	£1,710	£50,970	
	SR10-2	Ancient wide dunes	N/A				
	SR10-3	Modern thin dunes	N/A				
	SR10-4	Ancient wide dunes	N/A				
	SR10-5	Concrete wall	Wall	0.26	£1,434	£42,749	
FC10-1	SR10-6	Revetment with 3.2m wave wall	Revetment	1.49	£8,217	£244,984	£389,344
	SR10-7	River Brue right bank, Brick wall	Wall	0.69	£3,805	£113,449	
	SR10-8	River Brue right bank, Grass embankment (clay core)	Embankment	0.71	£783	£23,348	
	SR10-9a	River Brue left bank, grassed embankment	Embankment	1.32	£1,456	£43,407	
	SR10-9b	River Brue left bank, grassed embankment	Embankment	0.82	£904	£26,965	
	SR10-9c	Huntspill, revetment/embankment	Revetment	1.94	£10,699	£318,973	
	SR10-RPRBa	River Parrett right bank, Grass embankment (clay core)	Embankment	2.27	£2,504	£74,646	
	SR10-RPRBb	River Parrett right bank, Grass embankment (clay core)	Embankment	2.99	£3,298	£98,323	
FC10-2	SR10-RPRBc	River Parrett right bank, Grass embankment (clay core)	Embankment	7.3	£8,052	£240,052	£413,021
	SR11-RPLB	River Parrett left bank, grassed embankment	Embankment	6.32	£6,971	£207,826	
	SR11-0	Low bank on ground	Embankment	2	£2,206	£65,768	
	SR11-1	Informal embankment	Embankment	1.64	£1,809	£53,929	
	SR11-2	Shingle bank	N/A				
	SR11-3	Grass embankment (clay core)	Rock Armour	1.59	£8,769	£261,426	
	SR11-4	Grass embankment (clay core) with fronting rock armour	Rock Armour	1	£5,515	£164,419	
FC11-0	SR11-5	Grass embankment (clay core) with fronting rock armour	Rock Armour	0.68	£3,750	£111,805	£865,173



Defence Length:		SR1-P										
Flood Cell:		FC1-0										
Defence Length (km):		0.44										
0-19-yr Discount Factor:		14.70983742										
20-49-yr Discount Factor:		9.785468373										
50-99-yr Discount Factor:		5.317239543										
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)
1	Wave recurve wall	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.35	£69	£23	£22	£69	£37	£221	0.203180599	£44.84
			99	0.50	£139	£23	£39	£121	£64	£386	0.052088473	£20.10
									Reactive 5 year Maintenance 0-19-yr (£k):	£0.49		
									Reactive 5 year Maintenance 20-49-yr (£k):	£0.49		
									Reactive 5 year Maintenance 50-99-yr (£k):	£0.49		
									Maintenance PVc:	£14.47	Total PVc:	£79.41
2	Wave recurve wall	1.0%	0	0.05	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.10	£69	£23	£22	£69	£37	£221	0.52015569	£114.80
			49	0.25	£69	£23	£22	£69	£37	£221	0.203180599	£44.84
			99	0.50	£139	£23	£39	£121	£64	£386	0.052088473	£20.10
									Reactive 5 year Maintenance 0-19-yr (£k):	£0.49		
									Reactive 5 year Maintenance 20-49-yr (£k):	£0.49		
									Reactive 5 year Maintenance 50-99-yr (£k):	£0.49		
									Maintenance PVc:	£14.47	Total PVc:	£194.21
3	Wave recurve wall	0.5%	0	0.20	£69	£23	£22	£69	£37	£221	1	£220.69
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.25	£69	£23	£22	£69	£37	£221	0.203180599	£44.84
			99	0.20	£69	£23	£22	£69	£37	£221	0.052088473	£11.50
									Reactive 5 year Maintenance 0-19-yr (£k):	£0.49		
									Reactive 5 year Maintenance 20-49-yr (£k):	£0.49		
									Reactive 5 year Maintenance 50-99-yr (£k):	£0.49		
									Maintenance PVc:	£14.47	Total PVc:	£291.50
4	Wave recurve wall	0.1%	0	0.45	£139	£23	£39	£121	£64	£386	1	£385.93
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.20	£69	£23	£22	£69	£37	£221	0.203180599	£44.84
			99	0.50	£139	£23	£39	£121	£64	£386	0.052088473	£20.10
									Reactive 5 year Maintenance 0-19-yr (£k):	£0.49		
									Reactive 5 year Maintenance 20-49-yr (£k):	£0.49		
									Reactive 5 year Maintenance 50-99-yr (£k):	£0.49		
									Maintenance PVc:	£14.47	Total PVc:	£465.34

Defence Length:		SR1-CF									
Flood Cell:		FC1-0									
Defence Length (km):		5.3									
0-19-yr Discount Factor:		14.70983742									
20-49-yr Discount Factor:		9.785468373									
50-99-yr Discount Factor:		5.317239543									



Defence Length:		SR1-RRWB											
Flood Cell:		FC1-0											
Defence Length (km):		1.3											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVC (£k)	
1	Rock armour of front face	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89	
									Annual Maintenance 0-19-yr (£k):	£7.17			
2	Rock armour of front face	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£452	£245	£335	£619	£330	£1,981	0.052088473	£103.17	
									Annual Maintenance 0-19-yr (£k):	£7.17			
3	Rock armour of front face	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.25	£452	£245	£335	£619	£330	£1,981	0.052088473	£103.17	
									Annual Maintenance 0-19-yr (£k):	£7.17			
4	Rock armour of front face	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.25	£452	£245	£335	£619	£330	£1,981	0.052088473	£103.17	
									Annual Maintenance 0-19-yr (£k):	£7.17			
									Annual Maintenance 20-49-yr (£k):	£7.17			
									Annual Maintenance 50-99-yr (£k):	£7.17			
									Maintenance PVC:	£213.74			
											Total PVC:	£511.56	



Defence Length:		SR1-RRWB1											
Flood Cell:		FC1-0											
Defence Length (km):		1.65											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)		Total (£k)	Discount Factor	Pvc (£k)
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.35	£257	£87	£83	£256	£136	£819	0.052088473	£42.66	
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£1.82 £1.82 £1.82 £54.26			
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.35	£257	£87	£83	£256	£136	£819	0.052088473	£42.66	
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£1.82 £1.82 £1.82 £54.26	Total Pvc:	£96.92	
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.15	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.35	£257	£87	£83	£256	£136	£819	0.052088473	£42.66	
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£1.82 £1.82 £1.82 £54.26	Total Pvc:	£96.92	
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£257	£87	£83	£256	£136	£819	0.203180599	£166.39	
			99	0.35	£257	£87	£83	£256	£136	£819	0.052088473	£42.66	
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£1.82 £1.82 £1.82 £54.26	Total Pvc:	£263.31	
5	Free standing masonry wall	2.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.20	£257	£87	£83	£256	£136	£819	0.052088473	£42.66	
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£9.10 £9.10 £9.10 £271.29	Total Pvc:	£313.95	
6	Free standing masonry wall	1.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.30	£1,007	£87	£263	£814	£434	£2,606	0.052088473	£135.76	
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£9.10 £9.10 £9.10 £271.29	Total Pvc:	£407.05	
7	Free standing masonry wall	0.5%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.15	£504	£87	£142	£440	£235	£1,407	0.203180599	£285.90	
			99	0.35	£504	£87	£142	£440	£235	£1,407	0.052088473	£73.30	
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£9.10 £9.10 £9.10 £271.29	Total Pvc:	£630.49	
8	Free standing masonry wall	0.1%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.30	£504	£87	£142	£440	£235	£1,407	0.203180599	£285.90	
			99	0.35	£504	£87	£142	£440	£235	£1,407	0.052088473	£73.30	
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£9.10 £9.10 £9.10 £271.29	Total Pvc:	£630.49	



Defence Length:		SR1-RRWB2															
Flood Cell:		FC1-0															
Defence Length (km):		0.2															
0-19-yr Discount Factor:		14.70983742															
20-49-yr Discount Factor:		9.785468373															
50-99-yr Discount Factor:		5.317239543															
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)		Total (£k)	Discount Factor	Pvc (£k)				
1	Improved embankment	2.0%	0	0.50	£122	£11	£32	£99	£53		£316	1	£316.18				
			19	0.10	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.25	£61	£11	£17	£53	£28		£171	0.203180599	£34.68				
			99	0.35	£61	£11	£17	£53	£28		£171	0.052088473	£8.89				
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£0.22 £0.22 £0.22 £6.58						
												Total Pvc:	£366.33				
2	Improved embankment	1.0%	0	0.60	£183	£11	£47	£144	£77		£462	1	£461.66				
			19	0.10	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.25	£61	£11	£17	£53	£28		£171	0.203180599	£34.68				
			99	0.35	£61	£11	£17	£53	£28		£171	0.052088473	£8.89				
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£0.22 £0.22 £0.22 £6.58						
												Total Pvc:	£511.81				
3	Improved embankment	0.5%	0	0.80	£244	£11	£61	£190	£101		£607	1	£607.14				
			19	0.10	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.25	£61	£11	£17	£53	£28		£171	0.203180599	£34.68				
			99	0.35	£61	£11	£17	£53	£28		£171	0.052088473	£8.89				
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£0.22 £0.22 £0.22 £6.58						
												Total Pvc:	£657.29				
4	Improved embankment	0.1%	0	1.00	£244	£11	£61	£190	£101		£607	1	£607.14				
			19	0.10	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.25	£122	£11	£32	£99	£53		£316	0.203180599	£64.24				
			99	0.35	£122	£11	£32	£99	£53		£316	0.052088473	£16.47				
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£0.22 £0.22 £0.22 £6.58						
												Total Pvc:	£694.43				
5	Free standing masonry wall	2.0%	0	0.50	£122	£11	£32	£99	£53		£316	1	£315.92				
			19	0.10	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.25	£61	£11	£17	£53	£28		£171	0.203180599	£34.66				
			99	0.35	£61	£11	£17	£53	£28		£171	0.052088473	£8.88				
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£1.10 £1.10 £1.10 £32.88						
												Total Pvc:	£392.34				
6	Free standing masonry wall	1.0%	0	0.60	£183	£11	£0	£116	£62		£372	1	£371.99				
			19	0.10	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.25	£61	£11	£0	£43	£23		£138	0.203180599	£27.95				
			99	0.35	£61	£11	£17	£53	£28		£171	0.052088473	£8.88				
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£1.10 £1.10 £1.10 £32.88						
												Total Pvc:	£441.71				
7	Free standing masonry wall	0.5%	0	0.80	£244	£11	£0	£153	£82		£489	1	£489.21				
			19	0.10	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.25	£61	£11	£17	£53	£28		£171	0.203180599	£34.66				
			99	0.35	£61	£11	£17	£53	£28		£171	0.052088473	£8.88				
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£1.10 £1.10 £1.10 £32.88						
												Total Pvc:	£565.63				
8	Free standing masonry wall	0.1%	0	1.00	£244	£11	£0	£153	£82		£489	1	£489.21				
			19	0.10	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.25	£122	£11	£32	£99	£53		£316	0.203180599	£64.19				
			99	0.35	£122	£11	£32	£99	£53		£316	0.052088473	£16.46				
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£1.10 £1.10 £1.10 £32.88						
												Total Pvc:	£602.74				



Defence Length:		SR1-RREB																
Flood Cell:		FC1-1																
Defence Length (km):		0.99																
0-19-yr Discount Factor:		14.70983742																
20-49-yr Discount Factor:		9.785468373																
50-99-yr Discount Factor:		5.317239543																
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)		Total (£k)	Discount Factor	Pvc (£k)					
1	Improved embankment	2.0%	0	0.06	£0	£0	£0	£0	£0		£0	1	£0.00					
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.25	£154	£52	£124	£124	£66	£396	0.203180599	£80.51						
			99	0.35	£154	£52	£0	£124	£66	£396	0.052088473	£20.64						
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£1.09 £1.09 £1.09 £32.55	Total Pvc:		£133.71										
2	Improved embankment	1.0%	0	0.16	£154	£52	£0	£124	£66		£396	1	£396.26					
			19	0.05	£0	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.25	£154	£52	£0	£124	£66	£396	0.203180599	£80.51						
			99	0.35	£154	£52	£0	£124	£66	£396	0.052088473	£20.64						
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£1.09 £1.09 £1.09 £32.55	Total Pvc:		£529.97										
3	Improved embankment	0.5%	0	0.26	£154	£52	£0	£124	£66		£396	1	£396.26					
			19	0.05	£0	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.25	£154	£52	£0	£124	£66	£396	0.203180599	£80.51						
			99	0.35	£154	£52	£0	£124	£66	£396	0.052088473	£20.64						
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£1.09 £1.09 £1.09 £32.55	Total Pvc:		£529.97										
4	Improved embankment	0.1%	0	0.51	£308	£52	£0	£216	£115		£692	1	£691.88					
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.25	£154	£52	£0	£124	£66	£396	0.203180599	£80.51						
			99	0.35	£154	£52	£0	£124	£66	£396	0.052088473	£20.64						
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£1.09 £1.09 £1.09 £32.55	Total Pvc:		£825.59										
5	Free standing masonry wall	2.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00					
			19	0.05	£0	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.25	£302	£52	£0	£213	£113	£681	0.203180599	£138.34						
			99	0.35	£302	£52	£0	£213	£113	£681	0.052088473	£35.47						
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£1.09 £1.09 £5.46 £55.78	Total Pvc:		£229.59										
6	Free standing masonry wall	1.0%	0	0.06	£0	£0	£0	£0	£0		£0	1	£0.00					
			19	0.05	£0	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.20	£302	£52	£0	£213	£113	£681	0.203180599	£138.34						
			99	0.35	£302	£52	£0	£213	£113	£681	0.052088473	£35.47						
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£5.46 £5.46 £5.46 £162.77	Total Pvc:		£336.58										
7	Free standing masonry wall	0.5%	0	0.21	£302	£52	£0	£213	£113		£681	1	£680.88					
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.25	£302	£52	£0	£213	£113	£681	0.203180599	£138.34						
			99	0.35	£302	£52	£0	£213	£113	£681	0.052088473	£35.47						
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£5.46 £5.46 £5.46 £162.77	Total Pvc:		£1,017.46										
8	Free standing masonry wall	0.1%	0	0.36	£604	£52	£0	£394	£210		£1,261.12	1	£1,261.12					
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.25	£302	£52	£0	£213	£113	£681	0.203180599	£138.34						
			99	0.35	£302	£52	£0	£213	£113	£681	0.052088473	£35.47						
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:		£5.46 £5.46 £5.46 £162.77	Total Pvc:		£1,597.70										



Defence Length:		SR1-RREB																	
Flood Cell:		FC1-1																	
Defence Length (km):		0.5																	
0-19-yr Discount Factor:		14.70983742																	
20-49-yr Discount Factor:		9.785468373																	
50-99-yr Discount Factor:		5.317239543																	
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)			Total (£k)	Discount Factor		Pvc (£k)				
1	Improved embankment	2.0%	0	0.06	£0	£0	£0	£0	£0			£0	1		£0.00				
			19	0.10	£0	£0	£0	£0	£0	£0	£0	£0	0.52015569		£0.00				
			49	0.25	£78	£26	£0	£63	£33	£200	£0.203180599	£40.66							
			99	0.35	£78	£26	£0	£63	£33	£200	0.052088473	£10.42							
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:			£0.55 £0.55 £0.55 £16.44	Total Pvc:		£67.53										
2	Improved embankment	1.0%	0	0.16	£78	£26	£0	£63	£33			£200	1		£200.13				
			19	0.05	£0	£0	£0	£0	£0	£0	£0	£0	0.52015569		£0.00				
			49	0.25	£78	£26	£0	£63	£33	£200	0.203180599	£40.66							
			99	0.35	£78	£26	£0	£63	£33	£200	0.052088473	£10.42							
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:			£0.55 £0.55 £0.55 £16.44	Total Pvc:		£267.66										
3	Improved embankment	0.5%	0	0.26	£78	£26	£0	£63	£33			£200	1		£200.13				
			19	0.05	£0	£0	£0	£0	£0	£0	£0	£0	0.52015569		£0.00				
			49	0.25	£78	£26	£0	£63	£33	£200	0.203180599	£40.66							
			99	0.35	£78	£26	£0	£63	£33	£200	0.052088473	£10.42							
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:			£0.55 £0.55 £0.55 £16.44	Total Pvc:		£267.66										
4	Improved embankment	0.1%	0	0.51	£156	£26	£0	£109	£58			£349	1		£349.44				
			19	0.10	£0	£0	£0	£0	£0	£0	£0	£0	0.52015569		£0.00				
			49	0.25	£78	£26	£0	£63	£33	£200	0.203180599	£40.66							
			99	0.35	£78	£26	£0	£63	£33	£200	0.052088473	£10.42							
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:			£0.55 £0.55 £0.55 £16.44	Total Pvc:		£416.97										
5	Free standing masonry wall	2.0%	0	0.00	£0	£0	£0	£0	£0			£0	1		£0.00				
			19	0.05	£0	£0	£0	£0	£0	£0	£0	£0	0.52015569		£0.00				
			49	0.25	£153	£26	£0	£107	£57	£344	0.203180599	£69.87							
			99	0.35	£153	£26	£0	£107	£57	£344	0.052088473	£17.91							
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:			£0.55 £0.55 £2.76 £28.17	Total Pvc:		£115.95										
6	Free standing masonry wall	1.0%	0	0.06	£0	£0	£0	£0	£0			£0	1		£0.00				
			19	0.05	£0	£0	£0	£0	£0	£0	£0	£0	0.52015569		£0.00				
			49	0.20	£153	£26	£0	£107	£57	£344	0.203180599	£69.87							
			99	0.35	£153	£26	£0	£107	£57	£344	0.052088473	£17.91							
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:			£2.76 £2.76 £2.76 £82.21	Total Pvc:		£169.99										
7	Free standing masonry wall	0.5%	0	0.21	£153	£26	£0	£107	£57			£344	1		£343.88				
			19	0.10	£0	£0	£0	£0	£0	£0	£0	£0	0.52015569		£0.00				
			49	0.25	£153	£26	£0	£107	£57	£344	0.203180599	£69.87							
			99	0.35	£153	£26	£0	£107	£57	£344	0.052088473	£17.91							
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:			£2.76 £2.76 £2.76 £82.21	Total Pvc:		£513.87										
8	Free standing masonry wall	0.1%	0	0.36	£305	£26	£0	£199	£106			£637	1		£636.93				
			19	0.10	£0	£0	£0	£0	£0	£0	£0	£0	0.52015569		£0.00				
			49	0.25	£153	£26	£0	£107	£57	£344	0.203180599	£69.87							
			99	0.35	£153	£26	£0	£107	£57	£344	0.052088473	£17.91							
			Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:			£2.76 £2.76 £2.76 £82.21	Total Pvc:		£806.92										

[illegible]



Defence Length:		SR1-1											
Flood Cell:		FC1-1											
Defence Length (km):		1.78											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVC (£k)	
1	Maintenance of 4 polder fields, proactive maintenance, improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £157.19	
2	Maintenance of 4 polder fields, proactive maintenance, improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £157.19	
3	Maintenance of 4 polder fields, proactive maintenance, improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.30	£277	£94	£89	£276	£147	£883	0.052088473	£46.02	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £203.21	
4	Maintenance of 4 polder fields, proactive maintenance, improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.50	£1,153	£94	£299	£928	£495	£2,971	0.052088473	£154.73	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £311.92	
5	Maintenance of 4 polder fields, proactive maintenance, concrete revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	2.90	£4,859	£94	£1,189	£3,685	£1,966	£11,794	0.052088473	£614.31	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £771.49	
6	Maintenance of 4 polder fields, proactive maintenance, concrete revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	2.90	£4,859	£94	£1,189	£3,685	£1,966	£11,794	0.052088473	£614.31	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £771.49	
7	Maintenance of 4 polder fields, proactive maintenance, concrete revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	2.90	£4,859	£94	£1,189	£3,685	£1,966	£11,794	0.052088473	£614.31	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £771.49	
8	Maintenance of 4 polder fields, proactive maintenance, concrete revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	2.90	£4,859	£94	£1,189	£3,685	£1,966	£11,794	0.052088473	£614.31	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £771.49	
9	Maintenance of 4 polder fields, proactive maintenance, rock armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	2.90	£6,803	£94	£1,655	£5,132	£2,737	£16,421	0.052088473	£855.35	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £1,012.54	
10	Maintenance of 4 polder fields, proactive maintenance, rock armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	2.90	£6,803	£94	£1,655	£5,132	£2,737	£16,421	0.052088473	£855.35	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £1,012.54	
11	Maintenance of 4 polder fields, proactive maintenance, rock armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	2.90	£6,803	£94	£1,655	£5,132	£2,737	£16,421	0.052088473	£855.35	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £1,012.54	
12	Maintenance of 4 polder fields, proactive maintenance, rock armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	2.90	£6,803	£94	£1,655	£5,132	£2,737	£16,421	0.052088473	£855.35	
									Annual Maintenance (£k): Maintenance PVc:	£5.27 £157.19		Total PVC: £1,012.54	

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Defence Length:		SR1-4																	
Flood Cell:		FC1-1																	
Defence Length (km):		1.71																	
100-yr Discount Factor:		29.813																	
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)							
1	Concrete revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£497.69							
2	Concrete revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£497.69							
3	Concrete revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£497.69							
4	Concrete revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£497.69							
5	Rock armour	2.0%	0	1.00	£2,377	£91	£592	£1,836	£979	£5,874	1	£5,873.68							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£6,371.37							
6	Rock armour	1.0%	0	1.00	£2,377	£91	£592	£1,836	£979	£5,874	1	£5,873.68							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£6,371.37							
7	Rock armour	0.5%	0	1.00	£2,377	£91	£592	£1,836	£979	£5,874	1	£5,873.68							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£6,371.37							
8	Rock armour	0.1%	0	1.00	£2,377	£91	£592	£1,836	£979	£5,874	1	£5,873.68							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£6,371.37							
9	Secondary embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	3.20	£3,810	£251	£0	£2,436	£1,299	£7,796	0.052088473	£406.06							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£881.87							
10	Secondary embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	3.20	£3,810	£251	£0	£2,436	£1,299	£7,796	0.052088473	£406.06							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£881.87							
11	Secondary embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	3.40	£4,330	£251	£0	£2,748	£1,466	£8,795	0.052088473	£458.10							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£933.91							
12	Secondary embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	3.65	£4,850	£251	£0	£3,061	£1,632	£9,794	0.052088473	£510.14							
Annual Maintenance (£k):									£9.43										
Maintenance Pvc:									£281.16		Total Pvc:	£985.95							



Defence Length:		SR1-5											
Flood Cell:		FC1-1											
Defence Length (km):		0.78											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVC (£k)	
5	Concrete revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £128.25	
6	Concrete revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £128.25	
7	Concrete revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £128.25	
8	Concrete revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £128.25	
9	Rock armour	2.0%	0	1.00	£1,084	£41	£270	£837	£447	£2,679	1	£2,679.22	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £2,807.47	
10	Rock armour	1.0%	0	1.00	£1,084	£41	£270	£837	£447	£2,679	1	£2,679.22	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £2,807.47	
11	Rock armour	0.5%	0	1.00	£1,084	£41	£270	£837	£447	£2,679	1	£2,679.22	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £2,807.47	
12	Rock armour	0.1%	0	1.00	£1,084	£41	£270	£837	£447	£2,679	1	£2,679.22	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £2,807.47	
13	Secondary embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	3.25	£1,905	£37	£0	£1,165	£621	£3,728	0.052088473	£194.20	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £322.45	
14	Secondary embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	3.30	£1,905	£37	£0	£1,165	£621	£3,728	0.052088473	£194.20	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £322.45	
15	Secondary embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	3.35	£2,165	£37	£0	£1,321	£705	£4,228	0.052088473	£220.22	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £348.47	
16	Secondary embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	3.65	£2,425	£37	£0	£1,477	£788	£4,727	0.052088473	£246.25	
									Annual Maintenance (£k): Maintenance PVc:	£4.30 £128.25		Total PVC: £374.49	



Defence Length:		SR1-6													
Flood Cell:		FC1-1													
Defence Length (km):		3.33													
100-yr Discount Factor:		29.813													
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVC (£k)			
1	Improved earth embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13			
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85			
			99	0.00	£0	£353	£0	£212	£113	£677	0.052088473	£35.28			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£301.76			
2	Improved earth embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13			
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85			
			99	0.00	£0	£353	£0	£212	£113	£677	0.052088473	£35.28			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£301.76			
3	Improved earth embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13			
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85			
			99	0.00	£0	£353	£0	£212	£113	£677	0.052088473	£35.28			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£301.76			
4	Improved earth embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13			
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85			
			99	0.30	£518	£353	£0	£522	£279	£1,672	0.052088473	£87.08			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£353.56			
5	Concrete revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28			
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37			
			99	3.40	£10,744	£353	£2,663	£8,256	£4,403	£26,418	0.052088473	£1,376.10			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,680.25			
6	Concrete revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28			
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37			
			99	3.40	£10,744	£353	£2,663	£8,256	£4,403	£26,418	0.052088473	£1,376.10			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,680.25			
7	Concrete revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28			
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37			
			99	3.70	£11,570	£353	£2,861	£8,871	£4,731	£28,386	0.052088473	£1,478.59			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,782.74			
8	Concrete revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28			
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37			
			99	3.70	£11,570	£353	£2,861	£8,871	£4,731	£28,386	0.052088473	£1,478.59			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,782.74			
9	Rock armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28			
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37			
			99	3.70	£12,727	£353	£3,139	£9,731	£5,190	£31,141	0.052088473	£1,622.07			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,926.22			
10	Rock armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28			
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37			
			99	3.70	£12,727	£353	£3,139	£9,731	£5,190	£31,141	0.052088473	£1,622.07			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,926.22			
11	Rock armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28			
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37			
			99	3.70	£12,727	£353	£3,139	£9,731	£5,190	£31,141	0.052088473	£1,622.07			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,926.22			
12	Rock armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28			
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37			
			99	3.70	£12,727	£353	£3,139	£9,731	£5,190	£31,141	0.052088473	£1,622.07			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,926.22			
13	Secondary embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13			
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85			
			99	3.20	£7,347	£319	£0	£4,600	£2,453	£14,720	0.052088473	£766.72			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,033.20			
14	Secondary embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13			
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85			
			99	3.20	£7,347	£319	£0	£4,600	£2,453	£14,720	0.052088473	£766.72			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,033.20			
15	Secondary embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13			
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85			
			99	3.40	£8,351	£319	£0	£5,202	£2,774	£16,646	0.052088473	£867.09			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,133.57			
16	Secondary embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13			
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85			
			99	3.65	£9,354	£319	£0	£5,804	£3,096	£18,573	0.052088473	£967.45			
									Annual Maintenance (£k):	£3.67					
Maintenance PVC:										£109.50	Total PVC:	£1,233.20			



Defence Length:		SR1-REWB															
Flood Cell:		FC1-1															
Defence Length (km):		1.8															
100-yr Discount Factor:		29.813															
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVC (£k)					
1	Improved earth embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£0	£0	£0	£0	0.052088473	£0.00						
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£59.19					
2	Improved earth embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£0	£0	£0	£0	0.052088473	£0.00						
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£59.19					
3	Improved earth embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£0	£0	£0	£0	0.052088473	£0.00						
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£59.19					
4	Improved earth embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.15	£280	£95	£0	£225	£120	£720	0.052088473	£37.53					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£96.72					
5	Concrete revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.45	£4,467	£95	£1,095	£3,395	£1,810	£10,862	0.052088473	£565.81					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£625.00					
6	Concrete revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.45	£4,467	£95	£1,095	£3,395	£1,810	£10,862	0.052088473	£565.81					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£625.00					
7	Concrete revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.45	£4,467	£95	£1,095	£3,395	£1,810	£10,862	0.052088473	£565.81					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£625.00					
8	Concrete revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.70	£4,914	£95	£1,202	£3,727	£1,988	£11,926	0.052088473	£621.21					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£680.40					
9	Rock armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.45	£6,254	£95	£1,524	£4,724	£2,519	£15,117	0.052088473	£787.41					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£846.60					
10	Rock armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.45	£6,254	£95	£1,524	£4,724	£2,519	£15,117	0.052088473	£787.41					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£846.60					
11	Rock armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.45	£6,254	£95	£1,524	£4,724	£2,519	£15,117	0.052088473	£787.41					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£846.60					
12	Rock armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.70	£6,880	£95	£1,674	£5,189	£2,768	£16,606	0.052088473	£864.96					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£924.16					
13	Secondary embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	3.20	£3,810	£74	£0	£2,330	£1,243	£7,457	0.052088473	£388.41					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£447.60					
14	Secondary embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	3.20	£3,810	£74	£0	£2,330	£1,243	£7,457	0.052088473	£388.41					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£447.60					
15	Secondary embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	3.30	£3,810	£74	£0	£2,330	£1,243	£7,457	0.052088473	£388.41					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£447.60					
16	Secondary embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	3.65	£4,850	£74	£0	£2,955	£1,576	£9,455	0.052088473	£492.49					
									Annual Maintenance (£k):	£1.99							
Maintenance PVC:										£59.19	Total PVC:	£551.68					



Defence Length:		SR1-REEB															
Flood Cell:		FC1-2															
Defence Length (km):		0.83															
100-yr Discount Factor:		29.813															
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)					
1	Improved earth embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.15	£129	£44	£0	£104	£55	£332	0.052088473	£17.30					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£44.60						
2	Improved earth embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.30	£129	£44	£0	£104	£55	£332	0.052088473	£17.30					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£44.60						
3	Improved earth embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.40	£258	£44	£0	£181	£97	£580	0.052088473	£30.21					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£57.51						
4	Improved earth embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.25	£129	£44	£0	£104	£55	£332	0.203180599	£67.50					
			99	0.40	£258	£44	£0	£181	£97	£580	0.052088473	£30.21					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£125.01						
5	Concrete revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.25	£1,854	£44	£455	£1,412	£753	£4,518	0.052088473	£235.36					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£262.65						
6	Concrete revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.35	£2,060	£44	£505	£1,565	£835	£5,009	0.052088473	£260.90					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£288.20						
7	Concrete revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.45	£2,060	£44	£505	£1,565	£835	£5,009	0.052088473	£260.90					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£288.20						
8	Concrete revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.70	£2,266	£44	£554	£1,719	£917	£5,499	0.052088473	£286.45					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£313.74						
9	Rock armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.25	£2,595	£44	£633	£1,964	£1,047	£6,284	0.052088473	£327.32					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£354.61						
10	Rock armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.35	£2,595	£44	£633	£1,964	£1,047	£6,284	0.052088473	£327.32					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£354.61						
11	Rock armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.45	£2,884	£44	£703	£2,178	£1,162	£6,970	0.052088473	£363.08					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£390.38						
12	Rock armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	2.70	£3,172	£44	£772	£2,393	£1,276	£7,657	0.052088473	£398.84					
									Annual Maintenance (£k):	£0.92							
								Maintenance PVc:	£27.29	Total PVc:	£426.14						



Defence Length:		SR1-RUWB1											
Flood Cell:		FC1-2											
Defence Length (km):		3.64											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Improved earth embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.05	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£566	£193	£182	£565	£301	£1,807	0.203180599	£367.07	
			99	0.35	£1,132	£193	£318	£986	£526	£3,154	0.052088473	£164.31	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£4.01				
								Annual Maintenance 50-99-yr (£k):	£4.01				
								Maintenance PVc:	£119.70	Total PVc:	£651.08		
2	Improved earth embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£566	£193	£182	£565	£301	£1,807	0.203180599	£367.07	
			99	0.40	£1,132	£193	£318	£986	£526	£3,154	0.052088473	£164.31	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£4.01				
								Annual Maintenance 50-99-yr (£k):	£4.01				
								Maintenance PVc:	£119.70	Total PVc:	£651.08		
3	Improved earth embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.05	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£566	£193	£182	£565	£301	£1,807	0.203180599	£367.07	
			99	0.45	£1,132	£193	£318	£986	£526	£3,154	0.052088473	£164.31	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£4.01				
								Annual Maintenance 50-99-yr (£k):	£4.01				
								Maintenance PVc:	£119.70	Total PVc:	£651.08		
4	Improved earth embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£566	£193	£182	£565	£301	£1,807	0.203180599	£367.07	
			99	0.40	£1,132	£193	£318	£986	£526	£3,154	0.052088473	£164.31	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£4.01				
								Annual Maintenance 50-99-yr (£k):	£4.01				
								Maintenance PVc:	£119.70	Total PVc:	£651.08		
5	Concrete revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	2.15	£8,130	£193	£3,995	£7,391	£3,942	£23,651	0.203180599	£4,805.39	
			99	0.35	£1,807	£193	£960	£1,776	£947	£5,682	0.052088473	£295.95	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£4.01				
								Annual Maintenance 50-99-yr (£k):	£20.07				
								Maintenance PVc:	£205.09	Total PVc:	£5,306.44		
6	Concrete revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	2.25	£8,130	£193	£3,995	£7,391	£3,942	£23,651	0.203180599	£4,805.39	
			99	0.35	£1,807	£193	£960	£1,776	£947	£5,682	0.052088473	£295.95	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£4.01				
								Annual Maintenance 50-99-yr (£k):	£20.07				
								Maintenance PVc:	£205.09	Total PVc:	£5,306.44		
7	Concrete revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	2.35	£8,130	£193	£3,995	£7,391	£3,942	£23,651	0.203180599	£4,805.39	
			99	0.60	£2,710	£193	£1,393	£2,578	£1,375	£8,249	0.052088473	£429.66	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£20.07				
								Annual Maintenance 50-99-yr (£k):	£20.07				
								Maintenance PVc:	£362.25	Total PVc:	£5,597.30		
8	Concrete revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.05	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	2.60	£9,034	£193	£4,429	£8,193	£4,370	£26,218	0.203180599	£5,326.96	
			99	0.35	£1,807	£193	£960	£1,776	£947	£5,682	0.052088473	£295.95	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£20.07				
								Annual Maintenance 50-99-yr (£k):	£20.07				
								Maintenance PVc:	£362.25	Total PVc:	£5,985.16		
9	Rock armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	2.15	£11,382	£193	£5,556	£10,279	£5,482	£32,892	0.203180599	£6,683.05	
			99	0.35	£2,529	£193	£1,307	£2,417	£1,289	£7,735	0.052088473	£402.92	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£4.01				
								Annual Maintenance 50-99-yr (£k):	£20.07				
								Maintenance PVc:	£205.09	Total PVc:	£7,291.06		
10	Rock armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	2.25	£11,382	£193	£5,556	£10,279	£5,482	£32,892	0.203180599	£6,683.05	
			99	0.35	£2,529	£193	£1,307	£2,417	£1,289	£7,735	0.052088473	£402.92	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£4.01				
								Annual Maintenance 50-99-yr (£k):	£20.07				
								Maintenance PVc:	£205.09	Total PVc:	£7,291.06		
11	Rock armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.10	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	2.35	£11,382	£193	£5,556	£10,279	£5,482	£32,892	0.203180599	£6,683.05	
			99	0.60	£3,794	£193	£1,914	£3,540	£1,888	£11,329	0.052088473	£590.12	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£20.07				
								Annual Maintenance 50-99-yr (£k):	£20.07				
								Maintenance PVc:	£362.25	Total PVc:	£7,635.41		
12	Rock armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.05	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	2.60	£12,647	£193	£6,163	£11,402	£6,081	£36,486	0.203180599	£7,413.24	
			99	0.35	£2,529	£193	£1,307	£2,417	£1,289	£7,735	0.052088473	£402.92	
								Annual Maintenance 0-19-yr (£k):	£4.01				
								Annual Maintenance 20-49-yr (£k):	£20.07				
								Annual Maintenance 50-99-yr (£k):	£20.07				
								Maintenance PVc:	£362.25	Total PVc:	£8,178.12		



Defence Length:		SR1-RUWB2										
Flood Cell:		FC1-2										
Defence Length (km):		1.12										
100-yr Discount Factor:		29.813										
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)
1	Free standing masonry wall	2.0%	0	0.15	£342	£59	£96	£298	£159	£955	1	£955.15
			19	0.05	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£342	£59	£96	£298	£159	£955	0.203180599	£194.07
			99	0.35	£684	£59	£178	£553	£295	£1,769	0.052088473	£92.15
									Annual Maintenance (£k):	£6.18		
						Maintenance PVc:	£184.15	Total PVc:	£1,425.53			
2	Free standing masonry wall	1.0%	0	0.25	£684	£59	£178	£553	£295	£1,769	1	£1,769.13
			19	0.05	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£342	£59	£96	£298	£159	£955	0.203180599	£194.07
			99	0.35	£684	£59	£178	£553	£295	£1,769	0.052088473	£92.15
									Annual Maintenance (£k):	£6.18		
						Maintenance PVc:	£184.15	Total PVc:	£2,239.50			
3	Free standing masonry wall	0.5%	0	0.35	£684	£59	£178	£553	£295	£1,769	1	£1,769.13
			19	0.10	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.20	£342	£59	£96	£298	£159	£955	0.203180599	£194.07
			99	0.35	£684	£59	£178	£553	£295	£1,769	0.052088473	£92.15
									Annual Maintenance (£k):	£6.18		
						Maintenance PVc:	£184.15	Total PVc:	£2,239.50			
4	Free standing masonry wall	0.1%	0	0.60	£1,026	£59	£260	£807	£431	£2,583	1	£2,583.11
			19	0.05	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£342	£59	£96	£298	£159	£955	0.203180599	£194.07
			99	0.35	£684	£59	£178	£553	£295	£1,769	0.052088473	£92.15
									Annual Maintenance (£k):	£6.18		
						Maintenance PVc:	£184.15	Total PVc:	£3,053.48			
5	New earth embankment then improve	2.0%	0	0.30	£342	£59	£96	£299	£159	£956	1	£955.88
			19	0.05	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£174	£59	£56	£174	£93	£556	0.203180599	£112.95
			99	0.35	£174	£59	£56	£174	£93	£556	0.052088473	£28.96
									Annual Maintenance (£k):	£1.24		
						Maintenance PVc:	£36.83	Total PVc:	£1,134.61			
6	New earth embankment then improve	1.0%	0	0.35	£684	£59	£178	£553	£295	£1,771	1	£1,770.58
			19	0.10	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£174	£59	£56	£174	£93	£556	0.203180599	£112.95
			99	0.40	£348	£59	£98	£303	£162	£971	0.052088473	£50.56
									Annual Maintenance (£k):	£1.24		
						Maintenance PVc:	£36.83	Total PVc:	£1,970.92			
7	New earth embankment then improve	0.5%	0	0.45	£684	£59	£178	£553	£295	£1,771	1	£1,770.58
			19	0.05	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£174	£59	£56	£174	£93	£556	0.203180599	£112.95
			99	0.45	£348	£59	£98	£303	£162	£971	0.052088473	£50.56
									Annual Maintenance (£k):	£1.24		
						Maintenance PVc:	£36.83	Total PVc:	£1,970.92			
8	New earth embankment then improve	0.1%	0	0.70	£1,369	£59	£343	£1,062	£567	£3,400	1	£3,399.99
			19	0.10	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.25	£174	£59	£56	£174	£93	£556	0.203180599	£112.95
			99	0.40	£348	£59	£98	£303	£162	£971	0.052088473	£50.56
									Annual Maintenance (£k):	£1.24		
						Maintenance PVc:	£36.83	Total PVc:	£3,600.32			



Defence Length:		SR1-RUWB3											
Flood Cell:		FC1-2											
Defence Length (km):		3.86											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Free standing masonry wall	2.0%	0	0.00	£0	£0	£0	£0			1	£0.00	
			19	0.00	£0	£0	£0	£0		0.52015569	£0.00		
			49	0.00	£0	£0	£0	£0		0.203180599	£0.00		
			99	0.15	£1,178	£204	£332	£1,029	£549	£3,292	0.052088473	£171.47	
								Annual Maintenance (£k):	£21.29				
								Maintenance PVc:	£634.67	Total PVc:	£806.14		
2	Free standing masonry wall	1.0%	0	0.00	£0	£0	£0	£0			1	£0.00	
			19	0.00	£0	£0	£0	£0		0.52015569	£0.00		
			49	0.00	£0	£0	£0	£0		0.203180599	£0.00		
			99	0.25	£1,178	£204	£332	£1,029	£549	£3,292	0.052088473	£171.47	
								Annual Maintenance (£k):	£21.29				
								Maintenance PVc:	£634.67	Total PVc:	£806.14		
3	Free standing masonry wall	0.5%	0	0.00	£0	£0	£0	£0			1	£0.00	
			19	0.00	£0	£0	£0	£0		0.52015569	£0.00		
			49	0.00	£0	£0	£0	£0		0.203180599	£0.00		
			99	0.35	£2,357	£204	£615	£1,905	£1,016	£6,097	0.052088473	£317.59	
								Annual Maintenance (£k):	£21.29				
								Maintenance PVc:	£634.67	Total PVc:	£952.26		
4	Free standing masonry wall	0.1%	0	0.00	£0	£0	£0	£0			1	£0.00	
			19	0.00	£0	£0	£0	£0		0.52015569	£0.00		
			49	0.25	£1,178	£204	£332	£1,029	£549	£3,292	0.203180599	£668.84	
			99	0.35	£2,357	£204	£615	£1,905	£1,016	£6,097	0.052088473	£317.59	
								Annual Maintenance (£k):	£21.29				
								Maintenance PVc:	£634.67	Total PVc:	£1,621.10		



Defence Length:		SR2-RUEB1																	
Flood Cell:		FC2-0																	
Defence Length (km):		1.45																	
100-yr Discount Factor:		29.813																	
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)							
1	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£504	£77	£279	£516	£275	£1,650	0.203180599	£335.20							
			99	0.35	£1,008	£77	£521	£963	£514	£3,081	0.052088473	£160.50							
								Annual Maintenance (£k):	£8.00										
								Maintenance PVc:	£238.41	Total PVc:	£734.11								
2	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£504	£77	£279	£516	£275	£1,650	0.203180599	£335.20							
			99	0.35	£1,008	£77	£521	£963	£514	£3,081	0.052088473	£160.50							
								Annual Maintenance (£k):	£8.00										
								Maintenance PVc:	£238.41	Total PVc:	£734.11								
3	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.20	£0	£0	£0	£0	£0	0.203180599	£0.00								
			99	0.35	£1,008	£77	£521	£963	£514	£3,081	0.052088473	£160.50							
								Annual Maintenance (£k):	£8.00										
								Maintenance PVc:	£238.41	Total PVc:	£398.92								
4	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£504	£77	£279	£516	£275	£1,650	0.203180599	£335.20							
			99	0.35	£1,008	£77	£521	£963	£514	£3,081	0.052088473	£160.50							
								Annual Maintenance (£k):	£8.00										
								Maintenance PVc:	£238.41	Total PVc:	£734.11								
5	New earth embankment/ground raising	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£226	£77	£73	£225	£120	£720	0.203180599	£146.22							
			99	0.35	£226	£77	£73	£225	£120	£720	0.052088473	£37.49							
								Annual Maintenance (£k):	£1.60										
								Maintenance PVc:	£47.68	Total PVc:	£231.39								
6	New earth embankment/ground raising	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£226	£77	£73	£225	£120	£720	0.203180599	£146.22							
			99	0.45	£451	£77	£127	£393	£209	£1,257	0.052088473	£65.45							
								Annual Maintenance (£k):	£1.60										
								Maintenance PVc:	£47.68	Total PVc:	£259.36								
7	New earth embankment/ground raising	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£226	£77	£73	£225	£120	£720	0.203180599	£146.22							
			99	0.45	£451	£77	£127	£393	£209	£1,257	0.052088473	£65.45							
								Annual Maintenance (£k):	£1.60										
								Maintenance PVc:	£47.68	Total PVc:	£259.36								
8	New earth embankment/ground raising	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£226	£77	£73	£225	£120	£720	0.203180599	£146.22							
			99	0.40	£451	£77	£127	£393	£209	£1,257	0.052088473	£65.45							
								Annual Maintenance (£k):	£1.60										
								Maintenance PVc:	£47.68	Total PVc:	£259.36								
9	Freestanding Masonry Wall	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£443	£77	£125	£386	£206	£1,237	0.203180599	£251.25							
			99	0.35	£885	£77	£231	£716	£382	£2,290	0.052088473	£119.30							
								Annual Maintenance (£k):	£8.00										
								Maintenance PVc:	£238.41	Total PVc:	£608.96								
10	Freestanding Masonry Wall	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£443	£77	£125	£386	£206	£1,237	0.203180599	£251.25							
			99	0.35	£885	£77	£231	£716	£382	£2,290	0.052088473	£119.30							
								Annual Maintenance (£k):	£8.00										
								Maintenance PVc:	£238.41	Total PVc:	£608.96								
11	Freestanding Masonry Wall	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.20	£443	£77	£125	£386	£206	£1,237	0.203180599	£251.25							
			99	0.35	£885	£77	£231	£716	£382	£2,290	0.052088473	£119.30							
								Annual Maintenance (£k):	£8.00										
								Maintenance PVc:	£238.41	Total PVc:	£608.96								
12	Freestanding Masonry Wall	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00								
			49	0.25	£443	£77	£125	£386	£206	£1,237	0.203180599	£251.25							
			99	0.35	£885	£77	£231	£716	£382	£2,290	0.052088473	£119.30							
								Annual Maintenance (£k):	£8.00										
								Maintenance PVc:	£238.41	Total PVc:	£608.96								



Defence Length:		SR2-RUEB2											
Flood Cell:		FC2-0											
Defence Length (km):		1.21											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Improved earth embankment	2.0%	0	0.25	£188	£64	£61	£188	£100	£601	1	£600.56	
			19	0.05	£0	£88	£21	£86	£35	£210	0.52015569	£109.28	
			49	0.25	£188	£241	£103	£319	£170	£1,021	0.203180599	£207.39	
			99	0.35	£376	£241	£148	£459	£245	£1,469	0.052088473	£76.51	
								Annual Maintenance (£k):	£1.33				
								Maintenance PVc:	£39.79	Total PVc:	£1,033.52		
2	Improved earth embankment	1.0%	0	0.30	£188	£64	£61	£188	£100	£601	1	£600.56	
			19	0.10	£0	£88	£21	£86	£35	£210	0.52015569	£109.28	
			49	0.25	£188	£241	£103	£319	£170	£1,021	0.203180599	£207.39	
			99	0.40	£376	£241	£148	£459	£245	£1,469	0.052088473	£76.51	
								Annual Maintenance (£k):	£1.33				
								Maintenance PVc:	£39.79	Total PVc:	£1,033.52		
3	Improved earth embankment	0.5%	0	0.40	£376	£64	£106	£328	£175	£1,049	1	£1,048.59	
			19	0.05	£0	£88	£21	£86	£35	£210	0.52015569	£109.28	
			49	0.25	£188	£241	£103	£319	£170	£1,021	0.203180599	£207.39	
			99	0.45	£376	£241	£148	£459	£245	£1,469	0.052088473	£76.51	
								Annual Maintenance (£k):	£1.33				
								Maintenance PVc:	£39.79	Total PVc:	£1,481.55		
4	Improved earth embankment	0.1%	0	0.65	£784	£64	£204	£631	£337	£2,019	1	£2,019.33	
			19	0.10	£0	£88	£21	£86	£35	£210	0.52015569	£109.28	
			49	0.25	£188	£241	£103	£319	£170	£1,021	0.203180599	£207.39	
			99	0.40	£376	£241	£148	£459	£245	£1,469	0.052088473	£76.51	
								Annual Maintenance (£k):	£1.33				
								Maintenance PVc:	£39.79	Total PVc:	£2,452.29		

Defence Length:		SR2-RUEB3											
Flood Cell:		FC2-0											
Defence Length (km):		4.45											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Retaining Wall	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£412	£99	£307	£164	£981	0.052088473	£51.10	
								Annual Maintenance (£k):	£24.54				
								Maintenance PVc:	£731.68	Total PVc:	£977.43		
2	Retaining Wall	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£412	£99	£307	£164	£981	0.052088473	£51.10	
								Annual Maintenance (£k):	£24.54				
								Maintenance PVc:	£731.68	Total PVc:	£977.43		
3	Retaining Wall	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.10	£2,352	£412	£663	£2,057	£1,097	£6,582	0.052088473	£342.83	
								Annual Maintenance (£k):	£24.54				
								Maintenance PVc:	£731.68	Total PVc:	£1,269.15		
4	Retaining Wall	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.35	£2,352	£412	£663	£2,057	£1,097	£6,582	0.052088473	£342.83	
								Annual Maintenance (£k):	£24.54				
								Maintenance PVc:	£731.68	Total PVc:	£1,269.15		



Defence Length:		SR2-RUEB4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										</
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Defence Length:		SR2-1																	
Flood Cell:		FC2-0																	
Defence Length (km):		2.89		Habitat Area Created (ha):		761													
100-yr Discount Factor:		29.813																	
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)							
1	Concrete Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	0.00	£0	£529	£127	£394	£210	£1,261	0.052088473	£65.66							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£1,124.78							
2	Concrete Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	0.00	£0	£529	£127	£394	£210	£1,261	0.052088473	£65.66							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£1,124.78							
3	Concrete Revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	0.00	£0	£682	£164	£508	£271	£1,625	0.052088473	£84.63							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£1,143.76							
4	Concrete Revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	0.10	£717	£682	£336	£1,041	£555	£3,332	0.052088473	£173.58							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£1,232.70							
5	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	0.00	£0	£529	£127	£394	£210	£1,261	0.052088473	£65.66							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£1,124.78							
6	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	0.00	£0	£529	£127	£394	£210	£1,261	0.052088473	£65.66							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£1,124.78							
7	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	0.00	£0	£682	£164	£508	£271	£1,625	0.052088473	£84.63							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£1,143.76							
8	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	0.10	£1,004	£682	£405	£1,255	£669	£4,015	0.052088473	£209.16							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£1,268.28							
9	Secondary Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	3.30	£5,986	£12,822	£0	£11,285	£6,019	£36,112	0.052088473	£1,881.02							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£2,940.15							
10	Secondary Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	3.35	£5,986	£12,822	£0	£11,285	£6,019	£36,112	0.052088473	£1,881.02							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£2,940.15							
11	Secondary Embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	3.45	£6,804	£12,822	£0	£11,776	£6,280	£37,682	0.052088473	£1,962.80							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£3,021.93							
12	Secondary Embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£265	£64	£197	£105	£630	0.52015569	£327.83							
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11							
			99	3.75	£7,622	£12,822	£0	£12,266	£6,542	£39,252	0.052088473	£2,044.58							
Annual Maintenance (£k):										£15.94									
Maintenance Pvc:										£475.18	Total Pvc:	£3,103.70							



Defence Length:		SR2-2											
Flood Cell:		FC2-0											
Defence Length (km):		2.16											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)	
1	Concrete Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£571.68	
2	Concrete Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£571.68	
3	Concrete Revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£571.68	
4	Concrete Revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£571.68	
5	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£571.68	
6	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£571.68	
7	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£571.68	
8	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.00	£0	£176	£42	£131	£70	£420	0.052088473	£21.89	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£571.68	
9	Secondary Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	3.30	£7,891	£330	£0	£4,933	£2,631	£15,785	0.052088473	£822.21	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£1,372.01	
10	Secondary Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	3.35	£7,891	£330	£0	£4,933	£2,631	£15,785	0.052088473	£822.21	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£1,372.01	
11	Secondary Embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	3.45	£8,969	£330	£0	£5,579	£2,976	£17,854	0.052088473	£930.01	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£1,479.81	
12	Secondary Embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	3.75	£10,047	£330	£0	£6,226	£3,321	£19,924	0.052088473	£1,037.81	
								Annual Maintenance (£k):	£11.91				
								Maintenance Pvc:	£355.15	Total Pvc:		£1,587.61	

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Defence Length:		SR2-4											
Flood Cell:		FC2-0											
Defence Length (km):		1.46											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVC (£k)	
1	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£86	£35	£210	0.52015569	£109.28	
			49	0.24	£507	£254	£183	£566	£302	£1,812	0.203180599	£368.15	
			99	0.35	£1,015	£254	£304	£944	£503	£3,020	0.052088473	£157.29	
									Annual Maintenance (£k):	£8.05			
									Maintenance PVc:	£240.06		Total PVC: £874.77	
2	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£86	£35	£210	0.52015569	£109.28	
			49	0.25	£507	£254	£183	£566	£302	£1,812	0.203180599	£368.15	
			99	0.35	£1,015	£254	£304	£944	£503	£3,020	0.052088473	£157.29	
									Annual Maintenance (£k):	£8.05			
									Maintenance PVc:	£240.06		Total PVC: £874.77	
3	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.14	£507	£166	£161	£501	£267	£1,602	0.52015569	£833.21	
			49	0.25	£507	£254	£183	£566	£302	£1,812	0.203180599	£368.15	
			99	0.35	£1,015	£254	£304	£944	£503	£3,020	0.052088473	£157.29	
									Annual Maintenance (£k):	£8.05			
									Maintenance PVc:	£240.06		Total PVC: £1,598.71	
4	Rock Armour	0.1%	0	0.24	£507	£77	£140	£435	£232	£1,392	1	£1,391.76	
			19	0.10	£507	£166	£161	£501	£267	£1,602	0.52015569	£833.21	
			49	0.25	£507	£254	£183	£566	£302	£1,812	0.203180599	£368.15	
			99	0.35	£1,015	£254	£304	£944	£503	£3,020	0.052088473	£157.29	
									Annual Maintenance (£k):	£8.05			
									Maintenance PVc:	£240.06		Total PVC: £2,990.47	
5	Concrete Revetment to existing embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£86	£35	£210	0.52015569	£109.28	
			49	0.24	£362	£254	£148	£458	£244	£1,467	0.203180599	£298.04	
			99	0.35	£725	£254	£235	£728	£388	£2,330	0.052088473	£121.34	
									Annual Maintenance (£k):	£8.05			
									Maintenance PVc:	£240.06		Total PVC: £768.71	
6	Concrete Revetment to existing embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£86	£35	£210	0.52015569	£109.28	
			49	0.25	£362	£254	£148	£458	£244	£1,467	0.203180599	£298.04	
			99	0.35	£725	£254	£235	£728	£388	£2,330	0.052088473	£121.34	
									Annual Maintenance (£k):	£8.05			
									Maintenance PVc:	£240.06		Total PVC: £768.71	
7	Concrete Revetment to existing embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.14	£362	£166	£127	£393	£209	£1,257	0.52015569	£663.72	
			49	0.25	£362	£254	£148	£458	£244	£1,467	0.203180599	£298.04	
			99	0.35	£725	£254	£235	£728	£388	£2,330	0.052088473	£121.34	
									Annual Maintenance (£k):	£8.05			
									Maintenance PVc:	£240.06		Total PVC: £1,313.16	
8	Concrete Revetment to existing embankment	0.1%	0	0.24	£362	£77	£106	£327	£174	£1,047	1	£1,046.70	
			19	0.10	£362	£166	£127	£393	£209	£1,257	0.52015569	£663.72	
			49	0.25	£362	£254	£148	£458	£244	£1,467	0.203180599	£298.04	
			99	0.35	£725	£254	£235	£728	£388	£2,330	0.052088473	£121.34	
									Annual Maintenance (£k):	£8.05			
									Maintenance PVc:	£240.06		Total PVC: £2,359.86	



Defence Length:		SR2-5										
Flood Cell:		FC2-0										
Defence Length (km):		3.98										
100-yr Discount Factor:		29.813										
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)
1	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	0.00	£0	£353	£85	£263	£140	£840	0.203180599	£170.74
			99	0.40	£2,766	£564	£799	£2,477	£1,321	£7,927	0.052088473	£412.89
									Annual Maintenance (£k):	£21.95		
										Maintenance Pvc:	£654.40	Total Pvc: £1,456.58
2	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	0.12	£988	£564	£372	£1,154	£616	£3,694	0.203180599	£750.48
			99	0.35	£2,766	£564	£799	£2,477	£1,321	£7,927	0.052088473	£412.89
									Annual Maintenance (£k):	£21.95		
										Maintenance Pvc:	£654.40	Total Pvc: £2,036.32
3	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	0.22	£988	£564	£372	£1,154	£616	£3,694	0.203180599	£750.48
			99	0.30	£1,383	£564	£467	£1,448	£772	£4,634	0.052088473	£241.40
									Annual Maintenance (£k):	£21.95		
										Maintenance Pvc:	£654.40	Total Pvc: £1,864.83
4	Rock Armour	0.1%	0	0.12	£988	£211	£288	£892	£476	£2,853	1	£2,853.33
			19	0.05	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	0.30	£988	£564	£372	£1,154	£616	£3,694	0.203180599	£750.48
			99	0.30	£1,383	£564	£467	£1,448	£772	£4,634	0.052088473	£241.40
									Annual Maintenance (£k):	£21.95		
										Maintenance Pvc:	£654.40	Total Pvc: £4,718.16
5	Concrete Revetment to existing embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	0.00	£0	£529	£127	£394	£210	£1,261	0.203180599	£256.11
			99	0.40	£1,976	£564	£609	£1,889	£1,008	£6,045	0.052088473	£314.89
									Annual Maintenance (£k):	£21.95		
										Maintenance Pvc:	£654.40	Total Pvc: £1,443.96
6	Concrete Revetment to existing embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	0.12	£988	£564	£372	£1,154	£616	£3,694	0.203180599	£750.48
			99	0.35	£1,976	£564	£609	£1,889	£1,008	£6,045	0.052088473	£314.89
									Annual Maintenance (£k):	£21.95		
										Maintenance Pvc:	£654.40	Total Pvc: £1,938.33
7	Concrete Revetment to existing embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	0.22	£988	£564	£372	£1,154	£616	£3,694	0.203180599	£750.48
			99	0.30	£988	£564	£372	£1,154	£616	£3,694	0.052088473	£192.40
									Annual Maintenance (£k):	£21.95		
										Maintenance Pvc:	£654.40	Total Pvc: £1,815.83
8	Concrete Revetment to existing embankment	0.1%	0	0.12	£988	£211	£288	£892	£476	£2,853	1	£2,853.33
			19	0.05	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	0.30	£988	£564	£372	£1,154	£616	£3,694	0.203180599	£750.48
			99	0.30	£988	£564	£372	£1,154	£616	£3,694	0.052088473	£192.40
									Annual Maintenance (£k):	£21.95		
										Maintenance Pvc:	£654.40	Total Pvc: £4,669.16



Defence Length:		SR2-6												
Flood Cell:		FC2-0												
Defence Length (km):		1.92												
0-19-yr Discount Factor:		14.70983742												
20-49-yr Discount Factor:		9.785468373												
50-99-yr Discount Factor:		5.317239543												
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)		
1	Improved Embankment with future toe protection	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£88	£0	£53	£169	£28	0.52015569	£88.13		
			49	0.25	£299	£2,947	£0	£1,947	£1,038	£6,231	0.203180599	£1,265.96		
			99	0.40	£597	£2,78	£0	£525	£280	£1,681	0.052088473	£87.54		
2	Improved Embankment with future toe protection	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£88	£0	£53	£169	£28	0.52015569	£88.13		
			49	0.35	£299	£2,947	£0	£1,947	£1,038	£6,231	0.203180599	£1,265.96		
			99	0.40	£597	£2,78	£0	£525	£280	£1,681	0.052088473	£87.54		
3	Improved Embankment with future toe protection	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.15	£299	£190	£0	£293	£156	£938	0.52015569	£487.87		
			49	0.35	£299	£2,947	£0	£1,947	£1,038	£6,231	0.203180599	£1,265.96		
			99	0.40	£597	£2,78	£0	£525	£280	£1,681	0.052088473	£87.54		
4	Improved Embankment with future toe protection	0.1%	0	0.25	£299	£102	£0	£240	£128	£769	1	£768.51		
			19	0.15	£299	£190	£0	£293	£156	£938	0.52015569	£487.87		
			49	0.40	£597	£2,947	£0	£2,126	£1,134	£6,804	0.203180599	£1,382.45		
			99	0.35	£597	£2,78	£0	£525	£280	£1,681	0.052088473	£87.54		
5	Concrete Revetment to existing embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£88	£0	£66	£35	£210	0.52015569	£109.28		
			49	2.18	£4,289	£2,78	£1,096	£3,398	£1,812	£10,872	0.203180599	£2,209.05		
			99	0.15	£477	£2,78	£181	£561	£299	£1,797	0.052088473	£93.58		
6	Concrete Revetment to existing embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£88	£0	£66	£35	£210	0.52015569	£109.28		
			49	2.18	£4,289	£2,78	£1,096	£3,398	£1,812	£10,872	0.203180599	£2,209.05		
			99	0.20	£477	£2,78	£181	£561	£299	£1,797	0.052088473	£93.58		
7	Concrete Revetment to existing embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	2.18	£4,289	£190	£1,075	£3,332	£1,777	£10,662	0.52015569	£5,546.04		
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37		
			99	0.25	£477	£2,78	£181	£561	£299	£1,797	0.052088473	£93.58		
8	Concrete Revetment to existing embankment	0.1%	0	2.18	£4,289	£102	£1,054	£3,266	£1,742	£10,452	1	£10,452.17		
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28		
			49	0.20	£477	£2,78	£181	£561	£299	£1,797	0.203180599	£365.04		
			99	0.30	£477	£2,78	£181	£561	£299	£1,797	0.052088473	£93.58		
9	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28		
			49	2.18	£6,004	£2,78	£1,508	£4,674	£2,493	£14,956	0.203180599	£3,038.85		
			99	0.00	£0	£2,78	£67	£207	£110	£662	0.052088473	£34.49		
10	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28		
			49	2.18	£6,004	£2,78	£1,508	£4,674	£2,493	£14,956	0.203180599	£3,038.85		
			99	0.00	£0	£2,78	£67	£207	£110	£662	0.052088473	£34.49		
11	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	2.18	£6,004	£190	£1,487	£4,608	£2,458	£14,746	0.52015569	£7,670.38		
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37		
			99	0.00	£0	£2,78	£67	£207	£110	£662	0.052088473	£34.49		
12	Rock Armour	0.1%	0	2.18	£6,004	£102	£1,465	£4,543	£2,423	£14,536	1	£14,536.24		
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28		
			49	0.20	£667	£2,78	£227	£703	£375	£2,250	0.203180599	£457.24		
			99	0.00	£0	£2,78	£67	£207	£110	£662	0.052088473	£34.49		
										Annual Maintenance 0-19-yr (£k):	£2.12			
										Annual Maintenance 20-49-yr (£k):	£2.12			
										Annual Maintenance 50-99-yr (£k):	£2.12			
										Maintenance Pvc:	£63.14			
										Total Pvc:	£1,504.77			



Defence Length:	SR2-7
Flood Cell:	FC2-1
Defence Length (km):	3.95
0-19-yr Discount Factor:	14.70983742
20-49-yr Discount Factor:	9.785468373
50-99-yr Discount Factor:	5.317239543

Habitat Area Created (ha): 102

Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)
1	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£353	£0	£212	£113	£678	0.52015569	£352.51
			49	0.15	£1,372	£915	£0	£1,372	£732	£4,392	0.203180599	£892.37
			99	0.35	£2,745	£915	£0	£2,196	£1,171	£7,027	0.052088473	£366.03
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance PVc:	£21.78 £21.78 £21.78 £649.46	Total PVc:	£2,260.36
2	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£353	£0	£212	£113	£678	0.52015569	£352.51
			49	0.25	£2,745	£915	£0	£2,196	£1,171	£7,027	0.203180599	£1,427.76
			99	0.35	£2,745	£915	£0	£2,196	£1,171	£7,027	0.052088473	£366.03
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance PVc:	£21.78 £21.78 £21.78 £649.46	Total PVc:	£2,795.75
3	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0		£0	1	£0.00
			19	0.05	£1,372	£353	£0	£1,035	£552	£3,313	0.52015569	£1,723.15
			49	0.30	£2,745	£915	£0	£2,196	£1,171	£7,027	0.203180599	£1,427.76
			99	0.35	£2,745	£915	£0	£2,196	£1,171	£7,027	0.052088473	£366.03
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance PVc:	£21.78 £21.78 £21.78 £649.46	Total PVc:	£4,166.40
4	Rock Armour	0.1%	0	0.15	£1,372	£209	£0	£949	£506	£3,037	1	£3,036.60
			19	0.10	£0	£353	£0	£212	£113	£678	0.52015569	£352.51
			49	0.30	£1,372	£915	£0	£1,372	£732	£4,392	0.203180599	£892.37
			99	0.30	£3,891	£915	£0	£2,883	£1,538	£9,227	0.052088473	£480.63
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance PVc:	£21.78 £21.78 £21.78 £649.46	Total PVc:	£5,411.56
5	Secondary Embankment	2.0%	0	0.00	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£353	£0	£212	£113	£678	0.52015569	£352.51
			49	0.15	£1,372	£915	£0	£1,372	£732	£4,392	0.203180599	£892.37
			99	2.15	£8,458	£2,529	£0	£6,592	£3,516	£21,094	0.052088473	£1,098.76
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance PVc:	£21.78 £21.78 £21.78 £649.46	Total PVc:	£2,993.09
6	Secondary Embankment	1.0%	0	0.00	£0	£0	£0	£0		£0	1	£0.00
			19	0.00	£0	£353	£0	£212	£113	£678	0.52015569	£352.51
			49	0.25	£2,745	£915	£0	£2,196	£1,171	£7,027	0.203180599	£1,427.76
			99	2.25	£8,458	£2,529	£0	£6,592	£3,516	£21,094	0.052088473	£1,098.76
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance PVc:	£21.78 £21.78 £21.78 £649.46	Total PVc:	£3,528.48
7	Secondary Embankment	0.5%	0	0.00	£0	£0	£0	£0		£0	1	£0.00
			19	0.05	£1,372	£353	£0	£1,035	£552	£3,313	0.52015569	£1,723.15
			49	0.30	£2,745	£915	£0	£2,196	£1,171	£7,027	0.203180599	£1,427.76
			99	2.35	£8,458	£2,529	£0	£6,592	£3,516	£21,094	0.052088473	£1,098.76
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance PVc:	£21.78 £21.78 £21.78 £649.46	Total PVc:	£4,899.13
8	Secondary Embankment	0.1%	0	0.15	£1,372	£209	£0	£949	£506	£3,037	1	£3,036.60
			19	0.10	£0	£353	£0	£212	£113	£678	0.52015569	£352.51
			49	0.30	£1,372	£915	£0	£1,372	£732	£4,392	0.203180599	£892.37
			99	2.50	£8,458	£2,529	£0	£6,592	£3,516	£21,094	0.052088473	£1,098.76
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance PVc:	£21.78 £21.78 £21.78 £649.46	Total PVc:	£6,029.69



Defence Length:		SR2-8										
Flood Cell:		FC2-1										
Defence Length (km):		1.71										
0-19-yr Discount Factor:		14.70983742										
20-49-yr Discount Factor:		9.785468373										
50-99-yr Discount Factor:		5.317239543										
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)
1	Improved Embankment with future toe protection	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13
			49	0.04	£0	£2,553	£0	£1,532	£817	£4,902	0.203180599	£395.96
			99	0.35	£532	£267	£0	£479	£256	£1,534	0.052088473	£79.90
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£1,220.22
2	Improved Embankment with future toe protection	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13
			49	0.14	£266	£2,644	£0	£1,746	£931	£5,586	0.203180599	£1,135.03
			99	0.35	£532	£267	£0	£479	£256	£1,534	0.052088473	£79.90
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£1,359.29
3	Improved Embankment with future toe protection	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13
			49	0.24	£532	£2,644	£0	£1,905	£1,016	£6,097	0.203180599	£1,238.76
			99	0.35	£532	£267	£0	£479	£256	£1,534	0.052088473	£79.90
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£1,463.04
4	Improved Embankment with future toe protection	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.05	£266	£88	£0	£213	£28	£680	0.52015569	£353.73
			49	0.25	£532	£2,644	£0	£1,905	£1,016	£6,097	0.203180599	£1,238.76
			99	0.35	£532	£267	£0	£479	£256	£1,534	0.052088473	£79.90
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£1,728.64
5	Concrete revetment to existing embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37
			99	2.00	£3,395	£267	£879	£2,725	£1,453	£8,719	0.052088473	£454.15
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£705.03
6	Concrete revetment to existing embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28
			49	0.24	£532	£267	£0	£479	£256	£1,534	0.203180599	£311.66
			99	2.10	£3,819	£267	£981	£3,040	£1,622	£9,729	0.052088473	£506.76
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£1,624.05
7	Concrete revetment to existing embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28
			49	1.77	£2,971	£267	£777	£2,405	£1,285	£7,706	0.203180599	£1,566.19
			99	0.35	£849	£267	£268	£830	£443	£2,656	0.052088473	£138.37
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£1,810.19
8	Concrete revetment to existing embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28
			49	1.97	£3,395	£267	£879	£2,725	£1,453	£8,719	0.203180599	£1,771.48
			99	0.35	£849	£267	£268	£830	£443	£2,656	0.052088473	£138.37
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£2,115.45
9	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37
			99	2.00	£4,753	£267	£1,205	£3,735	£1,992	£11,952	0.052088473	£622.56
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£913.56
10	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28
			49	0.24	£3,565	£267	£920	£2,851	£1,520	£9,123	0.203180599	£1,853.60
			99	2.10	£1,188	£267	£349	£1,083	£577	£3,465	0.052088473	£180.48
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£2,239.70
11	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28
			49	1.77	£3,565	£267	£920	£2,851	£1,520	£9,123	0.203180599	£1,853.60
			99	0.35	£1,188	£267	£349	£1,083	£577	£3,465	0.052088473	£180.48
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£2,239.70
12	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28
			49	1.97	£4,753	£267	£1,205	£3,735	£1,992	£11,952	0.203180599	£2,428.41
			99	0.35	£1,188	£267	£349	£1,083	£577	£3,465	0.052088473	£180.48
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£2,614.51
13	Secondary Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13
			49	0.04	£0	£2,553	£0	£1,532	£817	£4,902	0.203180599	£395.96
			99	2.15	£3,289	£251	£0	£2,124	£1,133	£6,796	0.052088473	£354.02
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£1,494.34
14	Secondary Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13
			49	0.14	£266	£2,644	£0	£1,746	£931	£5,586	0.203180599	£1,135.03
			99	2.25	£3,289	£251	£0	£2,124	£1,133	£6,796	0.052088473	£354.02
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£1,633.40
15	Secondary Embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13
			49	0.24	£532	£2,644	£0	£1,905	£1,016	£6,097	0.203180599	£1,238.76
			99	2.35	£3,289	£251	£0	£2,124	£1,133	£6,796	0.052088473	£354.02
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£1,737.15
16	Secondary Embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.05	£266	£88	£0	£213	£28	£680	0.52015569	£353.73
			49	0.25	£532	£2,644	£0	£1,905	£1,016	£6,097	0.203180599	£1,238.76
			99	2.50	£3,289	£251	£0	£2,124	£1,133	£6,796	0.052088473	£354.02
									Annual Maintenance 0-19-yr (£k): £1.89 Annual Maintenance 20-49-yr (£k): £1.89 Annual Maintenance 50-99-yr (£k): £1.89 Maintenance PVc: £56.23			£2,002.75



Defence Length:		SR3-3											
Flood Cell:		FC3-2											
Defence Length (km):		3.7		Habitat Area Created (ha):		39							
MR Length (km):		0				£32.29							
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Land Compensation Costs	Total (£k)	Discount Factor	PVc (£k)
5	Managed Realignment	2.0%	0	0.00	£0	£331	£0	£199	£106	£624	£1,259	1	£1,259.34
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
									Annual Maintenance (£k):	£0.00			
Maintenance PVc:											Total PVc:	£1,259.34	
6	Managed Realignment	1.0%	0	0.00	£0	£331	£0	£199	£106	£624	£1,259	1	£1,259.34
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.00	£0	£0	£0	£0	£0	£0	£0	0.203180599	£0.00
			99	0.00	£0	£0	£0	£0	£0	£0	£0	0.052088473	£0.00
									Annual Maintenance (£k):	£0.00			
Maintenance PVc:											Total PVc:	£1,259.34	
7	Managed Realignment	0.5%	0	0.00	£0	£331	£0	£199	£106	£624	£1,259	1	£1,259.34
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.00	£0	£0	£0	£0	£0	£0	£0	0.203180599	£0.00
			99	0.00	£0	£0	£0	£0	£0	£0	£0	0.052088473	£0.00
									Annual Maintenance (£k):	£0.00			
Maintenance PVc:											Total PVc:	£1,259.34	
8	Managed Realignment	0.1%	0	0.00	£0	£331	£0	£199	£106	£624	£1,259	1	£1,259.34
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.00	£0	£0	£0	£0	£0	£0	£0	0.203180599	£0.00
			99	0.00	£0	£0	£0	£0	£0	£0	£0	0.052088473	£0.00
									Annual Maintenance (£k):	£0.00			
Maintenance PVc:											Total PVc:	£1,259.34	

Defence Length:		SR3-5													
Flood Cell:		FC3-3													
Defence Length (km):		3.7		Habitat Area Created (ha):		199									
MR Length (km):		4.1													
100-yr Discount Factor:		29.813													
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Land Compensation Costs	Total (£k)	Discount Factor	PVc (£k)		
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00		
			49	0.15	£575	£196	£0	£463	£247		£1,481	0.203180599	£300.91		
			99	0.40	£1,151	£196	£0	£808	£431		£2,586	0.052088473	£134.69		
									Annual Maintenance (£k):		£4.08				
								Maintenance PVc:		£121.67	Total PVc:	£557.27			
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00		
			49	0.30	£575	£196	£0	£463	£247		£1,481	0.203180599	£300.91		
			99	0.40	£1,151	£196	£0	£808	£431		£2,586	0.052088473	£134.69		
									Annual Maintenance (£k):		£4.08				
								Maintenance PVc:		£121.67	Total PVc:	£557.27			
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00		
			49	0.45	£1,151	£196	£0	£808	£431		£2,586	0.203180599	£525.39		
			99	0.40	£1,151	£196	£0	£808	£431		£2,586	0.052088473	£134.69		
									Annual Maintenance (£k):		£4.08				
								Maintenance PVc:		£121.67	Total PVc:	£781.75			
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00		
			49	0.70	£2,398	£196	£0	£1,556	£830		£4,980	0.203180599	£1,011.78		
			99	0.60	£1,151	£196	£0	£808	£431		£2,586	0.052088473	£134.69		
									Annual Maintenance (£k):		£4.08				
								Maintenance PVc:		£121.67	Total PVc:	£1,268.14			
5	Managed Realignment	2.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00		
			19	0.00	£0	£88	£0	£53	£28		£169	0.52015569	£88.13		
			49	0.00	£0	£176	£0	£106	£56		£339	0.203180599	£68.85		
			99	1.80	£8,477	£3,477	£0	£7,172	£3,825	£3,184	£26,136	0.052088473	£1,361.38		
									Annual Maintenance (£k):		£4.52				
								Maintenance PVc:		£134.83	Total PVc:	£1,653.18			
6	Managed Realignment	1.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00		
			19	0.00	£0	£88	£0	£53	£28		£169	0.52015569	£88.13		
			49	0.00	£0	£176	£0	£106	£56		£339	0.203180599	£68.85		
			99	1.90	£9,633	£3,477	£0	£7,866	£4,195	£3,184	£28,354	0.052088473	£1,476.94		
									Annual Maintenance (£k):		£4.52				
								Maintenance PVc:		£134.83	Total PVc:	£1,768.74			
7	Managed Realignment	0.5%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00		
			19	0.00	£0	£88	£0	£53	£28		£169	0.52015569	£88.13		
			49	0.00	£0	£176	£0	£106	£56		£339	0.203180599	£68.85		
			99	2.00	£9,633	£3,477	£0	£7,866	£4,195	£3,184	£28,354	0.052088473	£1,476.94		
									Annual Maintenance (£k):		£4.52				
								Maintenance PVc:		£134.83	Total PVc:	£1,768.74			
8	Managed Realignment	0.1%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00		
			19	0.00	£0	£88	£0	£53	£28		£169	0.52015569	£88.13		
			49	0.00	£0	£176	£0	£106	£56		£339	0.203180599	£68.85		
			99	2.20	£9,633	£3,477	£0	£7,866	£4,195	£3,184	£28,354	0.052088473	£1,476.94		
									Annual Maintenance (£k):		£4.52				
								Maintenance PVc:		£134.83	Total PVc:	£1,768.74			



Defence Length:		SR4-2															
Flood Cell:		FC4-3															
Defence Length (km):		3.583		Habitat Area Created (ha):		153											
MR Length (km):		0				£20.15											
100-yr Discount Factor:		29.813															
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Land Compensation	Total (£k)	Discount Factor	PVc (£k)				
1	Improved embankment	2.0%	0	0.60	£1,114	£190	£0	£783	£417		£2,504	1	£2,504.06				
			19	0.10	£557	£190	£0	£448	£239		£1,434	0.52015569	£745.98				
			49	0.20	£557	£190	£0	£448	£239		£1,434	0.203180599	£291.39				
			99	0.30	£557	£190	£0	£448	£239		£1,434	0.052088473	£74.70				
									Annual Maintenance (£k):		£3.95						
Maintenance PVc:											£117.82	Total PVc:	£3,733.96				
2	Improved embankment	1.0%	0	0.65	£2,322	£190	£0	£1,507	£804		£4,822	1	£4,822.22				
			19	0.10	£557	£190	£0	£448	£239		£1,434	0.52015569	£745.98				
			49	0.20	£557	£190	£0	£448	£239		£1,434	0.203180599	£291.39				
			99	0.30	£557	£190	£0	£448	£239		£1,434	0.052088473	£74.70				
									Annual Maintenance (£k):		£3.95						
Maintenance PVc:											£117.82	Total PVc:	£6,052.11				
3	Improved embankment	0.5%	0	0.70	£2,322	£190	£0	£1,507	£804		£4,822	1	£4,822.22				
			19	0.10	£557	£190	£0	£448	£239		£1,434	0.52015569	£745.98				
			49	0.20	£557	£190	£0	£448	£239		£1,434	0.203180599	£291.39				
			99	0.30	£557	£190	£0	£448	£239		£1,434	0.052088473	£74.70				
									Annual Maintenance (£k):		£3.95						
Maintenance PVc:											£117.82	Total PVc:	£6,052.11				
4	Improved embankment	0.1%	0	1.00	£3,529	£190	£0	£2,231	£1,190		£7,140	1	£7,140.37				
			19	0.10	£557	£190	£0	£448	£239		£1,434	0.52015569	£745.98				
			49	0.20	£557	£190	£0	£448	£239		£1,434	0.203180599	£291.39				
			99	0.30	£557	£190	£0	£448	£239		£1,434	0.052088473	£74.70				
									Annual Maintenance (£k):		£3.95						
Maintenance PVc:											£117.82	Total PVc:	£8,370.27				
5	Managed Realignment	2.0%	0	0.00	£0	£331	£0	£199	£106	£2,448	£3,083	1	£3,083.34				
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.00	£0	£0	£0	£0	£0		£0	0.203180599	£0.00				
			99	0.00	£0	£0	£0	£0	£0		£0	0.052088473	£0.00				
									Annual Maintenance (£k):		£32.88						
Maintenance PVc:											£0.00	Total PVc:	£3,083.34				
6	Managed Realignment	1.0%	0	0.00	£0	£331	£0	£199	£106	£2,448	£3,083	1	£3,083.34				
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.00	£0	£0	£0	£0	£0		£0	0.203180599	£0.00				
			99	0.00	£0	£0	£0	£0	£0		£0	0.052088473	£0.00				
									Annual Maintenance (£k):		£32.88						
Maintenance PVc:											£0.00	Total PVc:	£3,083.34				
7	Managed Realignment	0.5%	0	0.00	£0	£331	£0	£199	£106	£2,448	£3,083	1	£3,083.34				
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.00	£0	£0	£0	£0	£0		£0	0.203180599	£0.00				
			99	0.00	£0	£0	£0	£0	£0		£0	0.052088473	£0.00				
									Annual Maintenance (£k):		£32.88						
Maintenance PVc:											£0.00	Total PVc:	£3,083.34				
8	Managed Realignment	0.1%	0	0.00	£0	£331	£0	£199	£106	£2,448	£3,083	1	£3,083.34				
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00				
			49	0.00	£0	£0	£0	£0	£0		£0	0.203180599	£0.00				
			99	0.00	£0	£0	£0	£0	£0		£0	0.052088473	£0.00				
									Annual Maintenance (£k):		£32.88						
Maintenance PVc:											£0.00	Total PVc:	£3,083.34				

Defence Length:		SR4-3										
Flood Cell:		FC4-6										
Defence Length (km):		1										
100-yr Discount Factor:		29.813										
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.40	£311	£318	£0	£377	£201	£1,207	0.52015569	£627.90
			49	0.30	£156	£582	£0	£443	£236	£1,417	0.203180599	£287.87
			99	0.50	£311	£582	£0	£536	£286	£1,715	0.052088473	£89.35
									Annual Maintenance (£k):	£1.10		
									Maintenance Pvc:	£32.88	Total Pvc:	£1,038.01
2	Improved embankment	1.0%	0	0.40	£311	£53	£0	£218	£116	£699	1	£698.87
			19	0.10	£0	£265	£0	£159	£85	£508	0.52015569	£264.38
			49	0.20	£156	£582	£0	£443	£236	£1,417	0.203180599	£287.87
			99	0.30	£156	£582	£0	£443	£236	£1,417	0.052088473	£73.80
									Annual Maintenance (£k):	£1.10		
									Maintenance Pvc:	£32.88	Total Pvc:	£1,357.80
3	Improved embankment	0.5%	0	0.45	£311	£53	£0	£218	£116	£699	1	£698.87
			19	0.10	£0	£318	£0	£191	£102	£610	0.52015569	£317.26
			49	0.20	£156	£582	£0	£443	£236	£1,417	0.203180599	£287.87
			99	0.30	£156	£582	£0	£443	£236	£1,417	0.052088473	£73.80
									Annual Maintenance (£k):	£1.10		
									Maintenance Pvc:	£32.88	Total Pvc:	£1,410.68
4	Improved embankment	0.1%	0	0.75	£648	£53	£0	£421	£224	£1,346	1	£1,345.86
			19	0.10	£0	£318	£0	£191	£102	£610	0.52015569	£317.26
			49	0.20	£156	£582	£0	£443	£236	£1,417	0.203180599	£287.87
			99	0.30	£156	£582	£0	£443	£236	£1,417	0.052088473	£73.80
									Annual Maintenance (£k):	£1.10		
									Maintenance Pvc:	£32.88	Total Pvc:	£2,057.67



Defence Length:		SR4-4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Defence Length:		SR4-6											
Flood Cell:		FC4-7											
Defence Length (km):		5.63											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£6.21			
									Maintenance PVc:	£185.14	Total PVc:	£534.39	
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£6.21			
									Maintenance PVc:	£185.14	Total PVc:	£534.39	
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£6.21			
									Maintenance PVc:	£185.14	Total PVc:	£534.39	
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£6.21			
									Maintenance PVc:	£185.14	Total PVc:	£534.39	
5	Managed Realignment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	2.00	£2,349	£229	£0	£1,547	£825	£4,953	0.52015569	£2,576.54	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£2.43			
									Maintenance PVc:	£72.35	Total PVc:	£2,821.88	
6	Managed Realignment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	2.00	£2,349	£229	£0	£1,547	£825	£4,953	0.52015569	£2,576.54	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£2.43			
									Maintenance PVc:	£72.35	Total PVc:	£2,821.88	
7	Managed Realignment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	2.00	£2,349	£229	£0	£1,547	£825	£4,953	0.52015569	£2,576.54	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£2.43			
									Maintenance PVc:	£72.35	Total PVc:	£2,821.88	
8	Managed Realignment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	2.00	£2,349	£229	£0	£1,547	£825	£4,953	0.52015569	£2,576.54	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£2.43			
									Maintenance PVc:	£72.35	Total PVc:	£2,821.88	



Defence Length:		SR4-8											
Flood Cell:		FC4-8											
Defence Length (km):		2.53											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVC (£k)	
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85	
			99	0.00	£0	£176	£0	£106	£56	£339	0.052088473	£17.65	
									Annual Maintenance (£k):	£2.79			
									Maintenance PVc:	£83.20		Total PVC: £257.82	
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85	
			99	0.00	£0	£176	£0	£106	£56	£339	0.052088473	£17.65	
									Annual Maintenance (£k):	£2.79			
									Maintenance PVc:	£83.20		Total PVC: £257.82	
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85	
			99	0.00	£0	£176	£0	£106	£56	£339	0.052088473	£17.65	
									Annual Maintenance (£k):	£2.79			
									Maintenance PVc:	£83.20		Total PVC: £257.82	
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85	
			99	0.10	£393	£310	£0	£422	£225	£1,352	0.052088473	£70.40	
									Annual Maintenance (£k):	£2.79			
									Maintenance PVc:	£83.20		Total PVC: £310.57	

Defence Length:		SR4-9											
Flood Cell:		FC4-9											
Defence Length (km):		2.24											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVC (£k)	
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£2.47			
									Maintenance PVc:	£73.66		Total PVC: £422.91	
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£2.47			
									Maintenance PVc:	£73.66		Total PVC: £422.91	
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£2.47			
									Maintenance PVc:	£73.66		Total PVC: £422.91	
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
									Annual Maintenance (£k):	£2.47			
									Maintenance PVc:	£73.66		Total PVC: £422.91	

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Defence Length:		SR5-3																			
Flood Cell:		FC5-6																			
Defence Length (km):		3.78		Habitat Area Created (ha):		166															
MR Length (km):		1.7																			
100-yr Discount Factor:		29.813																			
80-yr Discount Factor:		15.103																			
Number	Type	SOP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Land Compensation Costs	Total (£k)	Discount Factor	PVc (£k)								
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00								
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25									
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69									
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30									
									Annual Maintenance (£k):	£4.17											
											£124.30	Total PVc:	£473.55								
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00								
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25									
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69									
			99	0.25	£588	£353	£0	£565	£301	£1,806	0.052088473	£94.09									
									Annual Maintenance (£k):	£4.17											
											£124.30	Total PVc:	£532.35								
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00								
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25									
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69									
			99	0.25	£588	£353	£0	£565	£301	£1,806	0.052088473	£94.09									
									Annual Maintenance (£k):	£4.17											
											£124.30	Total PVc:	£532.35								
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00								
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25									
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69									
			99	0.50	£1,176	£553	£0	£1,037	£553	£3,319	0.052088473	£172.90									
									Annual Maintenance (£k):	£4.17											
											£124.30	Total PVc:	£611.16								
5	Managed Realignment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00								
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	2.95	£3,994	£421	£0	£2,649	£1,413	2,656	£11,133	0.203180599	£2,261.95								
			99	0.20	£0	£0	£0	£0	£0		£0	0.052088473	£0.00								
									Annual Maintenance (£k):	£3.64											
											£54.97	Total PVc:	£2,316.92								
6	Managed Realignment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00								
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00								
			49	3.00	£3,994	£421	£0	£2,649	£1,413	2,656	£11,133	0.203180599	£2,261.95								
			99	0.20	£0	£0	£0	£0	£0		£0	0.052088473	£0.00								
									Annual Maintenance (£k):	£3.64											
											£54.97	Total PVc:	£2,316.92								
7	Managed Realignment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00								
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00								
			49	3.05	£3,994	£421	£0	£2,649	£1,413	2,656	£11,133	0.203180599	£2,261.95								
			99	0.10	£0	£0	£0	£0	£0		£0	0.052088473	£0.00								
									Annual Maintenance (£k):	£3.64											
											£54.97	Total PVc:	£2,316.92								
8	Managed Realignment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00								
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00								
			49	3.25	£5,258	£421	£0	£3,407	£1,817	2,656	£13,559	0.203180599	£2,754.94								
			99	0.00	£0	£0	£0	£0	£0		£0	0.052088473	£0.00								
									Annual Maintenance (£k):	£3.64											
											£54.97	Total PVc:	£2,809.91								



Defence Length:		SR5-5																	
Flood Cell:		FC5-8																	
Defence Length (km):		9.47		Habitat Area Created (ha):		355.6													
100-yr Discount Factor:		29.813																	
50-yr Discount Factor:		5.317																	
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Land Compensation Costs	Total (£k)	Discount Factor	PVc (£k)						
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00						
			19	0.00	£0	£176	£0	£106	£56		£339	0.52015569	£176.25						
			49	0.00	£0	£353	£0	£212	£113		£678	0.203180599	£137.69						
			99	0.51	£2,946	£854	£0	£2,280	£1,216		£7,296	0.052088473	£380.04						
									Annual Maintenance (Ek):		£10.45								
Maintenance PVC:											£311.41	Total PVc:	£1,005.40						
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00						
			19	0.00	£0	£176	£0	£106	£56		£339	0.52015569	£176.25						
			49	0.08	£0	£706	£0	£424	£226		£1,355	0.203180599	£275.39						
			99	0.52	£2,946	£854	£0	£2,280	£1,216		£7,296	0.052088473	£380.04						
									Annual Maintenance (Ek):		£10.45								
Maintenance PVC:											£311.41	Total PVc:	£1,143.10						
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00						
			19	0.00	£0	£176	£0	£106	£56		£339	0.52015569	£176.25						
			49	0.13	£1,473	£854	£0	£1,396	£745		£4,468	0.203180599	£907.85						
			99	0.57	£2,946	£854	£0	£2,280	£1,216		£7,296	0.052088473	£380.04						
									Annual Maintenance (Ek):		£10.45								
Maintenance PVC:											£311.41	Total PVc:	£1,775.56						
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00						
			19	0.00	£0	£176	£0	£106	£56		£339	0.52015569	£176.25						
			49	0.30	£1,473	£854	£0	£1,396	£745		£4,468	0.203180599	£907.85						
			99	0.62	£2,946	£854	£0	£2,280	£1,216		£7,296	0.052088473	£380.04						
									Annual Maintenance (Ek):		£10.45								
Maintenance PVC:											£311.41	Total PVc:	£1,775.56						
5	Managed Realignment	2.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00						
			19	0.00	£0	£176	£0	£106	£56		£339	0.52015569	£176.25						
			49	0.00	£0	£176	£0	£106	£56	£5,690	£6,028	0.203180599	£1,224.86						
			99	3.00	£9,796	£522	£0	£6,191	£3,302		£19,810	0.052088473	£1,031.86						
									Annual Maintenance (Ek):		£3.97								
Maintenance PVC:											£21.11	Total PVc:	£2,454.09						
6	Managed Realignment	1.0%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00						
			19	0.00	£0	£176	£0	£106	£56		£339	0.52015569	£176.25						
			49	0.00	£0	£176	£0	£106	£56	£5,690	£6,028	0.203180599	£1,224.86						
			99	3.00	£9,796	£522	£0	£6,191	£3,302		£19,810	0.052088473	£1,031.86						
									Annual Maintenance (Ek):		£3.97								
Maintenance PVC:											£21.11	Total PVc:	£2,454.09						
7	Managed Realignment	0.5%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00						
			19	0.00	£0	£176	£0	£106	£56		£339	0.52015569	£176.25						
			49	0.00	£0	£176	£0	£106	£56	£5,690	£6,028	0.203180599	£1,224.86						
			99	3.00	£9,796	£522	£0	£6,191	£3,302		£19,810	0.052088473	£1,031.86						
									Annual Maintenance (Ek):		£3.97								
Maintenance PVC:											£21.11	Total PVc:	£2,454.09						
8	Managed Realignment	0.1%	0	0.00	£0	£0	£0	£0	£0		£0	1	£0.00						
			19	0.00	£0	£176	£0	£106	£56		£339	0.52015569	£176.25						
			49	0.00	£0	£176	£0	£106	£56	£5,690	£6,028	0.203180599	£1,224.86						
			99	3.00	£9,796	£522	£0	£6,191	£3,302		£19,810	0.052088473	£1,031.86						
									Annual Maintenance (Ek):		£3.97								
Maintenance PVC:											£21.11	Total PVc:	£2,454.09						

Defence Length:		SR5-4 and 6											
Flood Cell:		FC5-7											
Defence Length (km):		3.97											
100-yr Discount Factor:		29.813											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)	
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.00	£0	£353	£0	£212	£113	£678	0.203180599	£137.69	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25	
			49	0.40	£1,235	£353	£0	£953	£508	£3,049	0.203180599	£619.43	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.10	£617	£176	£0	£476	£254	£1,524	0.52015569	£792.89	
			49	0.30	£617	£353	£0	£582	£311	£1,863	0.203180599	£378.56	
			99	0.00	£0	£353	£0	£212	£113	£678	0.052088473	£35.30	
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.10	£617	£176	£0	£476	£254	£1,524	0.52015569	£792.89	
			49	0.50	£1,235	£353	£0	£953	£508	£3,049	0.203180599	£619.43	
			99	0.00	£0	£563	£0	£338	£180	£1,081	0.052088473	£56.32	

[illegible]

Defence Length:		SR5-8																	
Flood Cell:		FC5-9		NOTE: assumed that canal bank can be used for realignment.															
Defence Length (km):		5		Habitat Area Created (ha):		184.2													
100-yr Discount Factor:		29.813																	
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Land Compensation Costs	Total (£k)	Discount Factor	PVc (£k)						
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0			£0	1	£0.00						
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13							
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85							
			99	0.00	£0	£176	£0	£106	£56	£339	0.052088473	£17.65							
Annual Maintenance (£k):											£5.52								
Maintenance Pvc:											£164.42	Total PVc:	£339.05						
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0			£0	1	£0.00						
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13							
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85							
			99	0.10	£778	£441	£0	£731	£390	£2,340	0.052088473	£121.90							
Annual Maintenance (£k):											£5.52								
Maintenance Pvc:											£164.42	Total PVc:	£443.29						
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0			£0	1	£0.00						
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13							
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85							
			99	0.20	£778	£441	£0	£731	£390	£2,340	0.052088473	£121.90							
Annual Maintenance (£k):											£5.52								
Maintenance Pvc:											£164.42	Total PVc:	£443.29						
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0			£0	1	£0.00						
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13							
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85							
			99	0.50	£1,555	£441	£0	£1,198	£639	£3,833	0.052088473	£199.67							
Annual Maintenance (£k):											£5.52								
Maintenance Pvc:											£164.42	Total PVc:	£521.06						
5	Managed Realignment	2.0%	0	0.00	£0	£0	£0	£0			£0	1	£2,947.20						
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00							
			49	0.25	£2,750	£415	£0	£1,899	£1,013	£6,076	0.203180599	£1,234.51							
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00							
Annual Maintenance (£k):											£4.96								
Maintenance Pvc:											£147.98	Total PVc:	£4,329.69						
6	Managed Realignment	1.0%	0	0.00	£0	£0	£0	£0			£0	1	£2,947.20						
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00							
			49	0.25	£2,750	£415	£0	£1,899	£1,013	£6,076	0.203180599	£1,234.51							
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00							
Annual Maintenance (£k):											£4.96								
Maintenance Pvc:											£147.98	Total PVc:	£4,329.69						
7	Managed Realignment	0.5%	0	0.00	£0	£0	£0	£0			£0	1	£2,947.20						
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00							
			49	0.25	£2,750	£415	£0	£1,899	£1,013	£6,076	0.203180599	£1,234.51							
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00							
Annual Maintenance (£k):											£4.96								
Maintenance Pvc:											£147.98	Total PVc:	£4,329.69						
8	Managed Realignment	0.1%	0	0.00	£0	£0	£0	£0			£0	1	£2,947.20						
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00							
			49	0.25	£2,750	£415	£0	£1,899	£1,013	£6,076	0.203180599	£1,234.51							
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00							
Annual Maintenance (£k):											£4.96								
Maintenance Pvc:											£147.98	Total PVc:	£4,329.69						



Defence Length:		SR6-0											
Flood Cell:		FC6-1											
Defence Length (km):		3.06											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0		£0	1	£0.00	
			19	0.20	£476	£498	£0	£585	£312	£1,871	0.52015569	£973.07	
			49	0.35	£476	£835	£0	£786	£419	£2,517	0.203180599	£511.34	
			99	0.30	£952	£835	£0	£1,072	£572	£3,430	0.052088473	£178.68	
									Annual Maintenance 0-19-yr (Ex):	£3.38			
									Annual Maintenance 20-49-yr (Ex):	£3.38			

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Defence Length:		SR6-2a											
Flood Cell:		FC6-2											
Defence Length (km):		0.66											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.15	£103	£123	£0	£135	£72	£434	0.52015569	£226.54	
			49	0.35	£103	£211	£0	£188	£101	£603	0.203180599	£122.52	
			99	0.50	£205	£211	£0	£250	£133	£800	0.052088473	£41.68	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £21.70			
										Total PVc:		£411.44	
2	Improved embankment	1.0%	0	0.15	£103	£35	£0	£83	£44	£264	1	£264.17	
			19	0.10	£103	£123	£0	£135	£72	£434	0.52015569	£225.54	
			49	0.25	£103	£211	£0	£188	£101	£603	0.203180599	£122.52	
			99	0.65	£428	£211	£0	£383	£205	£1,227	0.052088473	£63.92	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £21.70			
										Total PVc:		£697.86	
3	Improved embankment	0.5%	0	0.25	£103	£35	£0	£83	£44	£264	1	£264.17	
			19	0.15	£103	£123	£0	£135	£72	£434	0.52015569	£225.54	
			49	0.30	£103	£211	£0	£188	£101	£603	0.203180599	£122.52	
			99	0.55	£205	£211	£0	£250	£133	£800	0.052088473	£41.68	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £21.70			
										Total PVc:		£675.61	
4	Improved embankment	0.1%	0	0.55	£205	£35	£0	£144	£77	£461	1	£461.26	
			19	0.15	£103	£123	£0	£135	£72	£434	0.52015569	£225.54	
			49	0.40	£205	£211	£0	£250	£133	£800	0.203180599	£162.57	
			99	0.40	£205	£211	£0	£250	£133	£800	0.052088473	£41.68	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £21.70			
										Total PVc:		£912.74	
5	Revetment	2.0%	0	2.00	£1,310	£35	£0	£807	£431	£2,583	1	£2,583.04	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.05	£0	£176	£0	£106	£56	£339	0.203180599	£68.85	
			99	0.35	£328	£211	£0	£323	£172	£1,035	0.052088473	£53.91	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £37.19			
										Total PVc:		£2,831.10	
6	Revetment	1.0%	0	2.00	£1,310	£35	£0	£807	£431	£2,583	1	£2,583.04	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.15	£164	£211	£0	£225	£120	£720	0.203180599	£146.38	
			99	0.35	£328	£211	£0	£323	£172	£1,035	0.052088473	£53.91	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £37.19			
										Total PVc:		£2,908.63	
7	Revetment	0.5%	0	2.00	£1,310	£35	£0	£807	£431	£2,583	1	£2,583.04	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.25	£164	£211	£0	£225	£120	£720	0.203180599	£146.38	
			99	0.35	£328	£211	£0	£323	£172	£1,035	0.052088473	£53.91	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £37.19			
										Total PVc:		£2,908.63	
8	Revetment	0.1%	0	2.00	£1,310	£35	£0	£807	£431	£2,583	1	£2,583.04	
			19	0.10	£164	£123	£0	£172	£92	£551	0.52015569	£286.61	
			49	0.25	£164	£211	£0	£225	£120	£720	0.203180599	£146.38	
			99	0.35	£328	£211	£0	£323	£172	£1,035	0.052088473	£53.91	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£3.64 £3.64 £3.64 £108.52			
										Total PVc:		£3,178.45	
9	Rock Armour	2.0%	0	2.00	£1,835	£35	£449	£1,391	£742	£4,451	1	£4,450.87	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.05	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.35	£459	£211	£161	£499	£266	£1,595	0.052088473	£83.10	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £37.19			
										Total PVc:		£4,765.80	
10	Rock Armour	1.0%	0	2.00	£1,835	£35	£449	£1,391	£742	£4,451	1	£4,450.87	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.15	£229	£211	£106	£328	£175	£1,049	0.203180599	£213.20	
			99	0.35	£459	£211	£161	£499	£266	£1,595	0.052088473	£83.10	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £37.19			
										Total PVc:		£4,893.63	
11	Rock Armour	0.5%	0	2.00	£1,835	£35	£449	£1,391	£742	£4,451	1	£4,450.87	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.25	£229	£211	£106	£328	£175	£1,049	0.203180599	£213.20	
			99	0.35	£459	£211	£161	£499	£266	£1,595	0.052088473	£83.10	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£0.73 £0.73 £0.73 £37.19			
										Total PVc:		£4,893.63	
12	Rock Armour	0.1%	0	2.00	£1,835	£35	£449	£1,391	£742	£4,451	1	£4,450.87	
			19	0.10	£229	£123	£85	£262	£89	£339	0.52015569	£436.53	
			49	0.25	£229	£211	£106	£328	£175	£1,049	0.203180599	£213.20	
			99	0.35	£459	£211	£161	£499	£266	£1,595	0.052088473	£83.10	
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVc:	£3.64 £3.64 £3.64 £108.52			
										Total PVc:		£5,292.22	



Defence Length:		SR6-2b													
Flood Cell:		FC6-2													
Defence Length (km):		1.99													
0-19-yr Discount Factor:		14.70983742													
20-49-yr Discount Factor:		9.785468373													
50-99-yr Discount Factor:		5.317239543													
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)		Discount Factor	PVc (£k)		
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0		£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00			
			99	0.50	£619	£105	£0	£435	£232	£1,391	0.052088473	£72.44			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £2.20 £65.44	Total Pvc:	£137.88			
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00			
			99	0.60	£1,290	£105	£0	£837	£446	£2,678	0.052088473	£139.51			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £2.20 £65.44	Total Pvc:	£204.95			
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	0.17	£309	£105	£0	£249	£133	£797	0.203180599	£161.84			
			99	0.55	£619	£105	£0	£435	£232	£1,391	0.052088473	£72.44			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £2.20 £65.44	Total Pvc:	£299.72			
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	0.57	£619	£105	£0	£435	£232	£1,391	0.203180599	£282.57			
			99	0.40	£619	£105	£0	£435	£232	£1,391	0.052088473	£72.44			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £2.20 £65.44	Total Pvc:	£420.46			
5	Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	2.00	£3,951	£105	£0	£2,434	£1,298	£7,788	0.203180599	£1,582.42			
			99	0.00	£0	£105	£0	£63	£34	£202	0.052088473	£10.54			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £10.98 £112.12	Total Pvc:	£1,705.08			
6	Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	2.00	£3,951	£105	£0	£2,434	£1,298	£7,788	0.203180599	£1,582.42			
			99	0.00	£0	£105	£0	£63	£34	£202	0.052088473	£10.54			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £10.98 £112.12	Total Pvc:	£1,705.08			
7	Revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	2.00	£3,951	£105	£0	£2,434	£1,298	£7,788	0.203180599	£1,582.42			
			99	0.10	£494	£105	£0	£360	£192	£1,151	0.052088473	£59.93			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £10.98 £112.12	Total Pvc:	£1,754.47			
8	Revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	2.00	£3,951	£105	£0	£2,434	£1,298	£7,788	0.203180599	£1,582.42			
			99	0.30	£494	£105	£0	£360	£192	£1,151	0.052088473	£59.93			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £10.98 £112.12	Total Pvc:	£1,754.47			
9	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	2.00	£5,531	£105	£1,353	£4,194	£2,237	£13,420	0.203180599	£2,726.69			
			99	0.00	£0	£105	£25	£78	£42	£251	0.052088473	£13.07			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £10.98 £112.12	Total Pvc:	£2,851.88			
10	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	2.00	£5,531	£105	£1,353	£4,194	£2,237	£13,420	0.203180599	£2,726.69			
			99	0.00	£0	£105	£25	£78	£42	£251	0.052088473	£13.07			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £10.98 £112.12	Total Pvc:	£2,851.88			
11	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	2.00	£5,531	£105	£1,353	£4,194	£2,237	£13,420	0.203180599	£2,726.69			
			99	0.10	£691	£105	£191	£593	£316	£1,897	0.052088473	£98.81			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £10.98 £112.12	Total Pvc:	£2,937.63			
12	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	2.00	£5,531	£105	£1,353	£4,194	£2,237	£13,420	0.203180599	£2,726.69			
			99	0.30	£691	£105	£191	£593	£316	£1,897	0.052088473	£98.81			
									Annual Maintenance 0-19-yr (£k): Annual Maintenance 20-49-yr (£k): Annual Maintenance 50-99-yr (£k): Maintenance Pvc:	£2.20 £2.20 £10.98 £112.12	Total Pvc:	£2,937.63			



Defence Length:		SR6-2c											
Flood Cell:		FC6-2											
Defence Length (km):		1.76											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.30	£274	£270	£0	£326	£174	£1,043	0.203180599	£211.98	
			99	0.50	£547	£270	£0	£490	£261	£1,569	0.052088473	£81.72	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.05	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.25	£274	£270	£0	£326	£174	£1,043	0.203180599	£211.98	
			99	0.65	£1,141	£270	£0	£846	£451	£2,708	0.052088473	£141.03	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
3	Improved embankment	0.5%	0	0.05	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.15	£274	£181	£0	£273	£146	£874	0.52015569	£454.56	
			49	0.30	£274	£270	£0	£326	£174	£1,043	0.203180599	£211.98	
			99	0.55	£547	£270	£0	£490	£261	£1,569	0.052088473	£81.72	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
4	Improved embankment	0.1%	0	0.35	£0	£93	£0	£0	£205	£1,230	1	£1,230.02	
			19	0.15	£274	£181	£0	£273	£146	£874	0.52015569	£454.56	
			49	0.40	£547	£270	£0	£490	£261	£1,569	0.203180599	£318.76	
			99	0.40	£547	£270	£0	£490	£261	£1,569	0.052088473	£81.72	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
5	Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	2.00	£3,494	£270	£0	£2,258	£1,204	£7,227	0.203180599	£1,468.37	
			99	0.20	£437	£270	£0	£424	£226	£1,356	0.052088473	£70.65	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
6	Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	2.00	£3,494	£181	£0	£2,205	£1,176	£7,058	0.52015569	£3,671.01	
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85	
			99	0.30	£437	£270	£0	£424	£226	£1,356	0.052088473	£70.65	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
7	Revetment	0.5%	0	2.00	£3,494	£93	£0	£2,153	£1,148	£6,888	1	£6,888.09	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.05	£0	£176	£0	£106	£56	£339	0.203180599	£68.85	
			99	0.35	£874	£270	£0	£686	£366	£2,195	0.052088473	£114.34	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
8	Revetment	0.1%	0	2.00	£3,494	£93	£0	£2,153	£1,148	£6,888	1	£6,888.09	
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13	
			49	0.25	£437	£270	£0	£424	£226	£1,356	0.203180599	£275.60	
			99	0.35	£874	£270	£0	£686	£366	£2,195	0.052088473	£114.34	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
9	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	2.00	£4,892	£270	£1,239	£3,840	£2,048	£12,289	0.203180599	£2,496.92	
			99	0.20	£612	£270	£211	£656	£350	£2,098	0.052088473	£109.28	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
10	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	2.00	£4,892	£181	£1,218	£3,775	£2,013	£12,079	0.52015569	£6,283.00	
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.30	£612	£270	£211	£656	£350	£2,098	0.052088473	£109.28	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
11	Rock Armour	0.5%	0	2.00	£4,892	£93	£1,196	£3,709	£1,978	£11,869	1	£11,868.99	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.05	£0	£176	£42	£131	£70	£420	0.203180599	£85.37	
			99	0.35	£1,223	£270	£358	£1,111	£592	£3,554	0.052088473	£185.11	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			
12	Rock Armour	0.1%	0	2.00	£4,892	£93	£1,196	£3,709	£1,978	£11,869	1	£11,868.99	
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28	
			49	0.25	£612	£270	£211	£656	£350	£2,098	0.203180599	£426.26	
			99	0.35	£1,223	£270	£358	£1,111	£592	£3,554	0.052088473	£185.11	
									Annual Maintenance 0-19-yr (£k):	£1.94			
									Annual Maintenance 20-49-yr (£k):	£1.94			



Defence Length:		SR6-3																	
Flood Cell:		FC6-3																	
Defence Length (km):		2.39																	
0-19-yr Discount Factor:		14.70983742																	
20-49-yr Discount Factor:		9.785468373																	
50-99-yr Discount Factor:		5.317239543																	
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)							
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13							
			49	0.33	£372	£303	£0	£405	£216	£1,295	0.203180599	£263.22							
			99	0.55	£743	£303	£0	£628	£335	£2,009	0.052088473	£104.65							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £2.64 £78.59									
			Total PVc:											£534.59					
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.13	£372	£215	£0	£352	£188	£1,126	0.52015569	£585.72							
			49	0.30	£372	£303	£0	£405	£216	£1,295	0.203180599	£263.22							
			99	0.55	£743	£303	£0	£628	£335	£2,009	0.052088473	£104.65							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £2.64 £78.59									
			Total PVc:											£1,032.15					
3	Improved embankment	0.5%	0	0.13	£372	£127	£0	£299	£159	£957	1	£956.63							
			19	0.15	£372	£215	£0	£352	£188	£1,126	0.52015569	£585.72							
			49	0.30	£372	£303	£0	£405	£216	£1,295	0.203180599	£263.22							
			99	0.50	£743	£303	£0	£628	£335	£2,009	0.052088473	£104.65							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £2.64 £78.59									
			Total PVc:											£1,988.82					
4	Improved embankment	0.1%	0	0.43	£743	£127	£0	£522	£278	£1,670	1	£1,670.31							
			19	0.15	£372	£215	£0	£352	£188	£1,126	0.52015569	£585.72							
			49	0.30	£372	£303	£0	£405	£216	£1,295	0.203180599	£263.22							
			99	0.50	£743	£303	£0	£628	£335	£2,009	0.052088473	£104.65							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £2.64 £78.59									
			Total PVc:											£2,702.45					
5	Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13							
			49	2.00	£4,745	£303	£0	£3,029	£1,615	£9,693	0.203180599	£1,969.34							
			99	0.30	£593	£303	£0	£538	£287	£1,721	0.052088473	£89.63							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £13.18 £134.66									
			Total PVc:											£2,281.76					
6	Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	2.00	£4,745	£215	£0	£2,976	£1,587	£9,523	0.52015569	£4,953.52							
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85							
			99	0.40	£1,186	£303	£0	£894	£477	£2,859	0.052088473	£148.95							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £13.18 £134.66									
			Total PVc:											£5,305.97					
7	Revetment	0.5%	0	2.00	£4,745	£127	£0	£2,923	£1,559	£9,354	1	£9,353.72							
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13							
			49	0.13	£593	£303	£0	£538	£287	£1,721	0.203180599	£349.60							
			99	0.35	£1,186	£303	£0	£894	£477	£2,859	0.052088473	£148.95							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £13.18 £134.66									
			Total PVc:											£10,075.06					
8	Revetment	0.1%	0	2.00	£4,745	£127	£0	£2,923	£1,559	£9,354	1	£9,353.72							
			19	0.08	£0	£88	£0	£53	£28	£169	0.52015569	£88.13							
			49	0.25	£593	£303	£0	£538	£287	£1,721	0.203180599	£349.60							
			99	0.35	£1,186	£303	£0	£894	£477	£2,859	0.052088473	£148.95							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £13.18 £134.66									
			Total PVc:											£10,075.06					
9	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	2.00	£6,643	£303	£1,667	£5,168	£2,756	£16,538	0.203180599	£3,360.14							
			99	0.30	£830	£303	£272	£843	£450	£2,698	0.052088473	£140.56							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £13.18 £134.66									
			Total PVc:											£3,744.64					
10	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00							
			19	2.00	£6,643	£215	£1,646	£5,102	£2,721	£16,328	0.52015569	£8,492.91							
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37							
			99	0.40	£1,661	£303	£471	£1,461	£779	£4,676	0.052088473	£243.54							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £13.18 £134.66									
			Total PVc:											£8,956.45					
11	Rock Armour	0.5%	0	2.00	£6,643	£127	£1,625	£5,037	£2,686	£16,118	1	£16,117.55							
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.13	£830	£303	£272	£843	£450	£2,698	0.203180599	£548.28							
			99	0.35	£1,661	£303	£471	£1,461	£779	£4,676	0.052088473	£243.54							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £13.18 £134.66									
			Total PVc:											£17,153.31					
12	Rock Armour	0.1%	0	2.00	£6,643	£127	£1,625	£5,037	£2,686	£16,118	1	£16,117.55							
			19	0.08	£0	£88	£21	£66	£35	£210	0.52015569	£109.28							
			49	0.25	£830	£303	£272	£843	£450	£2,698	0.203180599	£548.28							
			99	0.35	£1,661	£303	£471	£1,461	£779	£4,676	0.052088473	£243.54							
									Annual Maintenance 0-19-yr (Ex): Annual Maintenance 20-49-yr (Ex): Annual Maintenance 50-99-yr (Ex): Maintenance PVC:	£2.64 £2.64 £13.18 £134.66									
			Total PVc:											£17,153.31					



Defence Length:		SR6-4													
Flood Cell:		FC6-3													
Defence Length (km):		1.25													
0-19-yr Discount Factor:		14.70983742													
20-49-yr Discount Factor:		9.785468373													
50-99-yr Discount Factor:		5.317239543													
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)			
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00			
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13			
			49	0.31	£194	£243	£0	£262	£140	£839	0.203180599	£170.50			
			99	0.50	£389	£243	£0	£379	£202	£1,212	0.052088473	£63.15			

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Defence Length:												
Pilot Cell:												
Defence Length (km):												
0-19 yr Discount Factor:												
20-49 yr Discount Factor:												
50-99 yr Discount Factor:												
Number												
Type												
SoP (P AEP)												
Year												
Defence Height Increase (m)												
Defence Cost (£k)												
Add Ons (£k)												
Uplifts (£k)												
Optimism Bias (£k)												
PAR / Design / Supervision Costs (£k)												
Total (£k)												
Discount Factor												
PVC (£k)												
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	0.00	£0	£363	£0	£212	£113	£978	0.203180599	£137.69
			99	0.50	£1,219	£561	£0	£1,068	£570	£3,417	0.052088473	£178.00
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £688.94
2	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	0.00	£0	£363	£0	£212	£113	£978	0.203180599	£137.69
			99	0.50	£1,219	£561	£0	£1,068	£570	£3,417	0.052088473	£178.00
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £688.94
3	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	0.00	£0	£363	£0	£212	£113	£978	0.203180599	£137.69
			99	0.75	£2,540	£561	£0	£1,860	£950	£5,953	0.052088473	£310.11
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £752.96
4	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	0.62	£1,219	£561	£0	£1,068	£570	£3,417	0.203180599	£894.32
			99	0.75	£2,540	£561	£0	£1,860	£950	£5,953	0.052088473	£310.11
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £1,368.99
5	New embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	1.80	£8,105	£561	£0	£5,199	£2,773	£16,638	0.203180599	£3,380.48
			99	0.50	£0	£561	£0	£336	£179	£1,076	0.052088473	£56.08
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £3,741.26
6	New embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	1.80	£8,105	£561	£0	£5,075	£2,707	£16,239	0.203180599	£3,298.52
			99	0.50	£0	£561	£0	£336	£179	£1,076	0.052088473	£56.08
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £3,686.77
7	New embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	1.80	£8,105	£561	£0	£5,075	£2,707	£16,239	0.203180599	£3,298.52
			99	0.75	£0	£561	£0	£336	£179	£1,076	0.052088473	£56.08
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £3,686.77
8	New embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	0.62	£1,219	£561	£0	£1,068	£570	£3,417	0.203180599	£894.32
			99	0.75	£0	£561	£0	£336	£179	£1,076	0.052088473	£56.08
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £1,368.99
9	Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	1.80	£8,810	£561	£0	£4,422	£2,359	£14,151	0.203180599	£2,875.30
			99	0.00	£0	£363	£0	£212	£113	£978	0.052088473	£35.35
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £3,216.70
10	Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	1.80	£8,810	£561	£0	£4,422	£2,359	£14,151	0.203180599	£2,875.30
			99	0.00	£0	£363	£0	£212	£113	£978	0.052088473	£35.35
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £3,216.70
11	Revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	1.80	£8,810	£561	£0	£4,422	£2,359	£14,151	0.203180599	£2,875.30
			99	0.00	£0	£363	£0	£212	£113	£978	0.052088473	£35.35
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £3,216.70
12	Revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	1.80	£8,172	£561	£0	£4,422	£2,359	£14,151	0.203180599	£2,875.30
			99	0.25	£973	£561	£0	£300	£491	£2,944	0.052088473	£153.39
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £3,333.81
13	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	1.80	£8,172	£561	£2,096	£6,497	£3,465	£20,790	0.203180599	£4,224.22
			99	0.00	£0	£363	£95	£263	£140	£940	0.052088473	£43.77
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £4,615.45
14	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	1.80	£8,172	£561	£2,096	£6,497	£3,465	£20,790	0.203180599	£4,224.22
			99	0.00	£0	£363	£95	£263	£140	£940	0.052088473	£43.77
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £4,615.45
15	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	1.80	£8,172	£561	£2,096	£6,497	£3,465	£20,790	0.203180599	£4,224.22
			99	0.00	£0	£363	£95	£263	£140	£940	0.052088473	£43.77
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £4,615.45
16	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£42	£131	£70	£420	0.52015569	£218.55
			49	1.80	£8,172	£561	£2,096	£6,497	£3,465	£20,790	0.203180599	£4,224.22
			99	0.25	£1,362	£561	£461	£1,430	£763	£4,677	0.052088473	£238.42
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £4,615.45
17	Wave Recurve Wall	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	0.00	£0	£363	£0	£212	£113	£978	0.203180599	£137.69
			99	0.00	£0	£561	£0	£336	£179	£1,076	0.052088473	£56.08
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £4,615.45
18	Wave Recurve Wall	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	0.00	£0	£363	£0	£212	£113	£978	0.203180599	£137.69
			99	0.00	£0	£561	£0	£336	£179	£1,076	0.052088473	£56.08
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £688.94
19	Wave Recurve Wall	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	0.00	£0	£363	£0	£212	£113	£978	0.203180599	£137.69
			99	0.00	£0	£561	£0	£336	£179	£1,076	0.052088473	£56.08
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £688.94
20	Wave Recurve Wall	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£176	£0	£106	£56	£339	0.52015569	£176.25
			49	0.00	£0	£363	£0	£212	£113	£978	0.203180599	£137.69
			99	0.25	£818	£561	£0	£707	£377	£2,263	0.052088473	£117.87
										Annual Maintenance 0-19 yr (£k): £4.32 Annual Maintenance 20-49 yr (£k): £4.32 Annual Maintenance 50-99 yr (£k): £4.32 Maintenance P/c: £128.95		Total P/c: £688.94



Defence Length:				0.00 - 0.25	
Pilot Cell:				0.25 - 0.50	
Defence Length (m):				0.50 - 0.75	
0-19-yr Discount Factor:				0.75 - 1.00	
20-49-yr Discount Factor:				1.00 - 1.25	
50-99-yr Discount Factor:				1.25 - 1.50	
100-yr Discount Factor:				1.50 - 1.75	
175-yr Discount Factor:				1.75 - 2.00	
250-yr Discount Factor:				2.00 - 2.25	
500-yr Discount Factor:				2.25 - 2.50	
1000-yr Discount Factor:				2.50 - 2.75	
2000-yr Discount Factor:				2.75 - 3.00	
5000-yr Discount Factor:				3.00 - 3.25	
10000-yr Discount Factor:				3.25 - 3.50	
20000-yr Discount Factor:				3.50 - 3.75	
50000-yr Discount Factor:				3.75 - 4.00	
100000-yr Discount Factor:				4.00 - 4.25	
200000-yr Discount Factor:				4.25 - 4.50	
500000-yr Discount Factor:				4.50 - 4.75	
1000000-yr Discount Factor:				4.75 - 5.00	
2000000-yr Discount Factor:				5.00 - 5.25	
5000000-yr Discount Factor:				5.25 - 5.50	
10000000-yr Discount Factor:				5.50 - 5.75	
20000000-yr Discount Factor:				5.75 - 6.00	
50000000-yr Discount Factor:				6.00 - 6.25	
100000000-yr Discount Factor:				6.25 - 6.50	
200000000-yr Discount Factor:				6.50 - 6.75	
500000000-yr Discount Factor:				6.75 - 7.00	
1000000000-yr Discount Factor:				7.00 - 7.25	
2000000000-yr Discount Factor:				7.25 - 7.50	
5000000000-yr Discount Factor:				7.50 - 7.75	
10000000000-yr Discount Factor:				7.75 - 8.00	
20000000000-yr Discount Factor:				8.00 - 8.25	
50000000000-yr Discount Factor:				8.25 - 8.50	
100000000000-yr Discount Factor:				8.50 - 8.75	
200000000000-yr Discount Factor:				8.75 - 9.00	
500000000000-yr Discount Factor:				9.00 - 9.25	
1000000000000-yr Discount Factor:				9.25 - 9.50	
2000000000000-yr Discount Factor:				9.50 - 9.75	
5000000000000-yr Discount Factor:				9.75 - 10.00	
10000000000000-yr Discount Factor:				10.00 - 10.25	
20000000000000-yr Discount Factor:				10.25 - 10.50	
50000000000000-yr Discount Factor:				10.50 - 10.75	
100000000000000-yr Discount Factor:				10.75 - 11.00	
200000000000000-yr Discount Factor:				11.00 - 11.25	
500000000000000-yr Discount Factor:				11.25 - 11.50	
1000000000000000-yr Discount Factor:				11.50 - 11.75	
2000000000000000-yr Discount Factor:				11.75 - 12.00	
5000000000000000-yr Discount Factor:				12.00 - 12.25	
10000000000000000-yr Discount Factor:				12.25 - 12.50	
20000000000000000-yr Discount Factor:				12.50 - 12.75	
50000000000000000-yr Discount Factor:				12.75 - 13.00	
100000000000000000-yr Discount Factor:				13.00 - 13.25	
200000000000000000-yr Discount Factor:				13.25 - 13.50	
500000000000000000-yr Discount Factor:				13.50 - 13.75	
1000000000000000000-yr Discount Factor:				13.75 - 14.00	
2000000000000000000-yr Discount Factor:				14.00 - 14.25	
5000000000000000000-yr Discount Factor:				14.25 - 14.50	
10000000000000000000-yr Discount Factor:				14.50 - 14.75	
20000000000000000000-yr Discount Factor:				14.75 - 15.00	
50000000000000000000-yr Discount Factor:				15.00 - 15.25	
100000000000000000000-yr Discount Factor:				15.25 - 15.50	
200000000000000000000-yr Discount Factor:				15.50 - 15.75	
500000000000000000000-yr Discount Factor:				15.75 - 16.00	
1000000000000000000000-yr Discount Factor:				16.00 - 16.25	
2000000000000000000000-yr Discount Factor:				16.25 - 16.50	
5000000000000000000000-yr Discount Factor:				16.50 - 16.75	
10000000000000000000000-yr Discount Factor:				16.75 - 17.00	
20000000000000000000000-yr Discount Factor:				17.00 - 17.25	
50000000000000000000000-yr Discount Factor:				17.25 - 17.50	
100000000000000000000000-yr Discount Factor:				17.50 - 17.75	
200000000000000000000000-yr Discount Factor:				17.75 - 18.00	
500000000000000000000000-yr Discount Factor:				18.00 - 18.25	
1000000000000000000000000-yr Discount Factor:				18.25 - 18.50	
2000000000000000000000000-yr Discount Factor:				18.50 - 18.75	
5000000000000000000000000-yr Discount Factor:				18.75 - 19.00	
10000000000000000000000000-yr Discount Factor:				19.00 - 19.25	
20000000000000000000000000-yr Discount Factor:				19.25 - 19.50	
50000000000000000000000000-yr Discount Factor:				19.50 - 19.75	
100000000000000000000000000-yr Discount Factor:				19.75 - 20.00	
200000000000000000000000000-yr Discount Factor:				20.00 - 20.25	
500000000000000000000000000-yr Discount Factor:				20.25 - 20.50	
1000000000000000000000000000-yr Discount Factor:				20.50 - 20.75	
2000000000000000000000000000-yr Discount Factor:				20.75 - 21.00	
5000000000000000000000000000-yr Discount Factor:				21.00 - 21.25	
10000000000000000000000000000-yr Discount Factor:				21.25 - 21.50	
20000000000000000000000000000-yr Discount Factor:				21.50 - 21.75	
50000000000000000000000000000-yr Discount Factor:				21.75 - 22.00	
100000000000000000000000000000-yr Discount Factor:				22.00 - 22.25	
200000000000000000000000000000-yr Discount Factor:				22.25 - 22.50	
500000000000000000000000000000-yr Discount Factor:				22.50 - 22.75	
1000000000000000000000000000000-yr Discount Factor:				22.75 - 23.00	
2000000000000000000000000000000-yr Discount Factor:				23.00 - 23.25	
5000000000000000000000000000000-yr Discount Factor:				23.25 - 23.50	
10000000000000000000000000000000-yr Discount Factor:				23.50 - 23.75	
20000000000000000000000000000000-yr Discount Factor:				23.75 - 24.00	
50000000000000000000000000000000-yr Discount Factor:				24.00 - 24.25	
100000000000000000000000000000000-yr Discount Factor:				24.25 - 24.50	
200000000000000000000000000000000-yr Discount Factor:				24.50 - 24.75	
500000000000000000000000000000000-yr Discount Factor:				24.75 - 25.00	
1000000000000000000000000000000000-yr Discount Factor:				25.00 - 25.25	
2000000000000000000000000000000000-yr Discount Factor:				25.25 - 25.50	
5000000000000000000000000000000000-yr Discount Factor:				25.50 - 25.75	
10000000000000000000000000000000000-yr Discount Factor:				25.75 - 26.00	
20000000000000000000000000000000000-yr Discount Factor:				26.00 - 26.25	
50000000000000000000000000000000000-yr Discount Factor:				26.25 - 26.50	
100000000000000000000000000000000000-yr Discount Factor:				26.50 - 26.75	
200000000000000000000000000000000000-yr Discount Factor:				26.75 - 27.00	
500000000000000000000000000000000000-yr Discount Factor:				27.00 - 27.25	
1000000000000000000000000000000000000-yr Discount Factor:				27.25 - 27.50	
2000000000000000000000000000000000000-yr Discount Factor:				27.50 - 27.75	
5000000000000000000000000000000000000-yr Discount Factor:				27.75 - 28.00	
10000000000000000000000000000000000000-yr Discount Factor:				28.00 - 28.25	
20000000000000000000000000000000000000-yr Discount Factor:				28.25 - 28.50	
50000000000000000000000000000000000000-yr Discount Factor:				28.50 - 28.75	
100000000000000000000000000000000000000-yr Discount Factor:				28.75 - 29.00	
200000000000000000000000000000000000000-yr Discount Factor:				29.00 - 29.25	
500000000000000000000000000000000000000-yr Discount Factor:				29.25 - 29.50	
1000000000000000000000000000000000000000-yr Discount Factor:				29.50 - 29.75	
2000000000000000000000000000000000000000-yr Discount Factor:				29.75 - 30.00	
5000000000000000000000000000000000000000-yr Discount Factor:				30.00 - 30.25	
100-yr Discount Factor:				30.25 - 30.50	
200-yr Discount Factor:				30.50 - 30.75	
500-yr Discount Factor:				30.75 - 31.00	
1000-yr Discount Factor:				31.00 - 31.25	
2000-yr Discount Factor:				31.25 - 31.50	
5000-yr Discount Factor:				31.50 - 31.75	
100-yr Discount Factor:				31.75 - 32.00	
200-yr Discount Factor:				32.00 - 32.25	
500-yr Discount Factor:				32.25 - 32.50	
1000-yr Discount Factor:				32.50 - 32.75	
2000-yr Discount Factor:				32.75 - 33.00	
5000-yr Discount Factor:				33.00 - 33.25	
100-yr Discount Factor:				33.25 - 33.50	
200-yr Discount Factor:				33.50 - 33.75	
500-yr Discount Factor:				33.75 - 34.00	
1000-yr Discount Factor:				34.00 - 34.25	
2000-yr Discount Factor:				34.25 - 34.50	
5000-yr Discount Factor:				34.50 - 34.75	
100-yr Discount Factor:				34.75 - 35.00	
200-yr Discount Factor:				35.00 - 35.25	
500-yr Discount Factor:				35.25 - 35.50	
1000-yr Discount Factor:				35.50 - 35.75	
2000-yr Discount Factor:				35.75 - 36.00	
5000-yr Discount Factor:				36.00 - 36.25	
100-yr Discount Factor:				36.25 - 36.50	
200-yr Discount Factor:				36.50 - 36.75	
500-yr Discount Factor:				36.75 - 37.00	
1000-yr Discount Factor:				37.00 - 37.25	
2000-yr Discount Factor:				37.25 - 37.50	
5000-yr Discount Factor:				37.50 - 37.75	
100-yr Discount Factor:				37.75 - 38.00	
200-yr Discount Factor:				38.00 - 38.25	
500-yr Discount Factor:				38.25 - 38.50	
1000-yr Discount Factor:				38.50 - 38.75	
2000-yr Discount Factor:				38.75 - 39.00	
5000-yr Discount Factor:				39.00 - 39.25	
100-yr Discount Factor:				39.25 - 39.50	
200-yr Discount Factor:				39.50 - 39.75	
500-yr Discount Factor:				39.75 - 40.00	
1000-yr Discount Factor:				40.00 - 40.25	
2000-yr Discount Factor:				40.25 - 40.50	
5000-yr Discount Factor:				40.50 - 40.75	
100-yr Discount Factor:				40.75 - 41.00	
200-yr Discount Factor:				41.00 - 41.25	
500-yr Discount Factor:				41.25 - 41.50	
1000-yr Discount Factor:				41.50 - 41.75	
2000-yr Discount Factor:				41.75 - 42.00	
5000-yr Discount Factor:				42.00 - 42.25	
100-yr Discount Factor:				42.25 - 42.50	
200-yr Discount Factor:				42.50 - 42.75	
500-yr Discount Factor:				42.75 - 43.00	
1000-yr Discount Factor:				43.00 - 43.25	
2000-yr Discount Factor:				43.25 - 43.50	
5000-yr Discount Factor:				43.50 - 43.75	
100-yr Discount Factor:				43.75 - 44.00	
200-yr Discount Factor:				44.00 - 44.25	
500-yr Discount Factor:				44.25 - 44.50	
1000-yr Discount Factor:				44.50 - 44.75	
2000-yr Discount Factor:				44.75 - 45.00	
5000-yr Discount Factor:				45.00 - 45.25	
100-yr Discount Factor:				45.25 - 45.50	
200-yr Discount Factor:				45.50 - 45.75	
500-yr Discount Factor:				45.75 - 46.00	
1000-yr Discount Factor:				46.00 - 46.25	
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Defence Length:		SR9-1													
Flood Cell:		FC9-0													
Defence Length (km):		0.46													
0-19-yr Discount Factor:		14.70983742													
20-49-yr Discount Factor:		9.785468373													
50-99-yr Discount Factor:		5.317239543													
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)			
1	Wave Recurve Wall	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00			
			99	0.00	£0	£24	£6	£18	£10	£58	0.052088473	£3.02			
2	Wave Recurve Wall	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00			
			99	0.00	£0	£24	£6	£18	£10	£58	0.052088473	£3.02			
3	Wave Recurve Wall	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00			
			99	0.25	£73	£24	£23	£72	£38	£231	0.052088473	£12.02			
4	Wave Recurve Wall	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00			
			49	0.17	£73	£24	£23	£72	£38	£231	0.203180599	£46.88			
			99	0.25	£73	£24	£23	£72	£38	£231	0.052088473	£12.02			
5	Rock Armour	2.0%	0	0.02	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.27	£160	£24	£88	£164	£87	£523	0.52015569	£272.24			
			49	0.67	£479	£24	£242	£447	£239	£1,432	0.203180599	£290.89			
			99	1.00	£639	£24	£319	£589	£314	£1,886	0.052088473	£98.23			
6	Rock Armour	1.0%	0	0.02	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.27	£160	£24	£88	£164	£87	£523	0.52015569	£272.24			
			49	0.67	£479	£24	£242	£447	£239	£1,432	0.203180599	£290.89			
			99	1.00	£639	£24	£319	£589	£314	£1,886	0.052088473	£98.23			
7	Rock Armour	0.5%	0	0.17	£160	£24	£88	£164	£87	£523	£523.37	1	£523.37		
			19	0.47	£320	£24	£165	£305	£163	£978	0.52015569	£508.47			
			49	0.92	£639	£24	£319	£589	£314	£1,886	0.203180599	£383.17			
			99	1.25	£799	£24	£395	£731	£390	£2,340	0.052088473	£121.89			
8	Rock Armour	0.1%	0	0.62	£320	£24	£165	£305	£163	£978	£977.54	1	£977.54		
			19	0.87	£639	£24	£319	£589	£314	£1,886	0.52015569	£980.95			
			49	1.37	£959	£24	£472	£873	£466	£2,794	0.203180599	£567.73			
			99	1.50	£959	£24	£472	£873	£466	£2,794	0.052088473	£145.55			
9	Revetment	2.0%	0	0.02	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.27	£114	£24	£33	£103	£55	£330	0.52015569	£171.54			
			49	0.67	£342	£24	£88	£273	£146	£873	0.203180599	£177.45			
			99	1.00	£457	£24	£115	£358	£191	£1,145	0.052088473	£59.65			
10	Revetment	1.0%	0	0.02	£0	£0	£0	£0	£0	£0	£0	1	£0.00		
			19	0.27	£114	£24	£33	£103	£55	£330	0.52015569	£171.54			
			49	0.67	£342	£24	£88	£273	£146	£873	0.203180599	£177.45			
			99	1.00	£457	£24	£115	£358	£191	£1,145	0.052088473	£59.65			
11	Revetment	0.5%	0	0.17	£114	£24	£33	£103	£55	£330	£329.78	1	£329.78		
			19	0.47	£228	£24	£61	£188	£100	£602	0.52015569	£312.92			
			49	0.92	£457	£24	£115	£358	£191	£1,145	0.203180599	£232.68			
			99	1.25	£571	£24	£143	£443	£236	£1,417	0.052088473	£73.81			
12	Revetment	0.1%	0	0.62	£228	£24	£61	£188	£100	£602	£601.58	1	£601.58		
			19	0.87	£457	£24	£115	£358	£191	£1,145	0.52015569	£595.67			
			49	1.37	£685	£24	£170	£528	£281	£1,689	0.203180599	£343.13			
			99	1.50	£685	£24	£170	£528	£281	£1,689	0.052088473	£87.97			

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Defence Length:		SR9-4															
Flood Cell:		FC9-0															
Defence Length (km):		0.82															
0-19-yr Discount Factor:		14.70983742															
20-49-yr Discount Factor:		9.785468373															
50-99-yr Discount Factor:		5.317239543															
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)					
1	Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£0	£0	£0	£0	0.052088473	£0.00						
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£134.82				
2	Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£0	£0	£0	£0	0.052088473	£0.00						
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£134.82				
3	Revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£43	£0	£26	£14	£83	0.052088473	£4.34					
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£139.17				
4	Revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£43	£0	£26	£14	£83	0.052088473	£4.34					
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£139.17				
5	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£0	£0	£0	£0	0.052088473	£0.00						
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£134.82				
6	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£0	£0	£0	£0	0.052088473	£0.00						
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£134.82				
7	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£43	£10	£32	£17	£103	0.052088473	£5.38					
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£140.21				
8	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.00	£0	£43	£10	£32	£17	£103	0.052088473	£5.38					
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£140.21				
9	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.25	£128	£43	£0	£103	£55	£328	0.052088473	£17.10					
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£151.92				
10	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.50	£255	£43	£0	£179	£96	£573	0.052088473	£29.85					
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£164.67				
11	Improved embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	0.75	£531	£43	£0	£345	£184	£1,104	0.052088473	£57.49					
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£192.31				
12	Improved embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00						
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00						
			99	1.00	£808	£43	£0	£511	£272	£1,634	0.052088473	£85.12					
									Annual Maintenance 0-19-yr (£k):	£4.52							
								Annual Maintenance 20-49-yr (£k):	£4.52								
								Annual Maintenance 50-99-yr (£k):	£4.52								
Maintenance PVC:										£134.82	Total PVC:		£219.82				



Defence Length:		SR9-5															
Flood Cell:		FC9-0															
Defence Length (km):		1.36															
0-19-yr Discount Factor:		14.70983742															
20-49-yr Discount Factor:		9.785468373															
50-99-yr Discount Factor:		5.317239543															
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)					
1	Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13					
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85					
			99	0.25	£338	£248	£0	£352	£188	£1,125	0.052088473	£58.61					
2	Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13					
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85					
			99	0.50	£675	£248	£0	£554	£296	£1,773	0.052088473	£92.36					
3	Revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13					
			49	0.00	£0	£176	£0	£106	£56	£339	0.203180599	£68.85					
			99	0.75	£1,013	£248	£0	£757	£404	£2,421	0.052088473	£126.12					
4	Revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£88	£0	£53	£28	£169	0.52015569	£88.13					
			49	0.30	£338	£248	£0	£352	£188	£1,125	0.203180599	£228.61					
			99	1.00	£1,350	£248	£0	£959	£512	£3,069	0.052088473	£159.87					
5	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28					
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37					
			99	0.25	£473	£248	£173	£536	£286	£1,717	0.052088473	£89.42					
6	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28					
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37					
			99	0.50	£945	£248	£286	£888	£474	£2,842	0.052088473	£148.02					
7	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28					
			49	0.00	£0	£176	£42	£131	£70	£420	0.203180599	£85.37					
			99	0.75	£1,418	£248	£400	£1,240	£661	£3,967	0.052088473	£206.62					
8	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£88	£21	£66	£35	£210	0.52015569	£109.28					
			49	0.30	£473	£248	£173	£536	£286	£1,717	0.203180599	£348.78					
			99	1.00	£1,890	£248	£513	£1,591	£849	£5,092	0.052088473	£265.22					
9	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.10	£212	£160	£0	£223	£119	£714	0.52015569	£371.28					
			49	0.70	£881	£248	£0	£678	£362	£2,169	0.203180599	£440.74					
			99	1.75	£1,872	£248	£0	£1,272	£679	£4,072	0.052088473	£212.08					
10	Improved embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.30	£212	£160	£0	£223	£119	£714	0.52015569	£371.28					
			49	0.85	£881	£248	£0	£678	£362	£2,169	0.203180599	£440.74					
			99	1.75	£1,872	£248	£0	£1,272	£679	£4,072	0.052088473	£212.08					
11	Improved embankment	0.5%	0	0.20	£212	£72	£0	£170	£91	£544	1	£544.36					
			19	0.50	£423	£160	£0	£350	£187	£1,120	0.52015569	£582.52					
			49	1.05	£1,340	£248	£0	£953	£508	£3,049	0.203180599	£619.52					
			99	2.00	£1,872	£248	£0	£1,272	£679	£4,072	0.052088473	£212.08					
12	Improved embankment	0.1%	0	0.55	£423	£72	£0	£297	£158	£950	1	£950.47					
			19	0.95	£1,340	£160	£0	£900	£480	£2,880	0.52015569	£1,497.89					
			49	1.60	£1,634	£248	£0	£1,129	£602	£3,614	0.203180599	£734.22					
			99	2.50	£2,475	£248	£0	£1,634	£872	£5,229	0.052088473	£272.39					



Defence Length:		SR9-6												
Flood Cell:		FC9-0		NOTE: assumed that in the short term improvements are made to Commissioners Bank.										
Defence Length (km) - short term		0.8		Habitat Area Created (ha):		86		129						
Defence Length (km) - medium		2.8												
0-19-yr Discount Factor:		14.70983742												
20-49-yr Discount Factor:		9.785468373												
50-99-yr Discount Factor:		5.317239543												
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Land Compensation Costs	Total (£k)	Discount Factor	PVc (£k)	
1	Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£18	£159	0.52015569	£82.62		
			49	0.37	£199	£176	£0	£225	£75	£675	0.203180599	£137.17		
			99	0.75	£596	£219	£0	£489	£163	£1,466	0.052088473	£76.37		
2	Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£18	£159	0.52015569	£82.62		
			49	0.52	£397	£176	£0	£344	£115	£1,033	0.203180599	£209.79		
			99	0.75	£596	£219	£0	£489	£163	£1,466	0.052088473	£76.37		
3	Revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£18	£159	0.52015569	£82.62		
			49	0.67	£596	£176	£0	£463	£155	£1,390	0.203180599	£282.41		
			99	1.00	£794	£219	£0	£608	£203	£1,824	0.052088473	£94.99		
4	Revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£88	£0	£53	£18	£159	0.52015569	£82.62		
			49	1.07	£993	£219	£0	£727	£243	£2,181	0.203180599	£443.14		
			99	1.00	£794	£219	£0	£608	£203	£1,824	0.052088473	£94.99		
5	Secondary Embankment - short term	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	1.00	£788	£42	£0	£498	£166	£1,376	£2,871	0.52015569	£1,493.28	
			49	0.25	£244	£42	£0	£172	£57		£516	0.203180599	£104.89	
			99	0.25	£244	£42	£0	£172	£57		£516	0.052088473	£26.89	
6	Secondary Embankment - short term	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	1.10	£788	£42	£0	£498	£166	£1,376	£2,871	0.52015569	£1,493.28	
			49	0.25	£244	£42	£0	£172	£57		£516	0.203180599	£104.89	
			99	0.25	£244	£42	£0	£172	£57		£516	0.052088473	£26.89	
7	Secondary Embankment - short term	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	1.20	£874	£42	£0	£560	£184	£1,376	£3,027	0.52015569	£1,574.27	
			49	0.25	£244	£42	£0	£172	£57		£516	0.203180599	£104.89	
			99	0.25	£244	£42	£0	£172	£57		£516	0.052088473	£26.89	
8	Secondary Embankment - short term	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	1.30	£874	£42	£0	£560	£184	£1,376	£3,027	0.52015569	£1,574.28	
			49	0.25	£244	£42	£0	£172	£57		£516	0.203180599	£104.89	
			99	0.25	£244	£42	£0	£172	£57		£516	0.052088473	£26.89	
9	Secondary Embankment - medium term	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00	
			49	2.20	£6,578	£148	£0	£4,036	£1,346	£2,064	£14,172	0.203180599	£2,879.56	
			99	0.25	£855	£148	£0	£602	£201		£1,807	0.052088473	£94.11	
10	Secondary Embankment - medium term	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00	
			49	2.30	£6,578	£148	£0	£4,036	£1,346	£2,064	£14,172	0.203180599	£2,879.56	
			99	0.25	£855	£148	£0	£602	£201		£1,807	0.052088473	£94.11	
11	Secondary Embankment - medium term	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00	
			49	2.35	£6,578	£148	£0	£4,036	£1,346	£2,064	£14,172	0.203180599	£2,879.57	
			99	0.25	£855	£148	£0	£602	£201		£1,807	0.052088473	£94.11	
12	Secondary Embankment - medium term	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0		£0	0.52015569	£0.00	
			49	2.55	£6,578	£148	£0	£4,036	£1,346	£2,064	£14,172	0.203180599	£2,879.57	
			99	0.25	£855	£148	£0	£602	£201		£1,807	0.052088473	£94.11	
				0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
				19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
				49	0.25	£6,578	£148	£0	£4,036	£1,346	£2,064	£14,172	0.203180599	£2,879.57
				99	0.25	£855	£148	£0	£602	£201		£1,807	0.052088473	£94.11

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Defence Length:		SR9-8											
Flood Cell:		FC9-0		NOTE: assumed that Commissioners Bank (medium term) is relatively re-usable.									
Defence Length (km):		1.48											
Secondary Embankment (km):		1.3											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)	
1	Improved revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00		
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00		
			99	0.70	£745	£0	£0	£447	£238	£1,430	0.052088473	£74.46	
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£1.63 £1.63 £1.63 £42.11	Total Pvc:	£116.57	
2	Improved revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00		
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00		
			99	1.00	£993	£0	£0	£596	£318	£1,906	0.052088473	£99.28	
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£1.63 £1.63 £1.63 £42.11	Total Pvc:	£141.39	
3	Improved revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00		
			49	0.35	£248	£0	£0	£149	£79	£477	0.203180599	£96.82	
			99	0.90	£993	£0	£0	£596	£318	£1,906	0.052088473	£99.28	
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£1.63 £1.63 £1.63 £42.11	Total Pvc:	£238.21	
4	Improved revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.35	£248	£0	£0	£149	£79	£477	0.52015569	£247.86	
			49	0.40	£496	£0	£0	£298	£159	£953	0.203180599	£193.63	
			99	1.00	£993	£0	£0	£596	£318	£1,906	0.052088473	£99.28	
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£1.63 £1.63 £1.63 £42.11	Total Pvc:	£582.88	
5	Secondary Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00		
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00		
			99	0.35	£794	£69	£0	£518	£276	£1,657	0.052088473	£86.33	
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£1.63 £1.43 £1.43 £45.67	Total Pvc:	£132.00	
6	Secondary Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00		
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00		
			99	0.35	£794	£69	£0	£518	£276	£1,657	0.052088473	£86.33	
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£1.63 £1.43 £1.43 £45.67	Total Pvc:	£132.00	
7	Secondary Embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00		
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00		
			99	0.35	£794	£69	£0	£518	£276	£1,657	0.052088473	£86.33	
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£1.63 £1.43 £1.43 £45.67	Total Pvc:	£132.00	
8	Secondary Embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	0.52015569	£0.00		
			49	0.00	£0	£0	£0	£0	£0	0.203180599	£0.00		
			99	0.35	£794	£69	£0	£518	£276	£1,657	0.052088473	£86.33	
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£1.63 £1.43 £1.43 £45.67	Total Pvc:	£132.00	



Defence Length:		SR9-RBRB											
Flood Cell:		FC9-0		NOTE: no costs are in here as MR is covered in SR9-8									
Defence Length (km):		0.71											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)		Total (£k)	Discount Factor	PVc (£k)
1	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0		£0	£0	1	£0.00
			19	0.10	£110	£0	£0	£66	£35	£212	0.52015569	£110.28	
			49	0.20	£110	£0	£0	£66	£35	£212	0.203180599	£43.08	
			99	0.40	£221	£0	£0	£133	£71	£424	0.052088473	£22.09	
									Annual Maintenance 0-19-yr (Ek):	£0.78			
									Annual Maintenance 20-49-yr (Ek):	£0.78			
									Annual Maintenance 50-99-yr (Ek):	£0.78			
									Maintenance PVc:	£23.35	Total PVc:	£198.79	
2	Improved embankment	1.0%	0	0.10	£110	£0	£0	£66		£35	£212	1	£212.01
			19	0.10	£110	£0	£0	£66		£35	£212	0.52015569	£110.28
			49	0.20	£110	£0	£0	£66		£35	£212	0.203180599	£43.08
			99	0.40	£221	£0	£0	£133		£71	£424	0.052088473	£22.09
									Annual Maintenance 0-19-yr (Ek):	£0.78			
									Annual Maintenance 20-49-yr (Ek):	£0.78			
									Annual Maintenance 50-99-yr (Ek):	£0.78			
									Maintenance PVc:	£23.35	Total PVc:	£410.80	
3	Improved embankment	0.5%	0	0.20	£110	£0	£0	£66		£35	£212	1	£212.01
			19	0.10	£110	£0	£0	£66		£35	£212	0.52015569	£110.28
			49	0.20	£110	£0	£0	£66		£35	£212	0.203180599	£43.08
			99	0.40	£221	£0	£0	£133		£71	£424	0.052088473	£22.09
									Annual Maintenance 0-19-yr (Ek):	£0.78			
									Annual Maintenance 20-49-yr (Ek):	£0.78			
									Annual Maintenance 50-99-yr (Ek):	£0.78			
									Maintenance PVc:	£23.35	Total PVc:	£410.80	
4	Improved embankment	0.1%	0	0.50	£221	£38	£0	£155		£83	£496	1	£496.20
			19	0.10	£110	£0	£0	£66		£35	£212	0.52015569	£110.28
			49	0.20	£110	£0	£0	£66		£35	£212	0.203180599	£43.08
			99	0.40	£221	£0	£0	£133		£71	£424	0.052088473	£22.09
									Annual Maintenance 0-19-yr (Ek):	£0.78			
									Annual Maintenance 20-49-yr (Ek):	£0.78			
									Annual Maintenance 50-99-yr (Ek):	£0.78			
									Maintenance PVc:	£23.35	Total PVc:	£694.99	

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Defence Length:		SR9-9																			
Flood Cell:		FC9-0																			
Defence Length (km):		2.7				Sand Bay recharge amount is based on total loss of upper (artificial) beach i.e. XS of 20m width by 2m height / 2 as a triangle.															
0-19-yr Discount Factor:		14.70983742				This gives 20m2 per m length, with a length of 2.7km, this gives 54,000m3.															
20-49-yr Discount Factor:		9.785468373				1980s recharged beach is still in reasonable condition, therefore assume recharge once only in each of the medium and long term.															
50-99-yr Discount Factor:		5.317239543																			
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)									
1	Improved dunes	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£1,191	£143	£320	£993	£529	£3,176	0.203180599	£645.40									
			99	0.50	£1,489	£143	£392	£1,214	£648	£3,886	0.052088473	£202.39									
2	Improved dunes	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£1,191	£143	£320	£993	£529	£3,176	0.203180599	£645.40									
			99	0.50	£1,489	£143	£392	£1,214	£648	£3,886	0.052088473	£202.39									
3	Improved dunes	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£1,191	£143	£320	£993	£529	£3,176	0.203180599	£645.40									
			99	0.75	£1,638	£143	£427	£1,325	£707	£4,240	0.052088473	£220.86									
4	Improved dunes	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.34	£1,394	£143	£369	£1,143	£610	£3,659	0.203180599	£743.36									
			99	1.00	£1,787	£143	£463	£1,436	£766	£4,595	0.052088473	£239.32									
5	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00									
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00									
6	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00									
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00									
7	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00									
			99	0.00	£0	£143	£34	£106	£57	£340	0.052088473	£17.73									
8	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00									
			99	0.25	£347	£143	£118	£365	£195	£1,168	0.052088473	£60.82									
9	Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00									
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00									
10	Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00									
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00									
11	Revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00									
			99	0.00	£0	£143	£34	£106	£57	£340	0.052088473	£17.73									
12	Revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00									
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00									
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00									
			99	0.25	£248	£143	£94	£291	£155	£931	0.052088473	£48.50									

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Defence Length:		SR10-0															
Flood Cell:		FC10-0		Note: MR costs are located in SR9-13.													
Defence Length (km):		0.9															
0-19-yr Discount Factor:		14.70983742															
20-49-yr Discount Factor:		9.785468373															
50-99-yr Discount Factor:		5.317239543															
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)					
1	Rock Armour	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.50	£625	£48	£162	£501	£267	£1,602	0.052088473	£83.47					
2	Rock Armour	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.50	£625	£48	£162	£501	£267	£1,602	0.052088473	£83.47					
3	Rock Armour	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.75	£938	£48	£237	£733	£391	£2,347	0.052088473	£122.25					
4	Rock Armour	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	1.00	£1,251	£48	£312	£966	£515	£3,091	0.052088473	£161.03					
5	Improved embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.72	£583	£48	£0	£379	£202	£1,211	0.203180599	£246.11					
			99	2.00	£1,239	£48	£0	£772	£412	£2,470	0.052088473	£128.67					
6	Improved embankment	1.0%	0	0.07	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.22	£140	£48	£0	£113	£60	£360	0.52015569	£187.38					
			49	0.92	£886	£48	£0	£560	£299	£1,794	0.203180599	£364.42					
			99	2.00	£1,239	£48	£0	£772	£412	£2,470	0.052088473	£128.67					
7	Improved embankment	0.5%	0	0.22	£140	£48	£0	£113	£60	£360	1	£360.24					
			19	0.42	£280	£48	£0	£197	£105	£629	0.52015569	£327.17					
			49	1.12	£886	£48	£0	£560	£299	£1,794	0.203180599	£364.42					
			99	2.25	£1,638	£48	£0	£1,011	£539	£3,236	0.052088473	£168.58					
8	Improved embankment	0.1%	0	0.67	£583	£48	£0	£379	£202	£1,211	1	£1,211.27					
			19	0.82	£583	£48	£0	£379	£202	£1,211	0.52015569	£630.05					
			49	1.52	£1,081	£48	£0	£677	£361	£2,167	0.203180599	£440.32					
			99	2.50	£1,974	£48	£0	£1,213	£647	£3,882	0.052088473	£202.19					
9	Revetment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.50	£496	£48	£0	£326	£174	£1,044	0.052088473	£54.41					
10	Revetment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.50	£496	£48	£0	£326	£174	£1,044	0.052088473	£54.41					
11	Revetment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.75	£670	£48	£0	£431	£230	£1,378	0.052088473	£71.78					
12	Revetment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	1.00	£893	£48	£0	£565	£301	£1,807	0.052088473	£94.12					

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Defence Length:		SR10-8											
Flood Cell:		FC10-0											
Defence Length (km):		0.71											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)	
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0		£0	1	£0.00	
			19	0.00	£0	£0	£0	£0		£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0		£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0		£0	0.052088473	£0.00	
									Annual Maintenance 0-19-yr (£k):	£0.78			
									Annual Maintenance 20-49-yr (£k):	£0.78			
									Annual Maintenance 50-99-yr (£k):	£0.78			
						Maintenance Pvc:	£23.35	Total Pvc:	£23.35				
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0		£0	1	£0.00	
			19	0.00	£0	£0	£0	£0		£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0		£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0		£0	0.052088473	£0.00	
									Annual Maintenance 0-19-yr (£k):	£0.78			
									Annual Maintenance 20-49-yr (£k):	£0.78			
									Annual Maintenance 50-99-yr (£k):	£0.78			
						Maintenance Pvc:	£23.35	Total Pvc:	£23.35				
3	Improved Embankment	0.5%	0	0.00	£0	£0	£0	£0		£0	1	£0.00	
			19	0.00	£0	£0	£0	£0		£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0		£0	0.203180599	£0.00	
			99	0.15	£110	£38	£36	£110		£59	0.052088473	£18.36	
									Annual Maintenance 0-19-yr (£k):	£0.78			
									Annual Maintenance 20-49-yr (£k):	£0.78			
									Annual Maintenance 50-99-yr (£k):	£0.78			
						Maintenance Pvc:	£23.35	Total Pvc:	£41.70				
4	Improved Embankment	0.1%	0	0.00	£0	£0	£0	£0		£0	1	£0.00	
			19	0.00	£0	£0	£0	£0		£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0		£0	0.203180599	£0.00	
			99	0.35	£221	£38	£62	£192		£103	0.052088473	£32.05	
									Annual Maintenance 0-19-yr (£k):	£0.78			
									Annual Maintenance 20-49-yr (£k):	£0.78			
									Annual Maintenance 50-99-yr (£k):	£0.78			
						Maintenance Pvc:	£23.35	Total Pvc:	£55.40				



Defence Length:		SR10-9															
Flood Cell:		FC10-1															
Defence Length (km):		3.25															
Secondary Embankment (km):		4															
0-19-yr Discount Factor:		14.70983742															
20-49-yr Discount Factor:		9.785468373															
50-99-yr Discount Factor:		5.317239543															
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)					
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00					
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£3.58 £3.58 £3.58 £106.87	Total Pvc:	£106.87					
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00					
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£3.58 £3.58 £3.58 £106.87	Total Pvc:	£106.87					
3	Improved Embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.00	£0	£0	£0	£0	£0	£0	0.052088473	£0.00					
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£3.58 £3.58 £3.58 £106.87	Total Pvc:	£106.87					
4	Improved Embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	0.20	£505	£172	£0	£407	£217	£1,301	0.052088473	£67.76					
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£3.58 £3.58 £3.58 £106.87	Total Pvc:	£174.63					
5	Managed realignment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	2.90	£9,398	£212	£0	£5,766	£3,075	£18,450	0.052088473	£961.05					
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£3.58 £3.58 £3.58 £106.87	Total Pvc:	£1,067.92					
6	Managed realignment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	3.00	£9,398	£212	£0	£5,766	£3,075	£18,450	0.052088473	£961.05					
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£3.58 £3.58 £3.58 £106.87	Total Pvc:	£1,067.92					
7	Managed realignment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	3.10	£10,884	£212	£0	£6,658	£3,551	£21,305	0.052088473	£1,109.74					
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£3.58 £3.58 £3.58 £106.87	Total Pvc:	£1,216.61					
8	Managed realignment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00					
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00					
			49	0.00	£0	£0	£0	£0	£0	£0	0.203180599	£0.00					
			99	3.30	£10,884	£212	£0	£6,658	£3,551	£21,305	0.052088473	£1,109.74					
									Annual Maintenance 0-19-yr (Ek): Annual Maintenance 20-49-yr (Ek): Annual Maintenance 50-99-yr (Ek): Maintenance Pvc:	£3.58 £3.58 £3.58 £106.87	Total Pvc:	£1,216.61					

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Defence Length:		SR11-RPLB											
Flood Cell:		FC11											
Improved Defence Length (km):		1.6											
Maintained Defence Length (km)		4.72											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.10	£249	£85	£0	£200	£107	£640	0.203180599	£130.12	
			99	0.40	£498	£85	£0	£349	£186	£1,118	0.052088473	£58.25	
									Annual Maintenance 0-19-yr (£k):	£5.21			
									Annual Maintenance 20-49-yr (£k):	£5.21			
								Annual Maintenance 50-99-yr (£k):	£5.21				
								Maintenance PVc:	£155.21	Total PVc:	£343.58		
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.20	£249	£85	£0	£200	£107	£640	0.203180599	£130.12	
			99	0.40	£498	£85	£0	£349	£186	£1,118	0.052088473	£58.25	
									Annual Maintenance 0-19-yr (£k):	£5.21			
									Annual Maintenance 20-49-yr (£k):	£5.21			
								Annual Maintenance 50-99-yr (£k):	£5.21				
								Maintenance PVc:	£155.21	Total PVc:	£343.58		
3	Improved Embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.10	£249	£85	£0	£200	£107	£640	0.52015569	£333.12	
			49	0.20	£249	£85	£0	£200	£107	£640	0.203180599	£130.12	
			99	0.40	£498	£85	£0	£349	£186	£1,118	0.052088473	£58.25	
									Annual Maintenance 0-19-yr (£k):	£5.21			
									Annual Maintenance 20-49-yr (£k):	£5.21			
								Annual Maintenance 50-99-yr (£k):	£5.21				
								Maintenance PVc:	£155.21	Total PVc:	£676.70		
4	Improved Embankment	0.1%	0	0.15	£249	£85	£0	£200	£107	£640	1	£640.42	
			19	0.10	£249	£85	£0	£200	£107	£640	0.52015569	£333.12	
			49	0.20	£249	£85	£0	£200	£107	£640	0.203180599	£130.12	
			99	0.40	£498	£85	£0	£349	£186	£1,118	0.052088473	£58.25	
									Annual Maintenance 0-19-yr (£k):	£5.21			
									Annual Maintenance 20-49-yr (£k):	£5.21			
								Annual Maintenance 50-99-yr (£k):	£5.21				
								Maintenance PVc:	£155.21	Total PVc:	£1,317.12		

Defence Length:		SR11-0												
Flood Cell:		FC11												
Improved Defence Length (km):		2.01												
Maintained Defence Length (km):		2.01												
0-19-yr Discount Factor:		14.70983742												
20-49-yr Discount Factor:		9.785468373												
50-99-yr Discount Factor:		5.317239543												
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)		
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
3	Improved Embankment	0.5%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	
4	Improved Embankment	0.1%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.00	£0	£0	£0	£0	£0	£0	£0	0.203180599	£0.00	
			99	0.00	£0	£0	£0	£0	£0	£0	£0	0.052088473	£0.00	



Defence Length:		SR11-1											
Flood Cell:		FC11											
Improved Defence Length (km):		0.66											
Maintained Defence Length (km)		0.66											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)	
1	Improved Embankment	2.0%	0	0.35	£103	£35	£0	£83	£44	£264	1	£264.17	
			19	0.15	£103	£35	£0	£83	£44	£264	0.52015569	£137.41	
			49	0.55	£205	£35	£0	£144	£77	£461	0.203180599	£93.72	
			99	1.00	£650	£35	£0	£411	£219	£1,315	0.052088473	£68.51	
									Annual Maintenance 0-19-yr (£k):	£0.73			
									Annual Maintenance 20-49-yr (£k):	£0.73			
2	Improved Embankment	1.0%	0	0.50	£205	£35	£0	£144	£77	£461	1	£461.26	
			19	0.15	£103	£35	£0	£83	£44	£264	0.52015569	£137.41	
			49	0.55	£205	£35	£0	£144	£77	£461	0.203180599	£93.72	
			99	1.00	£650	£35	£0	£411	£219	£1,315	0.052088473	£68.51	
									Annual Maintenance 0-19-yr (£k):	£0.73			
									Annual Maintenance 20-49-yr (£k):	£0.73			
3	Improved Embankment	0.5%	0	0.90	£650	£35	£0	£411	£219	£1,315	1	£1,315.28	
			19	0.15	£103	£35	£0	£83	£44	£264	0.52015569	£137.41	
			49	0.55	£205	£35	£0	£144	£77	£461	0.203180599	£93.72	
			99	1.00	£650	£35	£0	£411	£219	£1,315	0.052088473	£68.51	
									Annual Maintenance 0-19-yr (£k):	£0.73			
									Annual Maintenance 20-49-yr (£k):	£0.73			
4	Improved Embankment	0.1%	0	1.25	£721	£35	£0	£454	£242	£1,452	1	£1,452.26	
			19	0.15	£103	£35	£0	£83	£44	£264	0.52015569	£137.41	
			49	0.55	£205	£35	£0	£144	£77	£461	0.203180599	£93.72	
			99	1.00	£650	£35	£0	£411	£219	£1,315	0.052088473	£68.51	
									Annual Maintenance 0-19-yr (£k):	£0.73			
									Annual Maintenance 20-49-yr (£k):	£0.73			
										Annual Maintenance 50-99-yr (£k):	£0.73		
										Maintenance PVc:	£21.70	Total PVc:	£1,773.60

Defence Length:		SR11-2+3										
Flood Cell:		FC11										
Improved Defence Length (km):		1.75										
Maintained Defence Length (km):		1.75										
0-19-yr Discount Factor:		14.70983742										
20-49-yr Discount Factor:		9.785468373										
50-99-yr Discount Factor:		5.317239543										
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	Pvc (£k)
1	Improved Embankment	2.0%	0	1.50	£3,125	£93	£0	£1,931	£1,030	£6,178	1	£6,178.12
			19	0.50	£544	£93	£0	£382	£204	£1,223	0.52015569	£636.17
			49	0.70	£1,134	£93	£0	£736	£393	£2,355	0.203180599	£478.54
			99	1.00	£1,724	£93	£0	£1,090	£581	£3,487	0.052088473	£181.66
									Annual Maintenance 0-19-yr (£k):	£1.93		
									Annual Maintenance 20-49-yr (£k):	£1.93		
									Annual Maintenance 50-99-yr (£k):	£1.93		
									Maintenance Pvc:	£57.55	Total Pvc:	£7,532.03
2	Improved Embankment	1.0%	0	2.00	£4,112	£93	£0	£2,522	£1,345	£8,072	1	£8,071.99
			19	0.50	£544	£93	£0	£382	£204	£1,223	0.52015569	£636.17
			49	0.70	£1,134	£93	£0	£736	£393	£2,355	0.203180599	£478.54
			99	1.00	£1,724	£93	£0	£1,090	£581	£3,487	0.052088473	£181.66
									Annual Maintenance 0-19-yr (£k):	£1.93		
									Annual Maintenance 20-49-yr (£k):	£1.93		
									Annual Maintenance 50-99-yr (£k):	£1.93		
									Maintenance Pvc:	£57.55	Total Pvc:	£9,425.90
3	Improved Embankment	0.5%	0	3.00	£4,112	£93	£0	£2,522	£1,345	£8,072	1	£8,071.99
			19	0.50	£544	£93	£0	£382	£204	£1,223	0.52015569	£636.17
			49	0.70	£1,134	£93	£0	£736	£393	£2,355	0.203180599	£478.54
			99	1.00	£1,724	£93	£0	£1,090	£581	£3,487	0.052088473	£181.66
									Annual Maintenance 0-19-yr (£k):	£1.93		
									Annual Maintenance 20-49-yr (£k):	£1.93		
									Annual Maintenance 50-99-yr (£k):	£1.93		
									Maintenance Pvc:	£57.55	Total Pvc:	£9,425.90
4	Improved Embankment	0.1%	0	3.85	£6,063	£93	£0	£3,693	£1,970	£11,819	1	£11,818.59
			19	0.50	£544	£93	£0	£382	£204	£1,223	0.52015569	£636.17
			49	0.70	£1,134	£93	£0	£736	£393	£2,355	0.203180599	£478.54
			99	1.00	£1,724	£93	£0	£1,090	£581	£3,487	0.052088473	£181.66
									Annual Maintenance 0-19-yr (£k):	£1.93		
									Annual Maintenance 20-49-yr (£k):	£1.93		
									Annual Maintenance 50-99-yr (£k):	£1.93		
									Maintenance Pvc:	£57.55	Total Pvc:	£13,172.51



Defence Length:		SR11-4											
Flood Cell:		FC11											
Improved Defence Length (km):		1											
Maintained Defence Length (km):		1											
0-19-yr Discount Factor:		14.70983742											
20-49-yr Discount Factor:		9.785468373											
50-99-yr Discount Factor:		5.317239543											
Number	Type	SoP (% AEP)	Year	Defence Height Increase (m)	Defence Cost (£k)	Add Ons (£k)	Uplifts (£k)	Optimism Bias (£k)	PAR / Design / Supervision Costs (£k)	Total (£k)	Discount Factor	PVc (£k)	
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.20	£156	£53	£0	£125	£67	£400	0.203180599	£81.33	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	1	£0.00	
			19	0.00	£0	£0	£0	£0	£0	£0	0.52015569	£0.00	
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
3	Improved Embankment	0.5%	0	0.20	£156	£53	£0	£125	£67	£400	1	£400.26	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
4	Improved Embankment	0.1%	0	0.40	£311	£53	£0	£218	£116	£699	1	£698.87	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.80	£648	£53	£0	£421	£224	£1,346	0.203180599	£273.45	
			99	0.45	£311	£53	£0	£218	£116	£699	0.052088473	£36.40	
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.20	£156	£53	£0	£125	£67	£400	0.203180599	£81.33	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
3	Improved Embankment	0.5%	0	0.20	£156	£53	£0	£125	£67	£400	1	£400.26	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
4	Improved Embankment	0.1%	0	0.40	£311	£53	£0	£218	£116	£699	1	£698.87	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.80	£648	£53	£0	£421	£224	£1,346	0.203180599	£273.45	
			99	0.45	£311	£53	£0	£218	£116	£699	0.052088473	£36.40	
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.20	£156	£53	£0	£125	£67	£400	0.203180599	£81.33	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
3	Improved Embankment	0.5%	0	0.20	£156	£53	£0	£125	£67	£400	1	£400.26	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
4	Improved Embankment	0.1%	0	0.40	£311	£53	£0	£218	£116	£699	1	£698.87	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.80	£648	£53	£0	£421	£224	£1,346	0.203180599	£273.45	
			99	0.45	£311	£53	£0	£218	£116	£699	0.052088473	£36.40	
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.20	£156	£53	£0	£125	£67	£400	0.203180599	£81.33	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
3	Improved Embankment	0.5%	0	0.20	£156	£53	£0	£125	£67	£400	1	£400.26	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
4	Improved Embankment	0.1%	0	0.40	£311	£53	£0	£218	£116	£699	1	£698.87	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.80	£648	£53	£0	£421	£224	£1,346	0.203180599	£273.45	
			99	0.45	£311	£53	£0	£218	£116	£699	0.052088473	£36.40	
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.20	£156	£53	£0	£125	£67	£400	0.203180599	£81.33	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
3	Improved Embankment	0.5%	0	0.20	£156	£53	£0	£125	£67	£400	1	£400.26	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
4	Improved Embankment	0.1%	0	0.40	£311	£53	£0	£218	£116	£699	1	£698.87	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.80	£648	£53	£0	£421	£224	£1,346	0.203180599	£273.45	
			99	0.45	£311	£53	£0	£218	£116	£699	0.052088473	£36.40	
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.20	£156	£53	£0	£125	£67	£400	0.203180599	£81.33	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
3	Improved Embankment	0.5%	0	0.20	£156	£53	£0	£125	£67	£400	1	£400.26	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
4	Improved Embankment	0.1%	0	0.40	£311	£53	£0	£218	£116	£699	1	£698.87	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	
			49	0.80	£648	£53	£0	£421	£224	£1,346	0.203180599	£273.45	
			99	0.45	£311	£53	£0	£218	£116	£699	0.052088473	£36.40	
1	Improved Embankment	2.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.20	£156	£53	£0	£125	£67	£400	0.203180599	£81.33	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
2	Improved Embankment	1.0%	0	0.00	£0	£0	£0	£0	£0	£0	£0	1	£0.00
			19	0.00	£0	£0	£0	£0	£0	£0	£0	0.52015569	£0.00
			49	0.50	£311	£53	£0	£218	£116	£699	0.203180599	£142.00	
			99	0.70	£648	£53	£0	£421	£224	£1,346	0.052088473	£70.10	
3	Improved Embankment	0.5%	0	0.20	£156	£53	£0	£125	£67	£400	1	£400.26	
			19	0.20	£156	£53	£0	£125	£67	£400	0.52015569	£208.20	

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Appendix N : Benefit-Cost Assessment








LOCATION				Do Minimum PVb (£K)	Do Something PVb (£K)						PVc for Do Minimum(£K)	PVc for improving defences in their current form when and where necessary (£K)				PVc for best value defence hardening when and where necessary (£K)				PVc for best value improvements and construction of realignments when and where relevant (£K)				
Relevant placename	Strategic flood sub-	Habitat Behaviour Unit	Strategic sub- reach	SoP reduces over time	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	MR environmental		SoP reduces over time	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	
Penarth	FC1-P	2	SR1-P	0	299	256	320	369	0		14	82	200	300	479	0	0	0	0	0	0	0	0	0
Tremorfa	FC1-0		SR1-CF	25,395	534,211	560,546	578,766	621,271	0		871	898	1,245	1,245	1,245	0	0	0	0	0	0	0	0	0
			SR1-RRWB								214	220	527	527	527	0	0	0	0	0	0	0	0	0
			SR1-RRWB1								54	100	100	100	271	0	0	0	0	0	0	0	0	0
Wentlooge Levels	FC1-1	3	SR1-RREB	490,578	653,763	723,992	783,335	846,347	0		33	138	546	546	850	236	347	1,068	1,678	138	546	546	850	
			SR1-0								122	348	353	353	386	348	353	353	386	348	353	353	386	
			SR1-1								59	162	162	209	321	795	795	795	795	162	162	209	321	
			SR1-2								24	448	826	1,071	1,130	2,332	4,413	4,526	4,526	1,689	2,074	2,342	2,439	
			SR1-3								84	668	727	727	1,211	1,404	1,404	1,404	1,487	1,145	1,145	1,380	1,877	
			SR1-4								281	513	513	513	513	513	513	513	513	908	908	962	1,016	
			SR1-5								128	132	132	132	132	132	132	132	132	332	332	359	386	
			SR1-6								110	311	311	311	364	1,764	1,764	1,872	1,872	1,085	1,085	1,190	1,296	
			SR1-REWB								59	61	61	61	100	644	644	644	701	461	461	461	568	
River Ebbw - River Usk	FC1-2	3	SR1-REEB	-157,346	133,089	147,446	159,723	176,018	0		27	46	46	59	129	271	297	297	323	NA	NA	NA	NA	
			SR1-RUWB1								120	671	671	671	671	5,678	5,678	5,989	6,404	NA	NA	NA	NA	
			SR1-RUWB2								184	1,497	2,351	2,351	3,206	1,497	2,351	2,351	3,206	NA	NA	NA	NA	
			SR1-RUWB3								635	830	830	981	1,702	830	830	981	1,702	NA	NA	NA	NA	
Caldicot Levels	FC2-0	3	SR2-RUEB1	39,018	1,220,358	1,303,059	1,427,245	1,569,225	0		238	756	756	411	756	627	627	627	627	756	756	411	756	
			SR2-RUEB2								86	1,085	1,085	1,556	2,575	1,085	1,085	1,556	2,575	1,085	1,085	1,556	2,575	
			SR2-RUEB3								732	1,007	1,007	1,333	1,333	1,007	1,007	1,333	1,333	1,007	1,007	1,333	1,333	
			SR2-RUEB4								79	1,168	1,925	1,925	2,682	1,168	1,925	1,925	2,682	1,168	1,925	1,925	2,682	
			SR2-RUEB5								171	176	176	176	224	176	176	176	224	176	176	176	224	
			SR2-0								801	825	825	825	825	825	825	825	825	825	825	825	825	
			SR2-1								475	1,181	1,181	1,201	1,294	1,181	1,181	1,201	1,294	3,087	3,087	3,173	3,259	
			SR2-2								355	589	589	589	589	589	589	589	589	1,441	1,441	1,554	1,667	
			SR2-3								119	2,389	2,389	2,448	2,448	2,483	2,483	2,483	2,717	3,680	3,680	3,856	4,031	
			SR2-4								240	901	901	1,679	3,140	901	901	1,679	3,140	901	901	1,679	3,140	
			SR2-5								654	1,529	2,138	1,958	4,954	1,529	2,138	1,958	4,954	1,529	2,138	1,958	4,954	
			SR2-6								63	1,580	1,580	2,000	2,929	2,646	2,646	6,330	12,129	1,580	1,580	2,000	2,929	
Mathern	FC2-1	4	SR2-7	4,297	8,110	8,469	9,059	9,709	0		649	2,373	2,936	4,375	5,790	2,373	2,936	4,375	5,790	3,143	3,705	5,144	6,452	
			SR2-8								56	1,281	1,427	1,536	1,815	726	1,075	2,006	2,221	1,569	1,715	1,824	2,103	





LOCATION				Do Minimum PVb (£K)	Do Something PVb (£K)						PVc for Do Minimum(£K)	PVc for improving defences in their current form when and where necessary (£K)					PVc for best value defence hardening when and where necessary (£K)				PVc for best value improvements and construction of realignments when and where relevant (£K)			
Relevant placename	Strategic flood sub-	Habitat Behaviour Unit	Strategic sub- reach	SoP reduces over time	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	MR environmental		SoP reduces over time	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	
Tidenham	FC3-1	5	SR3-0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	
			SR3-1							12	0	0	0	0	0	0	0	0	0	0	0			
			SR3-2							0	0	0	0	0	0	0	0	0	0	0	0			
Stroat	FC3-2		SR3-3	0	0	0	0	0	3,345		67	0	0	0	0	0	0	0	0	1,322	1,322	1,322	1,322	
			SR3-4							0	0	0	0	0	0	0	0	0	0	0	0			
Lydney	FC3-3		SR3-5	6,610	13,238	13,655	14,883	17,929	2,777		173	574	574	805	1,332	0	0	0	0	1,736	1,857	1,857	1,857	
Purton	FC4-1	6	SR4-0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	
Awre	FC4-3		SR4-2	0	0	0	0	0	12,262		118	3,921	6,476	6,476	8,956	0	0	0	0	3,238	3,238	3,238	3,238	
Bullo	FC4-4		SR4-3	0	0	0	0	0	0		66	68	68	68	68	0	0	0	0	0	0	0	0	
Ruddle	FC4-5		SR4-3	0	0	0	0	0	0		66	68	68	68	68	0	0	0	0	0	0	0	0	
Newnham-on-Severn	FC4-6		SR4-3	6,184	8,683	8,600	8,729	9,080	0		66	1,090	1,426	1,481	2,161	0	0	0	0	0	0	0	0	
Westbury-on-Severn and Rodley	FC4-7		SR4-4	25,697	29,947	30,488	30,923	32,379	0		36	1,218	1,321	1,559	1,969	0	0	0	0	1,218	1,321	1,559	1,969	
			SR4-5							0	0	0	0	0	0	0	0	0	0	0				
			SR4-6							185	550	550	550	550	0	0	0	0	2,963	2,963	2,963	2,963		
Wallmore Common	FC4-8		SR4-8	3,458	8,857	8,959	9,280	9,928	0		83	86	86	266	320	0	0	0	0	0	0	0	0	
Minsterworth	FC4-9		SR4-9	19,031	21,129	21,129	21,129	21,403	0		74	76	76	76	436	0	0	0	0	0	0	0	0	
Minsterworth Ham	FC4-10		SR4-10	10,336	15,823	16,557	16,854	17,545	32,213		324	1,106	1,106	1,267	5,815	0	0	0	0	1,295	1,295	1,726	1,726	
River Leadon	FC4-11		SR4-11	NA	NA	NA	NA	NA	NA		NA	0	0	0	0	0	0	0	0	0	0	0	0	
The Rea	FC5-3		SR5-0	4,638	5,996	6,544	6,911	7,461	0		164	392	392	392	2,714	0	0	0	0	0	0	0	0	
Stonebench	FC5-4		SR5-1	888	1,303	1,303	1,303	1,303	0		92	334	334	568	1,481	0	0	0	0	0	0	0	0	
Elmore Back	FC5-5		SR5-2	2,429	5,413	5,413	5,213	6,283	12,246		201	2,547	2,647	3,467	5,722	0	0	0	0	10,397	11,424	11,424	12,377	
Longney	FC5-6	SR5-3	5,127	8,913	9,178	9,404	10,362	7,130		124	488	548	548	629	0	0	0	0	2,433	2,433	2,433	2,950		
Upper Framilode	FC5-7	SR5-4	15,138	45,313	48,018	51,865	59,856	0		131	494	990	1,404	1,679	0	0	0	0	0	0	0	0		
		SR5-6							38	39	39	39	39	0	0	0	0	0	0					
Arlingham	FC5-8	SR5-5	3,696	10,147	17,242	18,310	21,197	4,731		311	321	1,200	1,532	1,864	0	0	0	0	0	0	0	2,577		
Slimbridge	FC5-9	SR5-7	2,320	0	0	0	11,502	15,488		89	452	452	452	510	0	0	0	0	452	452	452	510		
		SR5-8							164	349	457	457	537	0	0	0	0	4,546	4,546	4,546	4,546			



[illegible]



LOCATION				Benefit-Cost Ratios																Incremental Benefit-Cost Ratios															
				BCR for Do Minimum	BCR for improving defences in their current form when and where necessary					BCR for best value defence hardening when and where necessary					BCR for constructing realignments when and where relevant					IBCR for Do Minimum	IBCR for improving defences in their current form when and where necessary					IBCR for best value defence hardening when and where necessary					IBCR for constructing alignmentswhen and where relevant				
Relevant placename	Strategic flood sub-	Habitat Behaviour Unit	Strategic sub-reach	SoP reduces over time	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	SoP reduces over time	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP		
Tidenham	FC3-1	5	SR3-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
			SR3-1																																
			SR3-2																																
			SR3-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5	2.5	2.5	2.5																		
Stroat	FC3-2		SR3-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Lydney	FC3-3		SR3-5	38.3	23.1	23.8	18.5	13.5	NA	NA	NA	NA	9.2	8.8	9.5	11.1	NA	17	#DIV/0!	5	6	NA	NA	NA	NA	NA	4	NA	NA	NA	NA	NA	NA		
Purton	FC4-1	6	SR4-0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Awre	FC4-3		SR4-2	NA	0.0	0.0	0.0	0.0	NA	NA	NA	NA	3.8	3.8	3.8	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Bullo	FC4-4		SR4-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Ruddle	FC4-5		SR4-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Newnham-on-Severn	FC4-6		SR4-3	94.0	8.0	6.0	5.9	4.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2	0	2	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
			SR4-4																																
Westbury-on-Severn and Rodley	FC4-7		SR4-5	116.3	16.9	16.3	14.7	12.9	NA	NA	NA	NA	7.2	7.1	6.8	6.6	NA	3	5	2	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
			SR4-6																																
Wallmore Common	FC4-8		SR4-8	41.6	NA	NA	34.9	31.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	32	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Minsterworth	FC4-9		SR4-9	258.4	NA	NA	NA	49.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Minsterworth Ham	FC4-10		SR4-10	31.9	14.3	15.0	13.3	3.0	NA	NA	NA	NA	37.1	37.7	28.4	28.8	NA	7	NA	2	NA	NA	NA	NA	NA	NA	6	NA	1	NA	NA	NA	NA	NA	
River Leaden	FC4-11		SR4-11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
The Rea	FC5-3		SR5-0	28.2	15.3	16.7	17.6	2.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Stonebench	FC5-4		SR5-1	9.7	3.9	3.9	2.3	0.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Elmore Back	FC5-5		SR5-2	12.1	2.1	2.0	1.5	1.1	NA	NA	NA	NA	1.7	1.5	1.5	1.5	NA	1	0	0	0	NA	NA	NA	NA	NA	NA	0	NA	NA	1	NA	NA		
Longney	FC5-6		SR5-3	41.2	18.3	16.7	17.2	16.5	NA	NA	NA	NA	6.6	6.7	6.8	5.9	NA	10	NA	NA	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	
			SR5-4																																
Upper Framilode	FC5-7		SR5-6	89.9	85.0	46.6	35.9	34.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	5	9	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Arlingham	FC5-8		SR5-5	11.9	NA	14.4	NA	11.4	NA	NA	NA	NA	NA	NA	NA	10.1	NA	15	NA	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8	NA	NA	
			SR5-7																																
Slimbridge	FC5-9		SR5-8	9.1	0.0	0.0	0.0	11.0	NA	NA	NA	NA	3.1	3.1	3.1	5.3	NA	-4	0	#DIV/0!	83	NA	NA	NA	NA	NA	NA	NA	#DIV/0!	197	NA	NA	NA	NA	

LOCATION				Benefit-Cost Ratios														Incremental Benefit-Cost Ratios													
				BCR for Do Minimum	BCR for improving defences in their current form when and where necessary				BCR for best value defence hardening when and where necessary				BCR for constructing realignments when and where relevant				iBCR for Do Minimum	iBCR for improving defences in their current form when and where necessary				iBCR for best value defence hardening when and where necessary				iBCR for constructing alignmentswhen and where relevant					
Relevant placename	Strategic flood sub-	Habitat Behaviour Unit	Strategic sub-reach	SoP reduces over time	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	SoP reduces over time	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP	2% AEP SoP	1% AEP SoP	0.5 % AEP SoP	0.1 % AEP SoP		
Berkeley	FC6-1	5	SR6-0	150.0	22.7	13.1	10.3	7.5	9.6	6.3	4.1	4.2	NA	NA	NA	NA	NA	10	1	1	2	NA	1	0	5	NA	NA	NA	NA		
			SR6-1																												
Shepperdine	FC6-2		SR6-2a																												
			SR6-2b																												
Littleton-upon-Severn	FC6-3		SR6-2c																												
		SR6-3																													
		SR6-4																													
Avonmouth to Aust	FC7-0	4	SR7-0	76.0	75.8	84.6	67.2	40.7	79.3	82.3	67.7	52.2	127.0	88.2	46.0	58.4	NA	NA	NA	12	9	-47	188	14	17	-53	16	4	-39		
			SR7-1																												
		SR7-2																													
		SR7-3																													
		SR7-4																													
		SR7-5																													
		SR7-6																													
		SR7-7																													
		SR7-8																													
		Portbury	FC8-0																												SR8-0
Woodhill	FC8-1		SR8-1	0.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
Clevedon to Weston-Super-Mare	FC9-0	3	SR9-0	920.7	172.2	430.7	402.5	300.2	171.9	431.4	403.6	310.8	109.2	285.5	309.4	298.5	NA	-21	4354	243	74	NA	4582	245	82	NA	27526	1994	209		
			SR9-1																												
			SR9-2																												
			SR9-3																												
			SR9-4																												
			SR9-5																												
			SR9-6																												
			SR9-7																												
			SR9-CYRB																												
			SR9-CYLB																												
		SR9-8																													
		SR9-RBRB																													
		SR9-RBLB																													
		2	SR9-9LS																												
			SR9-9																												
SR9-10																															
SR9-11																															
Brean to Burnham-on-Sea	FC10-0		SR9-12	138.1	1609.0	1349.1	892.8	556.0	1657.1	1381.7	915.6	567.1	476.6	491.6	498.0	505.5	NA	4809	221	47	64	NA	221	48	65	NA	11661782	NA	734		
			SR9-13																												
			SR10-0																												
			SR10-1																												
			SR10-2																												
			SR10-3																												
			SR10-4																												
			SR10-5																												
			SR10-6																												
			SR10-7																												
SR10-8																															
Huntspill	FC10-1	1	SR10-9a	9.0	482.7	488.9	512.8	368.5	NA	NA	NA	NA	49.8	50.4	46.3	54.0	NA	NA	#DIV/0!	#DIV/0!	141	NA	NA	NA	NA	44	NA	17	NA		
			SR10-9b																												
			SR10-9c																												
Pawlett	FC10-2		SR10-RPRBa	76.6	61.4	63.6	52.4	26.7	NA	NA	NA	NA	20.4	20.9	21.6	23.1	NA	NA	1413362	12	5	NA	NA	NA	NA	3	355436	539514	1191731		
			SR10-RPRBb																												
			SR10-RPRBc																												
Steart Peninsula	FC11-0		SR11-RPLB	6.8	2.3	1.9	1.7	1.3	NA	NA	NA	NA	3.0	2.8	2.7	2.7	NA	2	0	0	-1	NA	NA	NA	NA	1	1	0	2		
			SR11-0																												
			SR11-1																												
			SR11-2																												
			SR11-3																												
			SR11-4																												
SR11-5																															



LOCATION				Optimised SoP and FDGiA funding	Technical solution and epochal timing		
Relevant placename	Strategic flood sub-	Habitat Behaviour Unit	Strategic sub-reach				
Penarth	FC1-P	2	SR1-P	2% SoP with defences improved in their current form when and where necessary. BCR of 1.3, with IBCR of 4.	Penarth sea wall raised with a 1m wave recurve in the medium to long term, with toe maintained/protected.		
Tremorfa	FC1-0		SR1-CF	0.1% SoP with defences improved in their current form when and where necessary. BCR of 304, with IBCR of 248.	Cardiff Flats frontage maintained with rock armouring on front face and toe.		
			SR1-RRWB		Cardiff Flats frontage maintained with rock armouring and man made ground levels.		
			SR1-RRWB1		River Rhymney west bank embankments being maintained generally and a short length raised in the short term. Embankments raised by up to 0.8m in the medium to long term.		
Wentlooge Levels	FC1-1	3	SR1-RREB	0.1% SoP with defences improved in their current form when and where necessary. BCR of 169, with IBCR of 58.	River Rhymney east bank embankments being maintained generally and a short length raised in the short term. Embankments raised by up to 0.6m in the medium to long term.		
			SR1-0		Maintenance of armoured earth embankment at Little Wharf in the short to medium term, with potential for polder development. Raising by up to 0.6m in the long term.		
			SR1-1		Continued maintenance of polders, rock armouring and earth embankment at Rumney Great Wharf in the short to medium term. Raising of embankment by up to 1m in the long term.		
			SR1-2		Continued maintenance of polders and rock armouring, and earth embankment raising by up to 0.6m, at Sluice Farm in the short term. Raising of earth embankment by up to 1m in the long term.		
			SR1-3		Continued maintenance of earth embankment and rock armouring in the short term. Raising of earth embankment by up to 1.3m in the medium to long term.		
			SR1-4		Continued maintenance of concrete revetment in the short to long term. No raising required.		
			SR1-5		Continued maintenance of concrete revetment in the short to long term. No raising required.		
			SR1-6		Continued maintenance of earth embankment and rock armouring in the short to medium term. Raising of earth embankment by up to 0.6m in the long term.		
			SR1-REWB		Continued maintenance of earth embankment in the short to medium term. Raising of earth embankment by up to 0.5m in the long term.		
			River Ebbw - River Usk		FC1-2	SR1-REEB	0.1% SoP with defences improved in their current form when and where necessary. BCR of 31, with IBCR of 10.
SR1-RUWB1	Continued maintenance of dock defences; no raising required.						
SR1-RUWB2	New wall constructed near Transporter Bridge on River Usk west bank in the short term, with wider raising in the medium and long term.						
SR1-RUWB3	Continued maintenance of various defences in the short to medium term. Raising of defences by up to 0.9m in the long term.						
Caldicot Levels	FC2-0	SR2-RUEB1	0.1% SoP with defences improved in their current form when and where necessary. BCR of 66, with IBCR of 18, although marginal with defence hardening, and also long term realignment.	Variable level of ground raising/defences in long term.			
		SR2-RUEB2		Raising of earth embankment by up to 0.6m (near Transporter Bridge on the River Usk east bank) in the short term. Continued raising in the medium to long term up to 1m.			
		SR2-RUEB3		Maintenance in the short to medium term. Raising of wall by up to 0.6m in the long term.			
		SR2-RUEB4		Riverside scheme recently constructed.			
		SR2-RUEB5		Maintenance in the short to long term.			
		SR2-0		Continued maintenance of revetment and wave recurve in the short to long term. No raising required.			
		SR2-1		Continued maintenance of revetment in the short to medium term. Up to 0.4m revetment raising in the long term.			
		SR2-2		Continued maintenance of revetment in the short to medium term. Up to 0.4m revetment raising in the long term.			
		SR2-3		Continued maintenance of earth embankment in the short to medium term. Raising of earth embankment, with toe protection, by up to 0.7m in the long term.			
		SR2-4		Continued maintenance of earth embankment and rock armouring in the short term, with raising of up to 0.2m. Further raising of up to 1m in the medium to long term.			
		SR2-5		Continued maintenance of earth embankment in the short term, with raising of up to 0.1m. Further raising of up to 1m in the medium to long term, with rock armouring.			
		SR2-6		Continued maintenance of earth embankment in the short term, with raising of up to 0.4m. Further raising of up to 1m in the medium to long term.			
		Mathern		FC2-1	4	SR2-7	Maintenance of rock armoured embankment in the short term, with raising of up to 0.8m in the medium to long term.
						SR2-8	Maintenance of earth embankment in the short to medium term, with raising of up to 0.7m in long term.



LOCATION				Optimised SoP and FDGiA funding	Technical solution and epochal timing
Relevant placename	Strategic flood sub-	Habitat Behaviour Unit	Strategic sub-reach		
Tidenham	FC3-1	5	SR3-0	No maintenance. Railway embankment is present with failing tide flaps.	No maintenance. Railway embankment is present with failing tide flaps.
			SR3-1		
			SR3-2		
Stroat	FC3-2		SR3-3	No maintenance. Railway embankment is present with failing tide flaps. Fronting FRM embankments were breached for local BAP scheme.	No maintenance. Railway embankment is present with failing tide flaps. Fronting FRM embankments were breached for local BAP scheme.
			SR3-4		
Lydney	FC3-3		SR3-5	0.1% SoP with defences maintained in their current form. BCR of 13, with iBCR of 6.	Maintenance of earth embankment, with raising of up to 1.3m in the medium to long term
Purton	FC4-1		SR4-0	No maintenance of defences.	No maintenance of defences.
Awre	FC4-3		SR4-2	Potential adaptation at Awre, to high ground. Full GiA funding for realignment.	Potential adaptation in the short to medium term to high ground.
Bullo	FC4-4		SR4-3	No maintenance of defences.	No maintenance of defences. High ground present.
Ruddle	FC4-5		SR4-3	No maintenance of defences.	No maintenance of defences. High ground present.
Newnham-on-Severn	FC4-6		SR4-3	2% SoP with defences maintained in their current form when and where necessary. BCR of 8, with iBCR of 2.	Maintenance of earth embankment from the short term, with raising in the medium to long term.
Westbury-on-Severn and Rodley	FC4-7		SR4-4	1% SoP with defences improved in their current form when and where necessary. BCR of 16, with iBCR of 5. Partial GiA funding in the short term.	Raising of earth embankment by 0.3m in the short term, with further raising of up to 0.8m in the medium to long term.
			SR4-5		No maintenance of defences. High ground present.
			SR4-6		Maintenance of earth embankment into the future.
Wallmore Common	FC4-8		SR4-8	0.1% SoP with defences improved in their current form when and where necessary. BCR of 31, with iBCR of 12.	Raising of earth embankment by up to 0.4m in the medium to long term.
Minsterworth	FC4-9		SR4-9	0.1% SoP with defences improved in their current form when and where necessary. BCR of 49 with iBCR of 7.	Raising of earth embankment by up to 0.3m in the long term.
Minsterworth Ham	FC4-10	6	SR4-10	Potential adaptation at Minsterworth Ham with 1% SoP into the future, BCR of 38 and iBCR of 1. Full GiA funding for realignment.	Potential adaptation with cut off embankments or property protection.
River Leadon	FC4-11		SR4-11	No maintenance of defences.	No maintenance of defences.
The Rea	FC5-3		SR5-0	0.5% SoP with defences improved in their current form when and where necessary. BCR of 18, with no iBCR.	Raising of earth embankment by up to 0.9m in the medium to long term.
Stonebench	FC5-4		SR5-1	1% SoP with defences improved in their current form when and where necessary. BCR of 4, with no iBCR.	Raising of earth embankment by up to 1.1m in the long term.
Elmore Back	FC5-5		SR5-2	2% SoP with defences maintained in their current form, with potential adaptation in the medium term. BCR of 1.7, with no iBCR.	Maintenance of earth embankment in the short term. Potential adaptation with construction of ring banks around the main access road with property protection in the medium term.
Longney	FC5-6		SR5-3	0.1% SoP with defences maintained in their current form. BCR of 17, with iBCR of 10.	Maintenance of earth embankment in the short term. Raising of earth embankment by up to 0.5m in the medium to long term.
Upper Framilode	FC5-7		SR5-4	0.1% SoP with defences improved in their current form when and where necessary. BCR of 35, with iBCR of 29. Full to partial GiA funding for short term works.	Raising of earth embankment by 0.6m in the short to long term.
			SR5-6	Raising of earth embankment by 0.1m in the long term.	
Arlingham	FC5-8		SR5-5	0.1% SoP with defences improved in their current form. BCR of 11, with iBCR of 11.	Raising of earth embankment by up to 0.9m in the long term.
Slimbridge	FC5-9		SR5-7	0.1% SoP with defences improved in their current form when and where necessary. BCR of 11, with iBCR of 83.	Maintenance of canal bank into the future.
			SR5-8	Raising of earth embankment by up to 0.5m in the long term.	



LOCATION				Optimised SoP and FDGiA funding	Technical solution and epochal timing	
Relevant placename	Strategic flood sub-	Habitat Behaviour Unit	Strategic sub-reach			
Berkeley	FC6-1	5	SR6-0	1% SoP with defences improved in their current form when and where necessary. BCR of 8, with iBCR of 3. Partial FDGiA funding for short term works.	Raising of 0.3m in the short term. Further raising of earth embankment in the medium to long term by 1m.	
Shepperdine	FC6-2		SR6-1		Raising of short lower section by 0.6m in the short term. Further raising of earth embankment in the medium to long term by 1m.	
			SR6-2a		Raising of 0.3m in the short term. Further raising of earth embankment in the medium to long term by 1m.	
			SR6-2b		Raising of earth embankment in the medium to long term by 0.7m.	
			SR6-2c		Raising of 0.1m in the short term. Further raising of earth embankment in the medium to long term by 1m.	
Littleton-upon-Severn	FC6-3		SR6-3		Raising of 0.1m in the short term. Further raising of earth embankment in the medium to long term by 1m.	
			SR6-4		Raising of 0.1m in the short term. Further raising of earth embankment in the medium to long term by 1m.	
Avonmouth to Aust	FC7-0	4	SR7-0	0.1% SoP with defence hardening when and where necessary, although marginal with back line around Avonmouth Docks. BCR of 58, with iBCR of 17. Partial GiA funding for short term works.	Raising of earth embankment by 0.4m in the short term, with a further raising of 1.4m or 1m wave recurve wall in the medium to long term.	
			SR7-1		Maintenance of wave wall and revetment into the future.	
			SR7-2		Maintenance of revetment into the future.	
			SR7-3		Maintenance of wave wall and revetment into the future.	
			SR7-4		Maintenance of railway embankment in the short to medium term. Addition of 0.6m wave recurve wall in the long term, by agreement.	
			SR7-5		Dependent on partnership with BPC deep water expansion. High quay level would provide flood defence. Otherwise landward wall constructed in short term.	
			SR7-6		Dependent on partnership with BPC. New seaward embankment construction, 0.7m above ground level in short term, then with up to 1.7m raising in medium to long term. Otherwise landward wall constructed in short term.	
			SR7-7			
SR7-8						
Portbury	FC8-0	3	SR8-0	Existing SoP with defences maintained in their current form when and where necessary. BCR of 188, with no iBCR.	Maintenance of defences from the short to long term.	
Woodhill	FC8-1		SR8-1	No maintenance of defences.	No maintenance of low wall and promenade.	
			SR9-0		Maintenance of vertical wall into the future.	
Clevedon to Weston-Super-Mare	FC9-0		SR9-1	0.1% SoP with defence hardening when and where necessary. BCR of 311, with iBCR of 82. Full GiA funding for short term works.	Raising of vertical wall by 1m in the medium to long term.	
			SR9-2		Wave recurve wall addition of 0.6m in the long term.	
			SR9-3		Maintenance of high ground into the future.	
			SR9-4		Rock armouring and raising of embankment by 0.5m in the long term.	
			SR9-5		Revetment raising by up to 1.8m in the long term.	
			SR9-6		Revetment raising by up to 2m in the medium to long term.	
			SR9-7		Revetment raising by up to 2m in the medium to long term.	
			SR9-CYRB		Recent scheme has addressed low spots with minor realignment in the short term. Further embankment raising by up to 1m in the medium to long term.	
			SR9-CYLB		Recent scheme has addressed low spots with minor realignment in the short term. Further embankment raising by up to 1m in the medium to long term.	
			SR9-8		Revetment raising by up to 0.4m in the short term. Further raising by up to 1.4m in the medium to long term.	
			SR9-RBRB		Embankment raising by up to 0.5m in the short term. Further raising by up to 0.7m in the medium to long term.	
			SR9-RBLB		Embankment raising by up to 0.3m in the short term. Further raising by up to 0.7m in the medium to long term.	
	2	SR9-9LS	Beach recharge and raising at Sand Bay in the medium to long term			
		SR9-9	Maintenance of beach into the future.			
		SR9-10	Maintenance of vertical wall into the future.			
		SR9-11	Maintenance of dunes into the future.			



LOCATION				Optimised SoP and FDGiA funding	Technical solution and epochal timing
Relevant placename	Strategic flood sub-	Habitat Behaviour Unit	Strategic sub-reach		
Brean to Burnham-on-Sea	FC10-0	1	SR9-12	0.1% SoP with defence hardening when and where necessary, with localised realignment around River Axe and Brean in the medium to long term. BCR of 505, with iBCR of 734.	Maintenance of embankment in the short term, with potential adaptation and landward realignment in the medium to long term with earth embankments.
			SR9-13		Reducing maintenance in the short to medium term, with potential adaptation and landward realignment and property protection in the long term.
			SR10-0		Reducing maintenance in the short to medium term, with potential adaptation and landward realignment and property protection in the long term.
			SR10-1		Reducing maintenance in the short to medium term, with potential adaptation and landward realignment and property protection in the long term.
			SR10-2		Maintenance of dunes into the future.
			SR10-3		Maintenance of dunes into the future.
			SR10-4		Maintenance of dunes into the future.
			SR10-5		Wall raising of up to 1m in the long term, with beach management in the long term.
			SR10-6		Maintenance of revetment and wave wall into the future, with beach management in the long term.
			SR10-7		Wall raising of up to 0.3m in the long term.
			SR10-8		Embankment raising of up to 0.7m in the long term.
Huntspill	FC10-1		SR10-9a	0.1% SoP with defence hardening when and where necessary. BCR of 369, with iBCR of 17.	Maintenance of embankments in the short to medium term. Embankment raising by up to 0.2m in the long term
			SR10-9b		Maintenance of embankments in the short to medium term. Embankment raising by up to 0.2m in the long term
			SR10-9c		Maintenance of embankments in the short to medium term. Embankment raising by up to 0.2m in the long term
Pawlett	FC10-2		SR10-RPRBa	0.1% SoP with defences maintained in their current form, with managed realignment in the long term. BCR of 23, high iBCR.	Maintenance of embankment in the short term. Potential adaptation, with landward realignment with earth embankment and to high ground in the long term.
			SR10-RPRBb		Maintenance of embankment in the short term. Potential adaptation with landward realignment with earth embankment and to high ground in the long term.
			SR10-RPRBc		Maintenance of embankment in the short term. Potential adaptation with landward realignment with earth embankment and to high ground in the long term.
Steart Peninsula	FC11-0		SR11-RPLB	Managed realignment site at Steart in the short term with SoP of 2-5%. BCR of 3, no iBCR. Full GiA funding for realignment.	Landward realignment in the short term, with individual property protection and earth embankments.
			SR11-0		Maintenance into the short term only.
			SR11-1		Landward realignment in the short term, with individual property protection and earth embankments protecting main access road in the short term.
			SR11-2		Landward realignment in the short term, with individual property protection and earth embankments.
			SR11-3		Landward realignment in the short term, with individual property protection and earth embankments.
			SR11-4		Landward realignment in the short term, with individual property protection and earth embankments.
			SR11-5		Landward realignment in the short term, with individual property protection and earth embankments.



Appendix O : Carbon Assessment

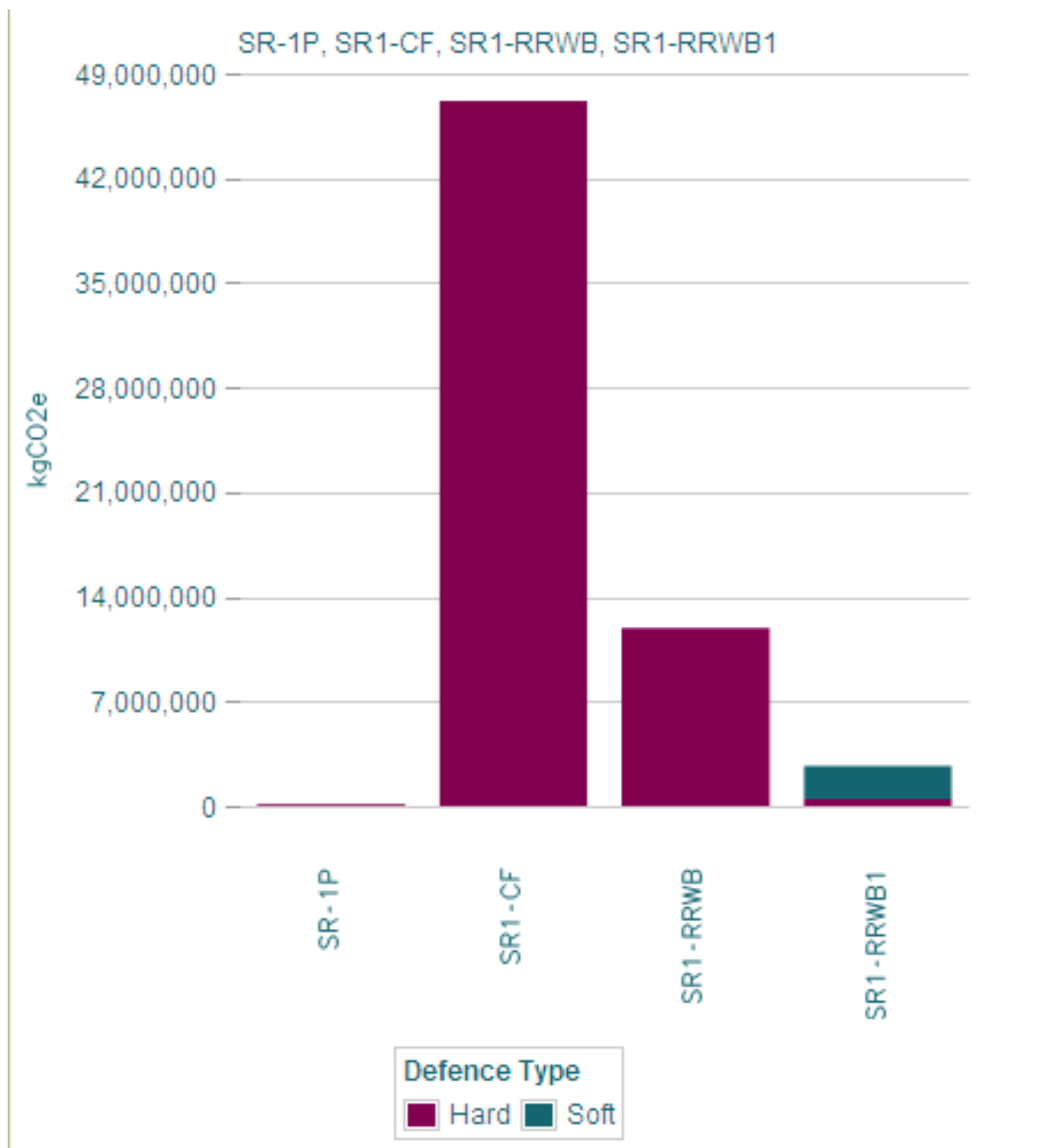






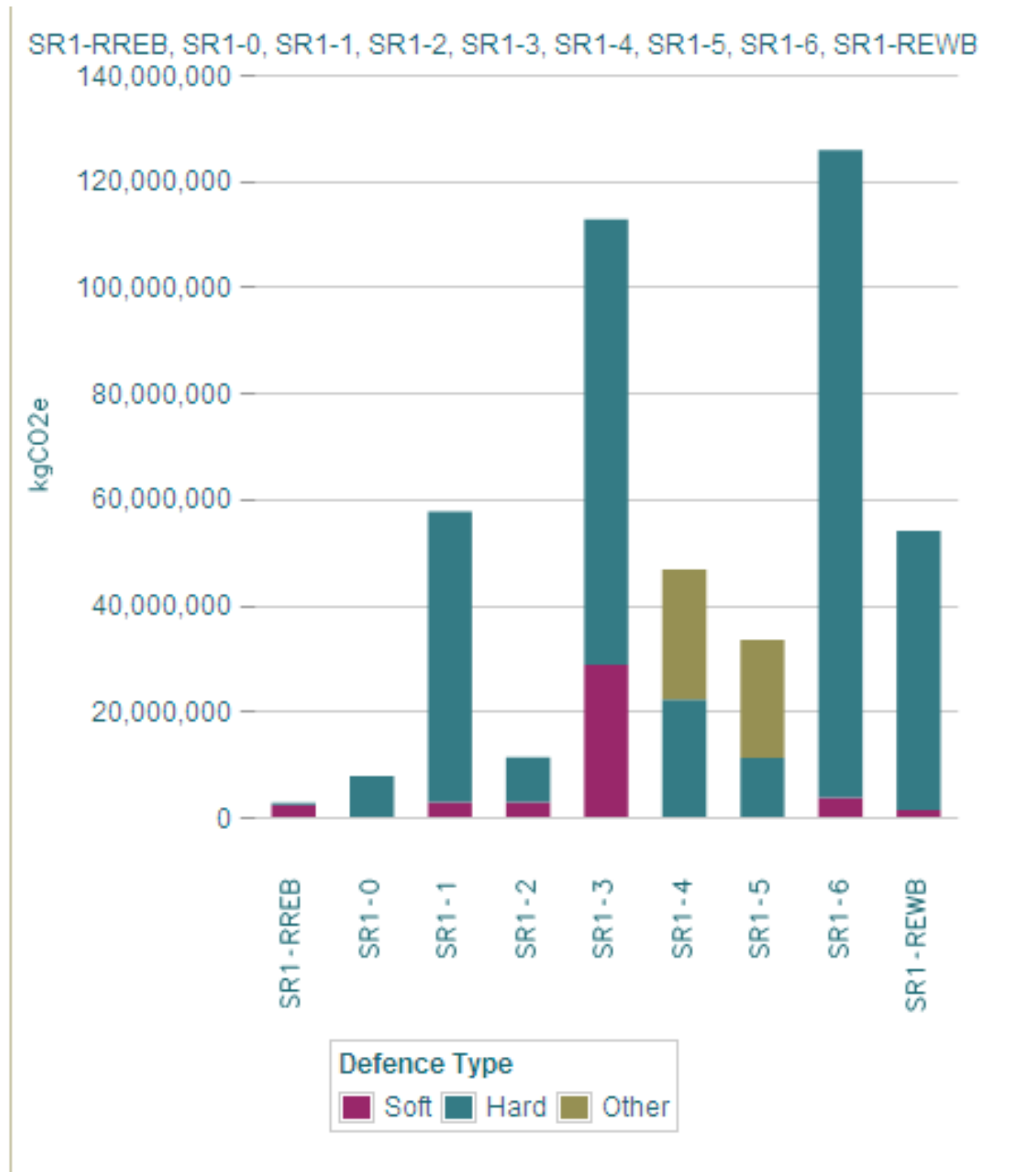
Methodology note: this carbon assessment can only be used for relative judgements on the footprint of different types of FCRM intervention, over and above maintenance works. Where clear and viable, the carbon assessment has been used to identify any potential preference to two closely preferred types of intervention.

Penarth (FC1-P) and Cardiff Flats (FC1-0): option type predominantly limited to hard (rock armouring, walls) intervention.



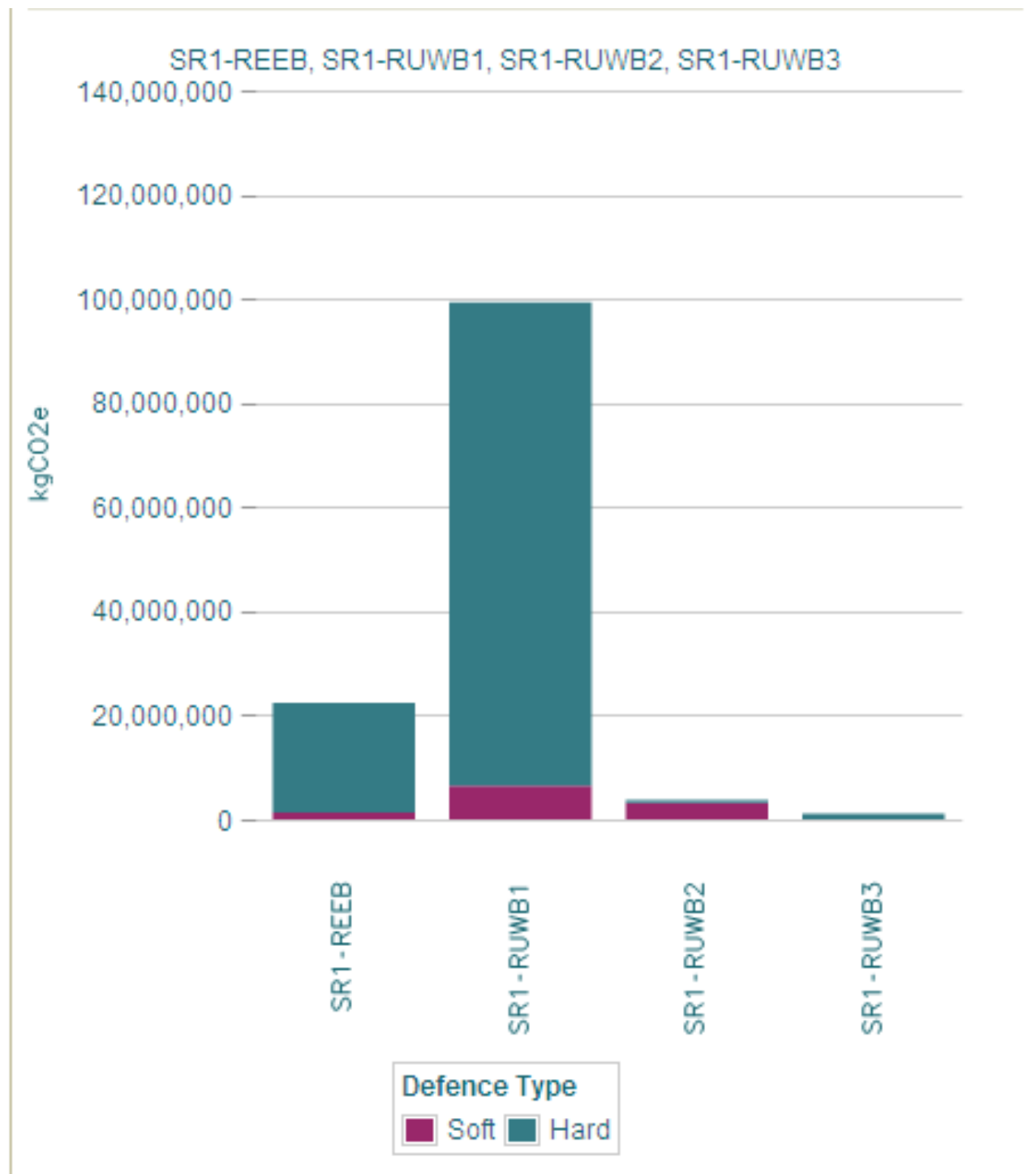


Wentlooge Levels (FC1-1): option type open to either soft (embankments with foreshore management) or hard/other (revetment or rock armouring) intervention. Soft intervention has a lower carbon footprint.



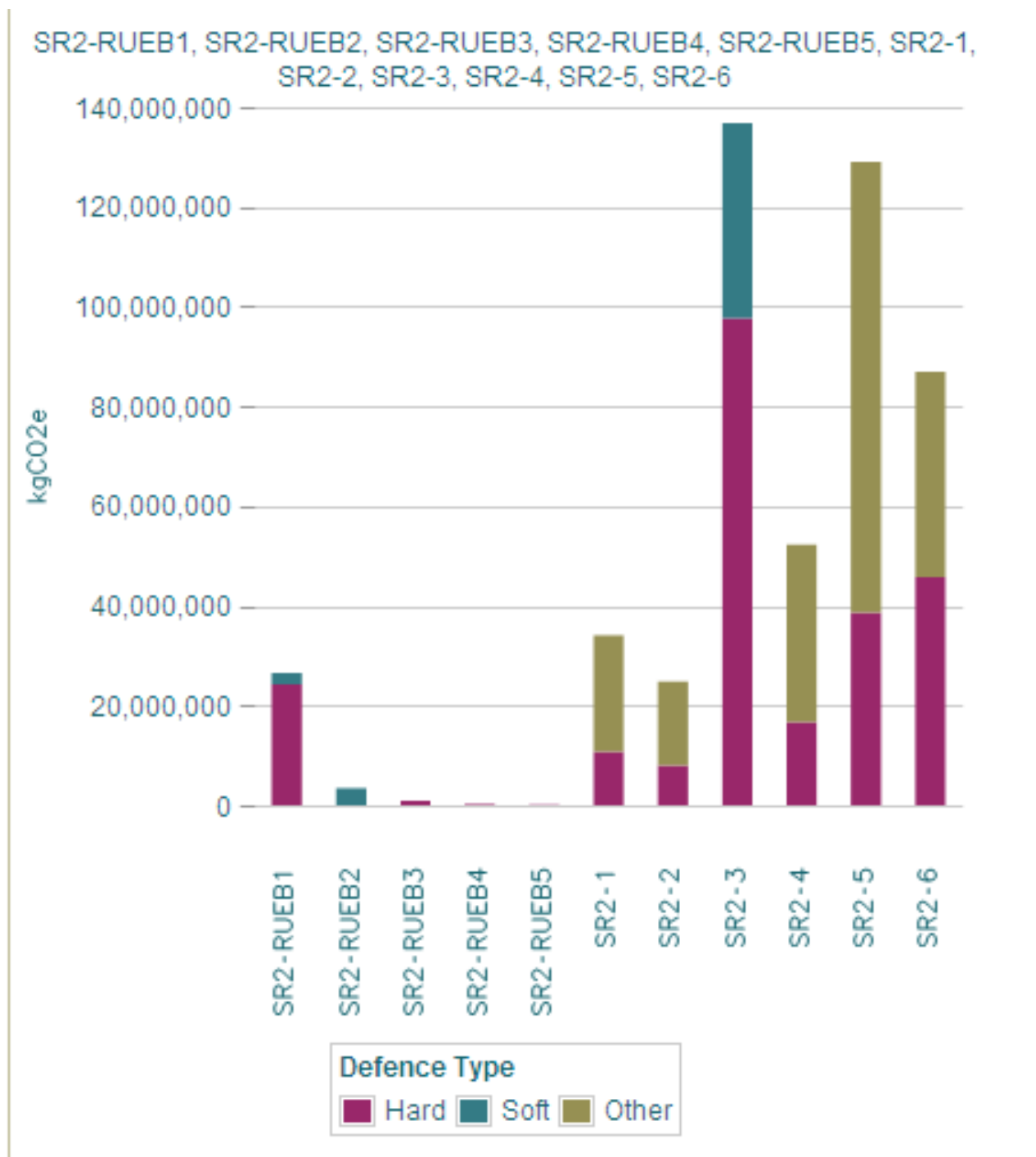


River Ebbw to River Usk (FC1-2): option type open to either soft (embankments) or hard (walls) intervention. Soft intervention has a lower carbon footprint.



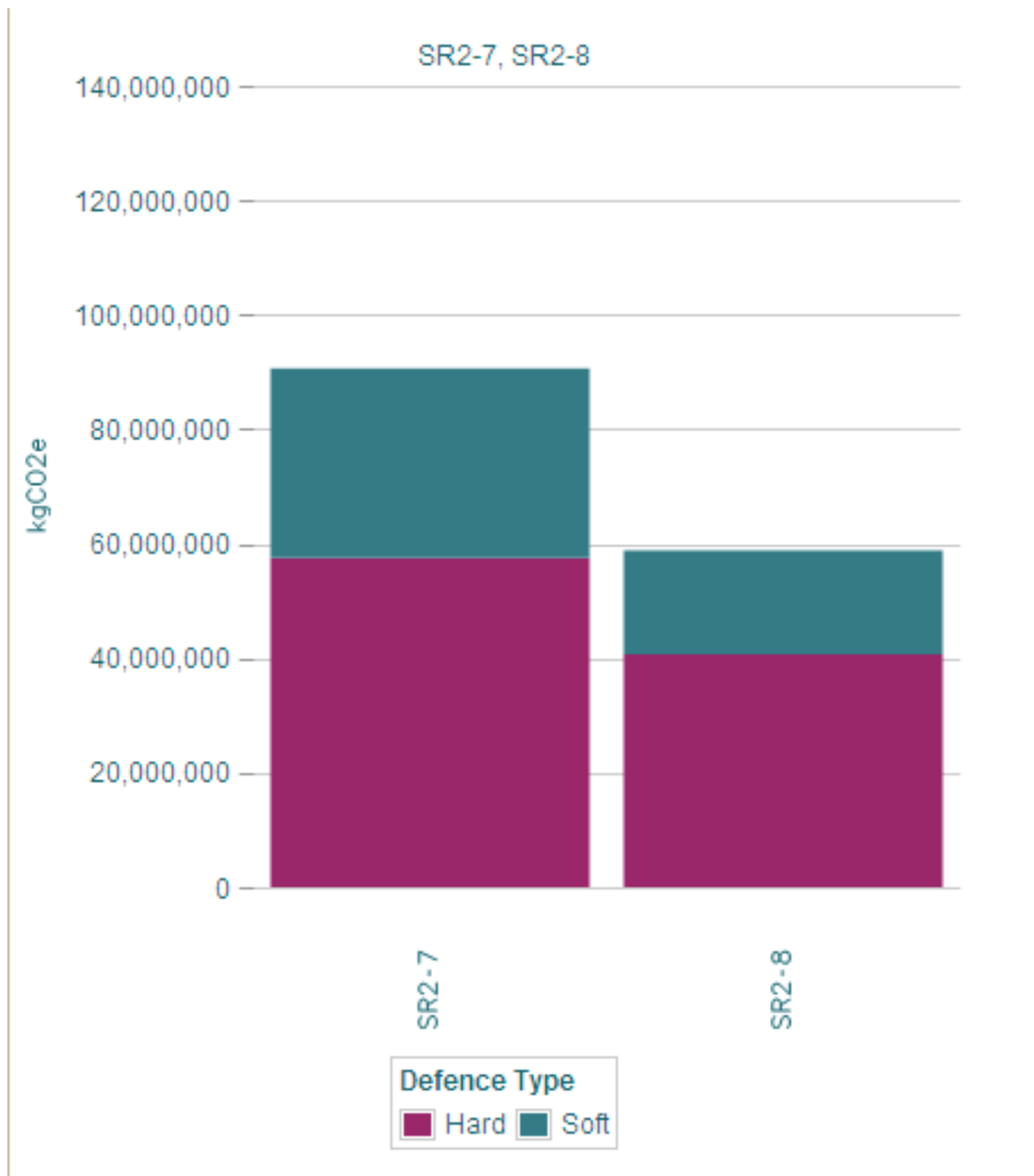


Caldicot Levels (FC2-0): option type open to either soft (embankments with foreshore management) or hard/other (revetment, rock armouring, walls) intervention. Soft, hard and other interventions have a similar carbon footprint at a flood cell level.



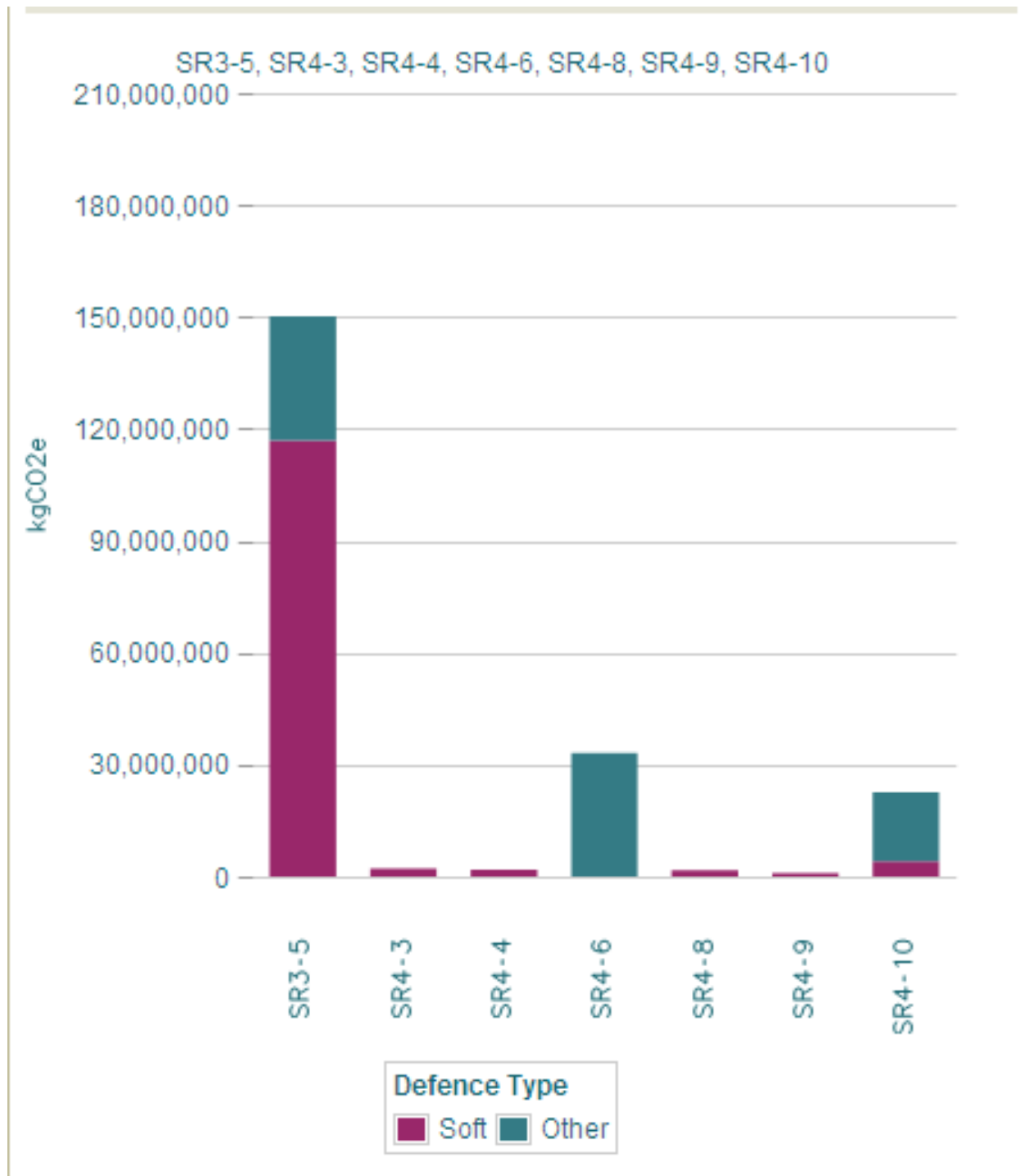


Mathern (FC2-1): option type open to either soft (embankment, managed realignment) or hard (revetment, rock armouring) intervention. Soft intervention has a lower carbon footprint.



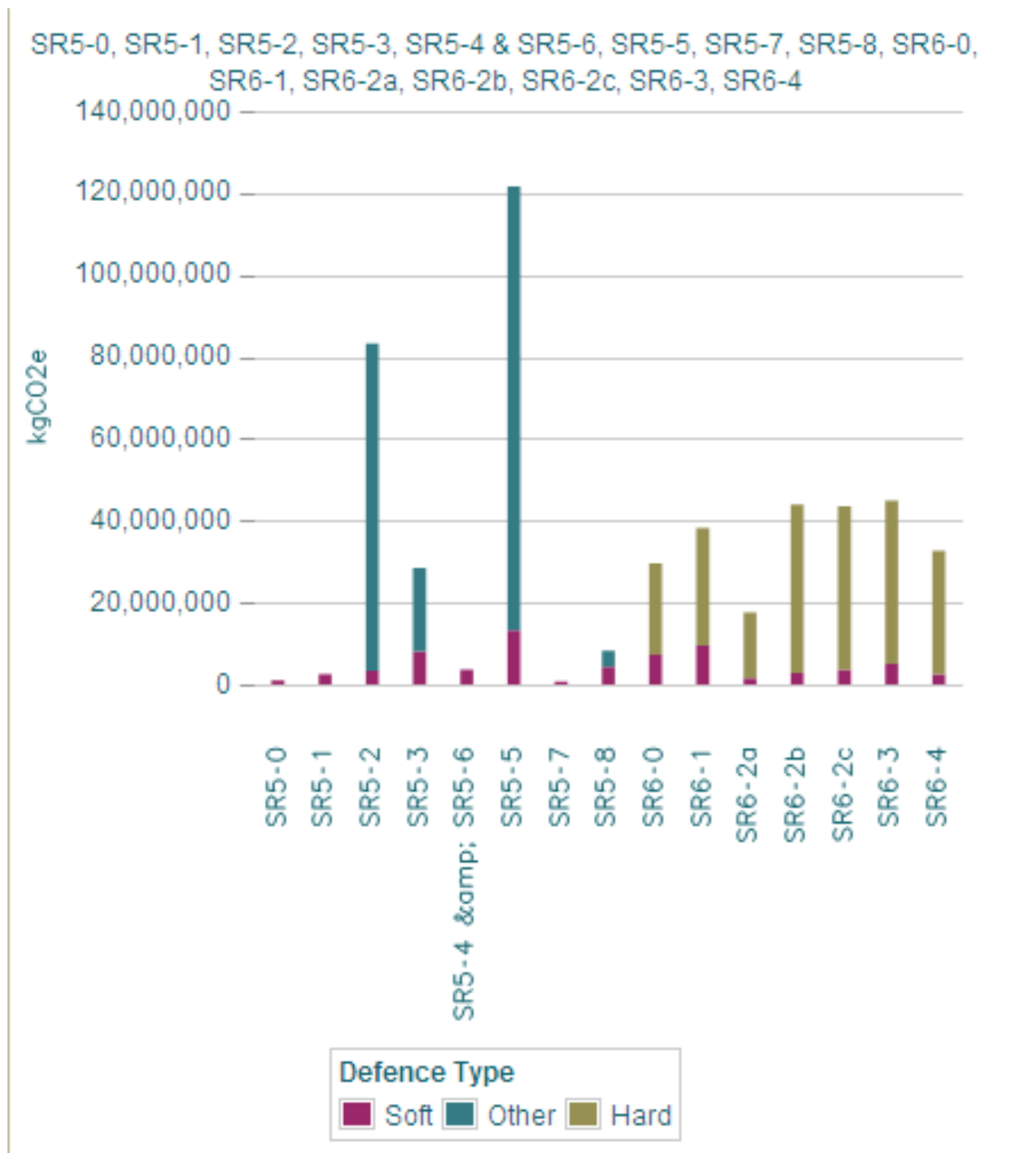


Upper Estuary west bank (FC3 and FC4): option type open to either soft (embankment) or other (managed realignment) intervention. Other (managed realignment) intervention has a lower carbon footprint at SR3-3 (Lydney), but larger at SR4-6 (Rodley) and SR4-10 (Minsterworth Ham).



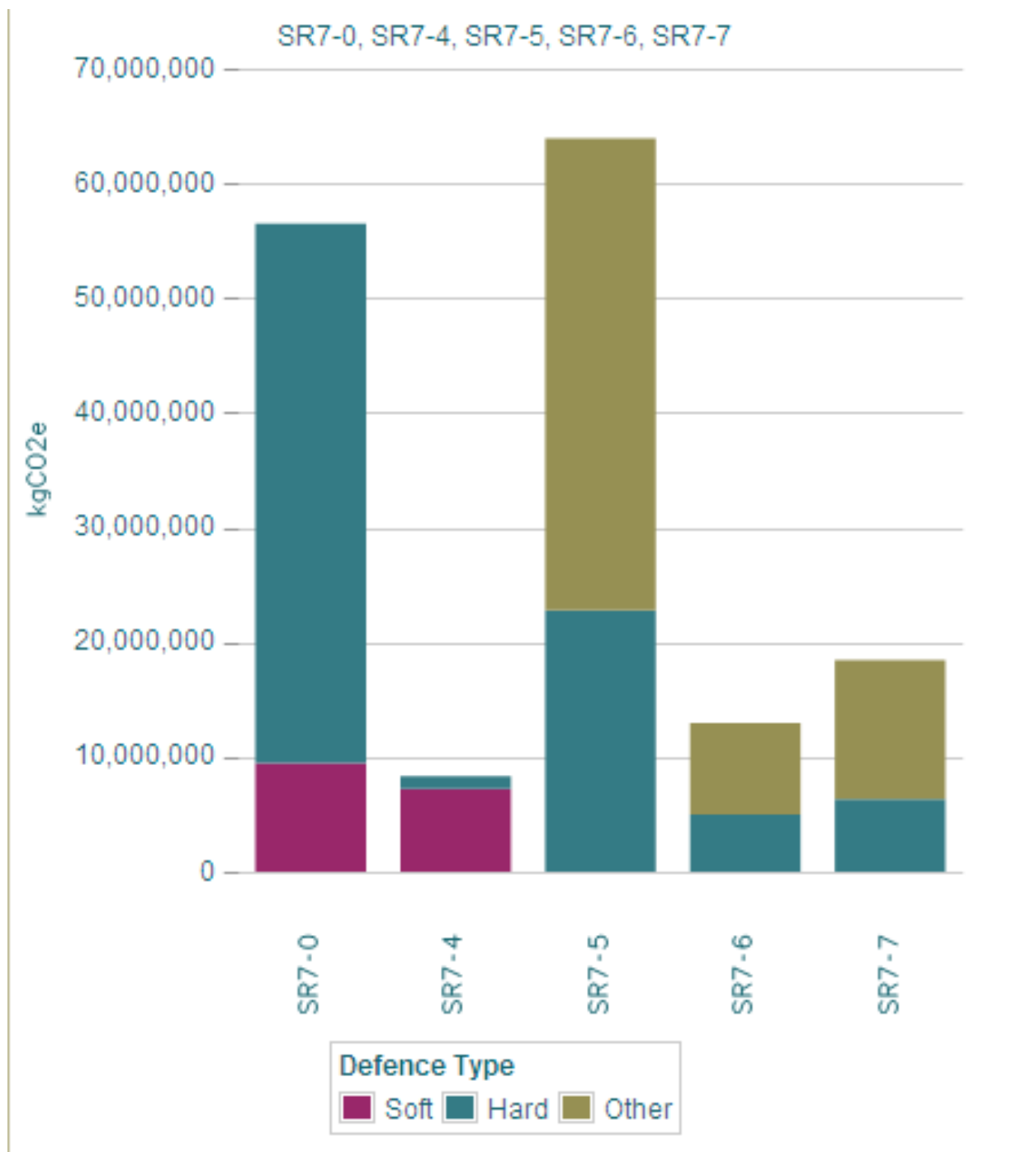


Upper Estuary east bank (FC5 and FC6): option type open to either soft (embankment), hard (revetment) or other (managed realignment) intervention. Soft (embankment) intervention has a lower carbon footprint.



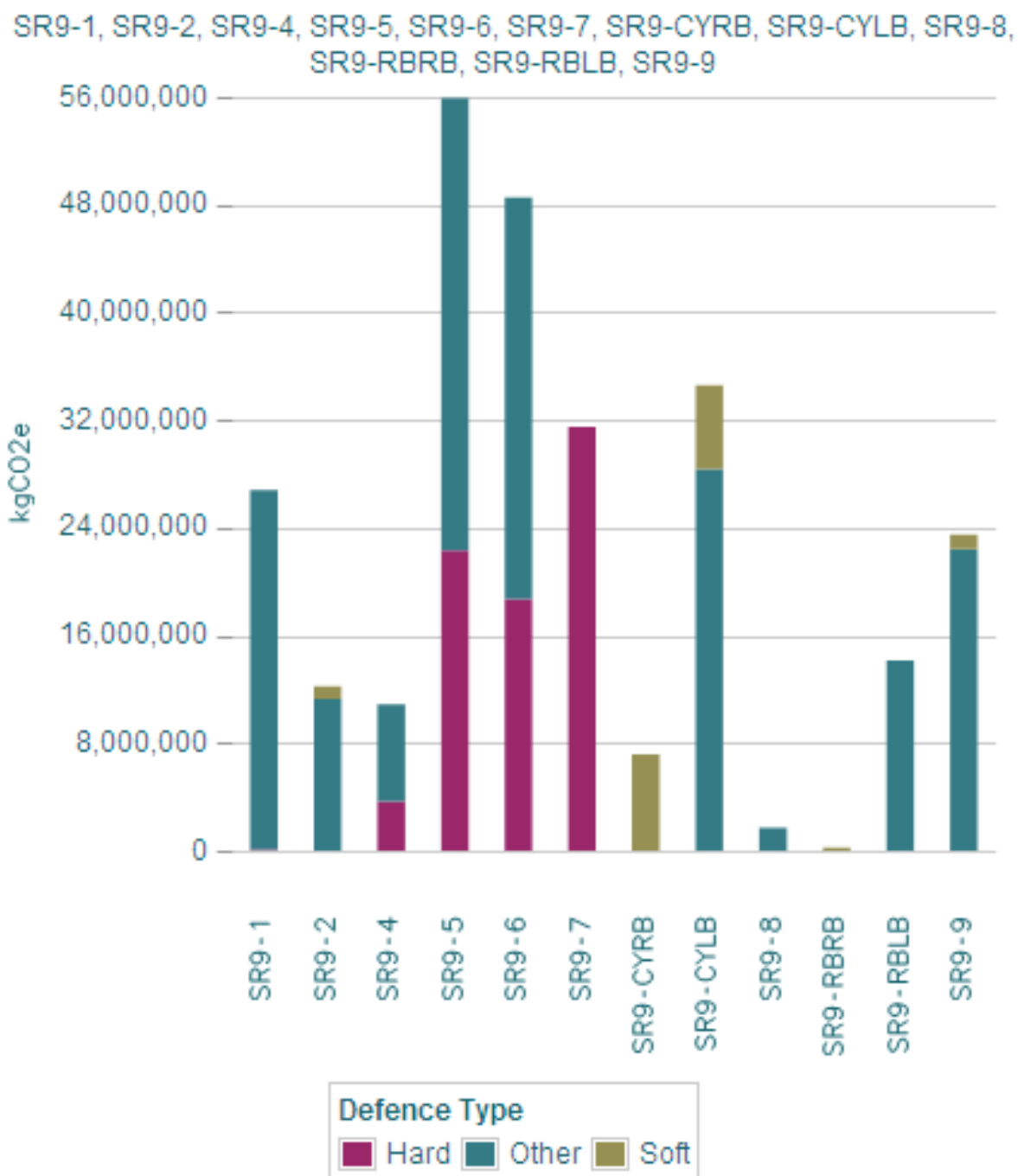


Avonmouth to Aust (FC7-0): option type open to either soft (embankment), hard (revetment) or other (wave recurve wall, rock armouring) intervention. Soft intervention has a lower carbon footprint than hard intervention, whilst hard intervention has a lower carbon footprint than other intervention.



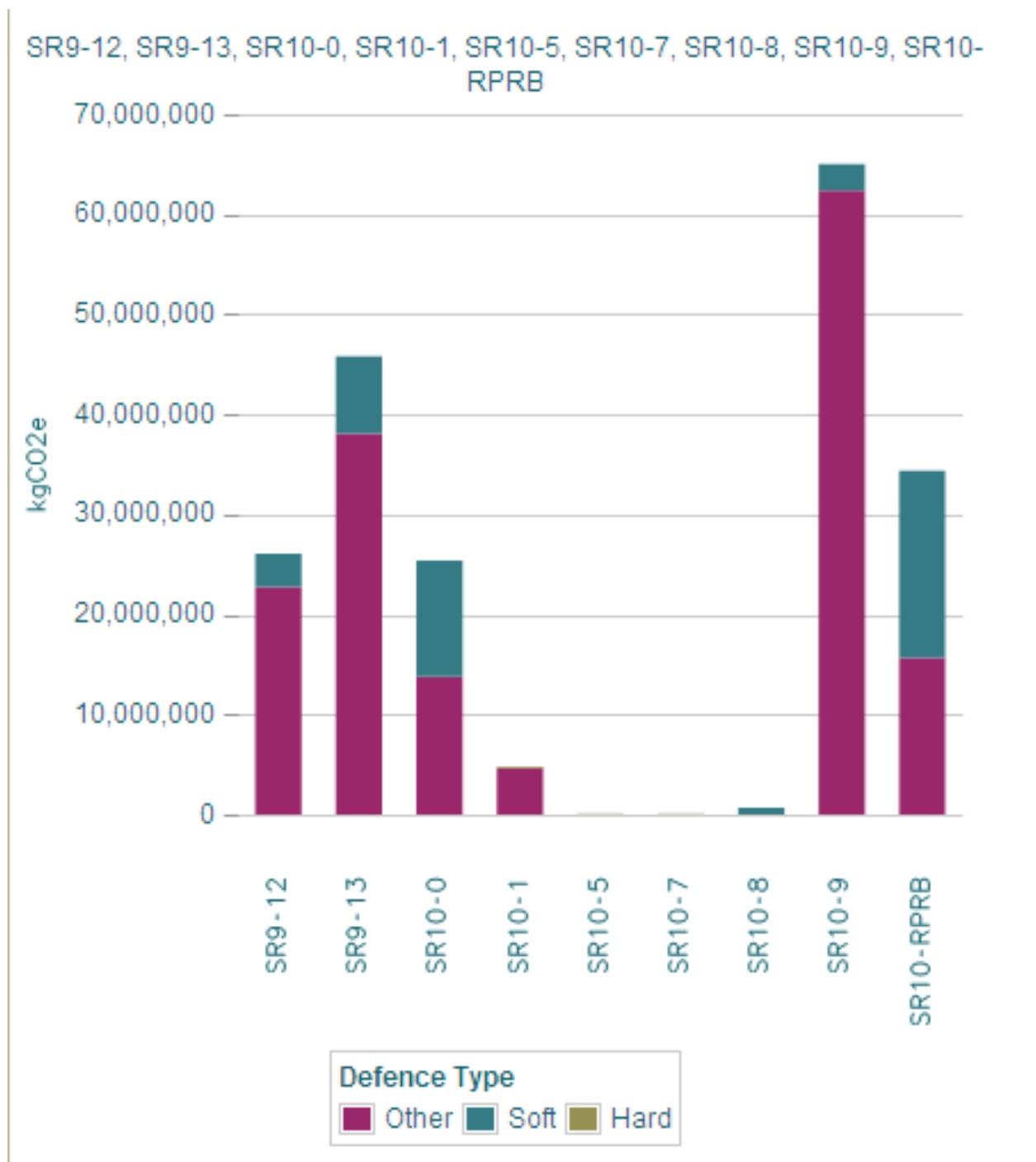


Clevedon to River Axe (FC9-0): option type open to either soft (embankment, dune recharge), hard (wave recurve wall, revetment) or other (managed realignment) intervention. Soft intervention has a lower carbon footprint than other intervention, whilst hard and other interventions have a similar carbon footprint.



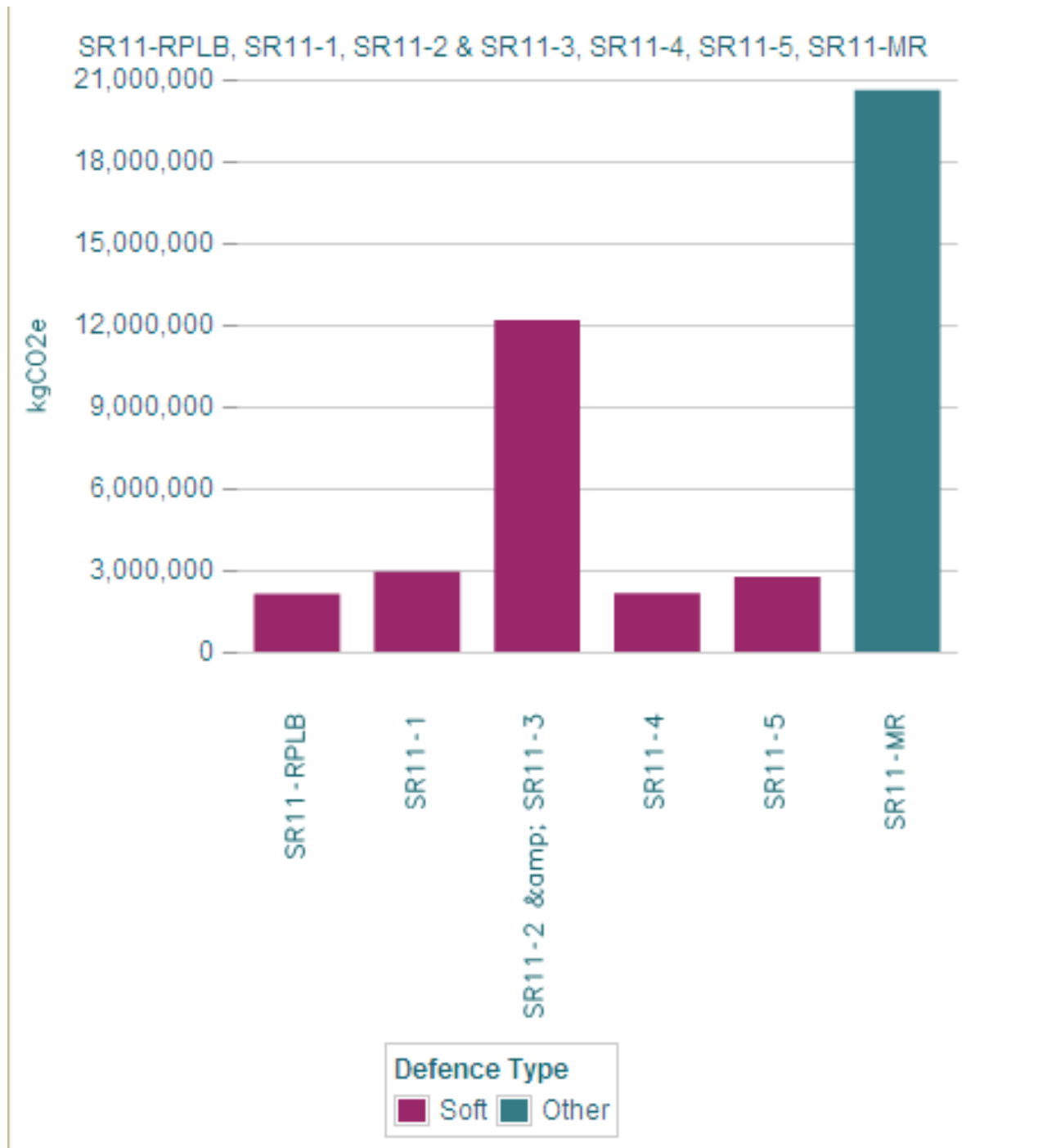


River Axe to River Parrett (FC10-0, 10-1, 10-2): option type open to either soft (embankment, dune management), hard (wall, wave recurve) or other (rock armouring, managed realignment) intervention. Soft intervention has a lower carbon footprint than other intervention.





River Parrett to Hinkley Point (FC11-0): option type predominantly limited to soft (embankment) or other (managed realignment) intervention. Soft and other interventions have a similar carbon footprint.





Appendix P : FCRM GiA Calculators





FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 7 April 2013

Project Name	FC1-1 Wentlooge Levels
Unique Project Reference	

Key	Input cells
	Calculated cells

All figures are in 'thousands of pounds' (£k)
 Figures in Blue to be entered onto MTP

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	825% (1)	
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17).
Adjusted Partnership Funding Score (PF)	825% (3)	
PV FCRM GiA towards the up-front costs of this scheme (Cost for Approval)	2,924 (4)	

Scheme Benefit to Cost Ratio:	90.48	to 1
Effective return to taxpayer:	90.48	to 1
Effective return to area:	n/a	to 1

1. Scheme details

Risk Management Authority type of asset maintainer	EA (5)	Yes (6)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?
Duration of Benefits (years)	20 (7)		
PV Whole-Life Benefits:	264,517 (8)		
PV Costs			
PV Appraisal Costs	0 (9)		
PV design & Construction Costs	2,924 (10)		
Sub Total - PV Cost for Approval (appraisal,design,construction)	2,924 (11)		
PV Post-Construction Costs	0 (12)		
PV Total Whole-Life Costs:	2,924 (13)		
PV Contributions secured to date			
PV Local Levy secured to date	0 (14)		
PV Public Contributions secured to date	0 (15)		
PV Private Contributions secured to date	0 (16)		
PV Funding from other Environment Agency functions/sources secured to date	0 (17)		
PV Total Contributions secured to date	0 (18)		

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.
 This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both the ongoing and up-front costs (Cost for Approval), and should be entered into cells(14-17).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Quantifying benefits under Outcome measure 2: Households better protected against flood risk

Number of households in:

	Before			After			Change due to scheme		
20% most deprived areas							0	0	
21-40% most deprived areas							0	0	
60% least deprived areas			7,146			-	0	-7,146	

At: Moderate risk Significant risk Very significant risk Moderate risk Significant risk Very significant risk

Annual damages avoided, compared with a household at low risk

	0.150	0.600	1.350
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Change in household damages, in:

	Per year		Over lifetime of scheme		Qual. benefits (discounted)		
20% most deprived areas	£	-	£	-	OM2 (20%)	£	-
21-40% most deprived areas	£	-	£	-	OM2 (21-40%)	£	-
60% least deprived areas	-£	4,288	-£	85,752	OM2 (60%)	£	65,225

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:		Before		Damages per household avoided:	
20% most deprived areas		-	-	Annual damages avoided	
21-40% most deprived areas		-	-	Loss expected in	
60% least deprived areas		-	-	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)	
		Long-term loss	Medium-term loss	£	6
				£	50
				£	1
				£	6
				£	20
				£	3
				£	years
				£	Long-term loss
				£	Medium-term loss
Change in household damages, in:		Year 1 loss avoided:		Over lifetime of scheme:	
20% most deprived areas		£	-	Qual. benefits (discounted)	
21-40% most deprived areas		£	-	OM3 (20%)	
60% least deprived areas		£	-	OM3 (21-40%)	
		£	-	OM3 (60%)	
		£	-	£	
		£	-	£	
		£	-	£	
		£	-	£	

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a Hectares of net water-dependent habitat created	£ 15	OM4a £ -
OM4b Hectares of net intertidal habitat created	£ 50	OM4b £ -
OM4c Kilometres of protected river improved	£ 80	OM4c £ -
		OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 199,292	5.56p in the £1	£ 11,072
OM2	£ -	45.0	£ -
20% most	£ -	30.0	£ -
21-40%	£ 65,225	20.0	£ 13,045
Least 60%	£ -	45.0	£ -
OM3	£ -	30.0	£ -
20% most	£ -	20.0	£ -
21-40%	£ -	100.0	£ -
Least 60%	£ -		£ -
OM4	£ -		£ -
Total	£ 264,517		£ 24,117

Maximum for Outcomes delivered

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

Raw Score	Contribution for 100% Score
825%	0
660%	0
825%	-
825%	-
535%	-
529%	-

As scenario above
 Sensitivity 1 - Change in PV Whole Life Cost (25% increase)
 Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk before
 Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss
 Sensitivity 4 - Increase Duration of Benefits by 25%
 Sensitivity 5 - Reduce Duration of Benefits by 25%

END OF WORKSHEET



FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 7 April 2013

Project Name FC1-2 River Ebbw to River Usk

Unique Project Reference

Key	Input cells
	Calculated cells

All figures are in 'thousands of pounds' (£k)
 Figures in Blue to be entered onto MTP

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	398% (1)	Scheme Benefit to Cost Ratio: 9.97 to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Effective return to taxpayer: 9.97 to 1
Adjusted Partnership Funding Score (PF)	398% (3)	Effective return to area: n/a to 1
PV FCRM GiA towards the up-front costs of this scheme (Cost for Approval)	3,648 (4)	

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17).

1. Scheme details

Risk Management Authority type of asset maintainer	EA (5)	Yes (6)
Duration of Benefits (years)	20 (7)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?
PV Whole-Life Benefits:	36,378 (8)	
PV Costs		
PV Appraisal Costs	0 (9)	
PV design & Construction Costs	3,648 (10)	
Sub Total - PV Cost for Approval (appraisal,design,construction)	3,648 (11)	
PV Post-Construction Costs	0 (12)	
PV Total Whole-Life Costs:	3,648 (13)	
PV Contributions secured to date		
PV Local Levy secured to date	0 (14)	
PV Public Contributions secured to date	0 (15)	
PV Private Contributions secured to date	0 (16)	
PV Funding from other Environment Agency functions/sources secured to date	0 (17)	
PV Total Contributions secured to date	0 (18)	

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.
 This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both the ongoing and up-front costs (Cost for Approval), and should be entered into cells(14-17).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Quantifying benefits under Outcome measure 2: households better protected against flood risk

Number of households in:	Before			After			Change due to scheme		
20% most deprived areas							0	0	
21-40% most deprived areas							0	0	
60% least deprived areas			7,960		-	-	0	-7,960	
At:	Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk

Annual damages avoided, compared with a household at low risk

	0.150	0.600	1.350
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Change in household damages, in:	Per year		Over lifetime of scheme		Qual. benefits (discounted)		
20% most deprived areas	£	-	£	-	OM2 (20%)	£	-
21-40% most deprived areas	£	-	£	-	OM2 (21-40%)	£	-
60% least deprived areas	-£	4,776	-£	95,520	OM2 (60%)	£	72,654

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:		Before		Damages per household avoided:	
20% most deprived areas		-	-	Annual damages avoided	
21-40% most deprived areas		-	-	Loss expected in	
60% least deprived areas		-	-	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)	
		Long-term loss	Medium-term loss	£	£
				6	6
				50	20
				1	3
		Long-term loss	Medium-term loss		
Change in household damages, in:		Year 1 loss avoided:		Qual. benefits (discounted):	
20% most deprived areas		£	-	OM3 (20%) £	
21-40% most deprived areas		£	-	OM3 (21-40%) £	
60% least deprived areas		£	-	OM3 (60%) £	

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a Hectares of net water-dependent habitat created	£ 15	OM4a £ -
OM4b Hectares of net intertidal habitat created	£ 50	OM4b £ -
OM4c Kilometres of protected river improved	£ 80	OM4c £ -
		OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 5.56p in the £1	£ 5.56	£ -
OM2	£ -	£ 45.0	£ -
20% most	£ -	£ 30.0	£ -
21-40%	£ 72,654	£ 20.0	£ 14,531
Least 60%	£ -	£ 45.0	£ -
OM3	£ -	£ 30.0	£ -
20% most	£ -	£ 20.0	£ -
21-40%	£ -	£ 100.0	£ -
Least 60%	£ 72,654		£ 14,531
OM4			
Total			Maximum for Outcomes delivered

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

As scenario above
 Sensitivity 1 - Change in PV Whole Life Cost (25% increase)
 Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk before
 Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss
 Sensitivity 4 - Increase Duration of Benefits by 25%
 Sensitivity 5 - Reduce Duration of Benefits by 25%

Raw Score	Contribution for 100% Score
398%	0
319%	0
398%	-
398%	-
81%	680
76%	871

END OF WORKSHEET



FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 7 April 2013

Project Name	FC2-0 Caldicot Levels
Unique Project Reference	

Key	Input cells
	Calculated cells

All figures are in 'thousands of pounds' (£k)
 Figures in Blue to be entered onto MTP

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	242% (1)	
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17).
Adjusted Partnership Funding Score (PF)	242% (3)	
PV FCRM GiA towards the up-front costs of this scheme (Cost for Approval)	15,773 (4)	

Scheme Benefit to Cost Ratio:	24.94	to 1
Effective return to taxpayer:	24.94	to 1
Effective return to area:	n/a	to 1

1. Scheme details

Risk Management Authority type of asset maintainer	EA (5)	Yes (6)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?
Duration of Benefits (years)	20 (7)		
PV Whole-Life Benefits:	393,451 (8)		
PV Costs			
PV Appraisal Costs	0 (9)		
PV design & Construction Costs	15,773 (10)		
Sub Total - PV Cost for Approval (appraisal,design,construction)	15,773 (11)		
PV Post-Construction Costs	0 (12)		
PV Total Whole-Life Costs:	15,773 (13)		
PV Contributions secured to date			
PV Local Levy secured to date	0 (14)		
PV Public Contributions secured to date	0 (15)		
PV Private Contributions secured to date	0 (16)		
PV Funding from other Environment Agency functions/sources secured to date	0 (17)		
PV Total Contributions secured to date	0 (18)		

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.
 This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both the ongoing and up-front costs (Cost for Approval), and should be entered into cells(14-17).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Quantifying benefits under Outcome measure 2: households better protected against flood risk											
Number of households in:		Before			After			Change due to scheme			
20% most deprived areas								0			
21-40% most deprived areas								0			
60% least deprived areas		12,335			-			-12,335			
At:	Moderate risk	Significant risk	Very significant risk		Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk	
					Annual damages avoided, compared with a household at low risk				0.150	0.600	1.350
Change in household damages, in:		Per year			Over lifetime of scheme			Qual. benefits (discounted)			
20% most deprived areas		£ -			£ -			OM2 (20%) £ -			
21-40% most deprived areas		£ -			£ -			OM2 (21-40%) £ -			
60% least deprived areas		-£ 7,401			-£ 148,020			OM2 (60%) £ 112,587			

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:	Before	Damages per household avoided:	
20% most deprived areas	-	Annual damages avoided	£ 6
21-40% most deprived areas	-	Loss expected in	£ 50
60% least deprived areas	-	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)	£ 1
Long-term loss	Medium-term loss	Long-term loss	Medium-term loss
Change in household damages, in:	Year 1 loss avoided:	Over lifetime of scheme:	Qual. benefits (discounted):
20% most deprived areas	£ -	£ -	OM3 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM3 (21-40%) £ -
60% least deprived areas	£ -	£ -	OM3 (60%) £ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a Hectares of net water-dependent habitat created	£ 15	OM4a £ -
OM4b Hectares of net intertidal habitat created	£ 50	OM4b £ -
OM4c Kilometres of protected river improved	£ 80	OM4c £ -
		OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 280,864	5.56p in the £1	£ 15,604
OM2	£ -	45.0	£ -
20% most	£ -	30.0	£ -
21-40%	£ -	20.0	£ -
Least 60%	£ 112,587	45.0	£ 22,517
OM3	£ -	45.0	£ -
20% most	£ -	30.0	£ -
21-40%	£ -	20.0	£ -
Least 60%	£ -	100.0	£ -
OM4	£ -		£ -
Total	£ 393,451		£ 38,121

Maximum for Outcomes delivered

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

Raw Score	Contribution for 100% Score
242%	0
193%	0
242%	-
242%	-
145%	-
143%	-

As scenario above
 Sensitivity 1 - Change in PV Whole Life Cost (25% increase)
 Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk before
 Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss
 Sensitivity 4 - Increase Duration of Benefits by 25%
 Sensitivity 5 - Reduce Duration of Benefits by 25%

END OF WORKSHEET



FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 7 April 2013

Project Name	FC3-2 Stroat
Unique Project Reference	

Key	Input cells
	Calculated cells

All figures are in 'thousands of pounds' (£k)
 Figures in Blue to be entered onto MTP

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	147%	(1)	
External Contribution or saving required to achieve an Adjusted Score of 100%	0	(2)	
Adjusted Partnership Funding Score (PF)	147%	(3)	
PV FCRM GiA towards the up-front costs of this scheme (Cost for Approval)	1,322	(4)	

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17).

Scheme Benefit to Cost Ratio:	0.30	to 1
Effective return to taxpayer:	0.30	to 1
Effective return to area:	n/a	to 1

1. Scheme details

Risk Management Authority type of asset maintainer	EA	(5)	Yes	(6)
Duration of Benefits (years)	20	(7)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?	
PV Whole-Life Benefits:	400	(8)		
PV Costs				
PV Appraisal Costs	0	(9)		
PV design & Construction Costs	1,322	(10)		
Sub Total - PV Cost for Approval (appraisal,design,construction)	1,322	(11)		
PV Post-Construction Costs	0	(12)		
PV Total Whole-Life Costs:	1,322	(13)		
PV Contributions secured to date				
PV Local Levy secured to date	0	(14)		
PV Public Contributions secured to date	0	(15)		
PV Private Contributions secured to date	0	(16)		
PV Funding from other Environment Agency functions/sources secured to date	0	(17)		
PV Total Contributions secured to date	0	(18)		

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.
 This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both the ongoing and up-front costs (Cost for Approval), and should be entered into cells(14-17).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:	Before	After	Change due to scheme
20% most deprived areas			0
21-40% most deprived areas			0
60% least deprived areas			0
At: Moderate risk		Moderate risk	Moderate risk
Significant risk		Significant risk	Significant risk
Very significant risk		Very significant risk	Very significant risk
Annual damages avoided, compared with a household at low risk			0.150 0.600 1.350
Change in household damages, in:	Per year	Over lifetime of scheme	Qual. benefits (discounted)
20% most deprived areas	£ -	£ -	OM2 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM2 (21-40%) £ -
60% least deprived areas	£ -	£ -	OM2 (60%) £ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:	Before	After	Qual. benefits (discounted)
20% most deprived areas	-	-	OM3 (20%) £ -
21-40% most deprived areas	-	-	OM3 (21-40%) £ -
60% least deprived areas	-	-	OM3 (60%) £ -
Long-term loss		Long-term loss	
Medium-term loss		Medium-term loss	
Change in household damages, in:	Year 1 loss avoided:	Over lifetime of scheme:	
20% most deprived areas	£ -	£ -	
21-40% most deprived areas	£ -	£ -	
60% least deprived areas	£ -	£ -	

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a	£ 15	OM4a £ -
OM4b	£ 50	OM4b £ 1,950.00
OM4c	£ 80	OM4c £ -
		OM4 £ 1,950.00

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ -	£ 5.56p in the £1	£ -
OM2	£ -		£ -
20% most	£ -		£ -
21-40%	£ -		£ -
Least 60%	£ -		£ -
OM3	£ -		£ -
20% most	£ -		£ -
21-40%	£ -		£ -
Least 60%	£ -		£ -
OM4	£ 1,950	100.0	£ 1,950
Total	£ 1,950		£ 1,950

Maximum for Outcomes delivered

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

As scenario above
 Sensitivity 1 - Change in PV Whole Life Cost (25% increase)
 Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk before
 Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss
 Sensitivity 4 - Increase Duration of Benefits by 25%
 Sensitivity 5 - Reduce Duration of Benefits by 25%

Raw Score	Contribution for 100% Score
147%	0
118%	0
147%	-
147%	-
80%	264
64%	482

END OF WORKSHEET



FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 7 April 2013

Project Name	FC4-3 Awre
Unique Project Reference	

Key	Input cells
	Calculated cells

All figures are in 'thousands of pounds' (£k)
 Figures in Blue to be entered onto MTP

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	283% (1)	Scheme Benefit to Cost Ratio: 0.49 to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Effective return to taxpayer: 0.49 to 1
Adjusted Partnership Funding Score (PF)	283% (3)	Effective return to area: n/a to 1
PV FCRM GiA towards the up-front costs of this scheme (Cost for Approval)	3,238 (4)	

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17).

1. Scheme details

Risk Management Authority type of asset maintainer	EA (5)	Yes (6)
Duration of Benefits (years)	20 (7)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?
PV Whole-Life Benefits:	1,570 (8)	
PV Costs		All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.
PV Appraisal Costs	0 (9)	
PV design & Construction Costs	3,238 (10)	
Sub Total - PV Cost for Approval (appraisal,design,construction)	3,238 (11)	
PV Post-Construction Costs	0 (12)	
PV Total Whole-Life Costs:	3,238 (13)	
PV Contributions secured to date		
PV Local Levy secured to date	0 (14)	
PV Public Contributions secured to date	0 (15)	
PV Private Contributions secured to date	0 (16)	
PV Funding from other Environment Agency functions/sources secured to date	0 (17)	
PV Total Contributions secured to date	0 (18)	

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.
 This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both the ongoing and up-front costs (Cost for Approval), and should be entered into cells(14-17).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:	Before	After	Change due to scheme
20% most deprived areas			0
21-40% most deprived areas			0
60% least deprived areas			0
At: Moderate risk		Moderate risk	
Significant risk		Significant risk	
Very significant risk		Very significant risk	
Annual damages avoided, compared with a household at low risk			0.150 0.600 1.350
Change in household damages, in:	Per year	Over lifetime of scheme	Qual. benefits (discounted)
20% most deprived areas	£ -	£ -	OM2 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM2 (21-40%) £ -
60% least deprived areas	£ -	£ -	OM2 (60%) £ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:	Before	Damages per household avoided:
20% most deprived areas	-	Annual damages avoided
21-40% most deprived areas	-	Loss expected in
60% least deprived areas	-	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)
Long-term loss		Long-term loss
Medium-term loss		Medium-term loss
Change in household damages, in:	Year 1 loss avoided:	Over lifetime of scheme:
20% most deprived areas	£ -	£ -
21-40% most deprived areas	£ -	£ -
60% least deprived areas	£ -	£ -
		Qual. benefits (discounted):
		OM3 (20%) £ -
		OM3 (21-40%) £ -
		OM3 (60%) £ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a	£ 15	OM4a £ -
OM4b	£ 50	OM4b £ 9,150.00
OM4c	£ 80	OM4c £ -
		OM4 £ 9,150.00

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ -	£ 5.56p in the £1	£ -
OM2	£ -		£ -
20% most	£ -		£ -
21-40%	£ -		£ -
Least 60%	£ -		£ -
OM3	£ -		£ -
20% most	£ -		£ -
21-40%	£ -		£ -
Least 60%	£ -		£ -
OM4	£ 9,150	100.0	£ 9,150
Total	£ 9,150		£ 9,150

Maximum for Outcomes delivered

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

As scenario above
 Sensitivity 1 - Change in PV Whole Life Cost (25% increase)
 Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk before
 Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss
 Sensitivity 4 - Increase Duration of Benefits by 25%
 Sensitivity 5 - Reduce Duration of Benefits by 25%

Raw Score	Contribution for 100% Score
283%	0
226%	0
283%	-
283%	-
33%	2,179
26%	2,394

END OF WORKSHEET



FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 7 April 2013

Project Name	FC4-10 Minsterworth Ham
Unique Project Reference	

Key	Input cells
	Calculated cells

All figures are in 'thousands of pounds' (£k)
 Figures in Blue to be entered onto MTP

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	489% (1)	Scheme Benefit to Cost Ratio: 15.22 to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Effective return to taxpayer: 15.22 to 1
Adjusted Partnership Funding Score (PF)	489% (3)	Effective return to area: n/a to 1
PV FCRM GiA towards the up-front costs of this scheme (Cost for Approval)	952 (4)	

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17).

1. Scheme details

Risk Management Authority type of asset maintainer	EA (5)	Yes (6)
Duration of Benefits (years)	20 (7)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?
PV Whole-Life Benefits:	14,494 (8)	
PV Costs		All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.
PV Appraisal Costs	0 (9)	
PV design & Construction Costs	952 (10)	
Sub Total - PV Cost for Approval (appraisal,design,construction)	952 (11)	
PV Post-Construction Costs	0 (12)	
PV Total Whole-Life Costs:	952 (13)	
PV Contributions secured to date		The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.
PV Local Levy secured to date	0 (14)	This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both the ongoing and up-front costs (Cost for Approval), and should be entered into cells(14-17).
PV Public Contributions secured to date	0 (15)	
PV Private Contributions secured to date	0 (16)	
PV Funding from other Environment Agency functions/sources secured to date	0 (17)	
PV Total Contributions secured to date	0 (18)	

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:	Before	After	Change due to scheme
20% most deprived areas			0
21-40% most deprived areas			0
60% least deprived areas	116	-	-116
At: Moderate risk		Moderate risk	0.150
Significant risk		Significant risk	0.600
Very significant risk		Very significant risk	1.350
Annual damages avoided, compared with a household at low risk			
Change in household damages, in:	Per year	Over lifetime of scheme	Qual. benefits (discounted)
20% most deprived areas	£ -	£ -	OM2 (20%) £ -
21-40% most deprived areas	£ -	£ -	OM2 (21-40%) £ -
60% least deprived areas	£ 70	£ 1,392	OM2 (60%) £ 1,059

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:	Before	Damages per household avoided:
20% most deprived areas	-	Annual damages avoided
21-40% most deprived areas	-	Loss expected in
60% least deprived areas	-	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)
Long-term loss		Long-term loss
Medium-term loss		Medium-term loss
Change in household damages, in:	Year 1 loss avoided:	Over lifetime of scheme:
20% most deprived areas	£ -	£ -
21-40% most deprived areas	£ -	£ -
60% least deprived areas	£ -	£ -
		Qual. benefits (discounted):
		OM3 (20%) £ -
		OM3 (21-40%) £ -
		OM3 (60%) £ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a 261.00 Hectares of net water-dependent habitat created	£ 15	OM4a £ 3,915.00
OM4b Hectares of net intertidal habitat created	£ 50	OM4b £ -
OM4c Kilometres of protected river improved	£ 80	OM4c £ -
		OM4 £ 3,915.00

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 9,520	5.56p in the £1	£ 529
OM2	£ -		£ -
20% most	£ -		£ -
21-40%	£ -		£ -
Least 60%	£ 1,059		£ 212
OM3	£ -		£ -
20% most	£ -		£ -
21-40%	£ -		£ -
Least 60%	£ -		£ -
OM4	£ 3,915	100.0	£ 3,915
Total	£ 14,494		£ 4,656

Maximum for Outcomes delivered

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

As scenario above
 Sensitivity 1 - Change in PV Whole Life Cost (25% increase)
 Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk before
 Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss
 Sensitivity 4 - Increase Duration of Benefits by 25%
 Sensitivity 5 - Reduce Duration of Benefits by 25%

Raw Score	Contribution for 100% Score
489%	0
391%	0
489%	-
489%	-
184%	-
164%	-

END OF WORKSHEET



FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 7 April 2013

Project Name	FC7-0 Avonmouth to Aust
Unique Project Reference	

Key	Input cells
	Calculated cells

All figures are in 'thousands of pounds' (£k)
 Figures in Blue to be entered onto MTP

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	119% (1)	
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17).
Adjusted Partnership Funding Score (PF)	119% (3)	
PV FCRM GiA towards the up-front costs of this scheme (Cost for Approval)	10,611 (4)	

Scheme Benefit to Cost Ratio:	13.44	to 1
Effective return to taxpayer:	13.44	to 1
Effective return to area:	n/a	to 1

1. Scheme details

Risk Management Authority type of asset maintainer	EA (5)	Yes (6)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?
Duration of Benefits (years)	20 (7)		
PV Whole-Life Benefits:	142,593 (8)		
PV Costs			All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.
PV Appraisal Costs	0 (9)		
PV design & Construction Costs	10,611 (10)		
Sub Total - PV Cost for Approval (appraisal,design,construction)	10,611 (11)		
PV Post-Construction Costs	0 (12)		
PV Total Whole-Life Costs:	10,611 (13)		
PV Contributions secured to date			<i>The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.</i>
PV Local Levy secured to date	0 (14)		This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both the ongoing and up-front costs (Cost for Approval), and should be entered into cells(14-17).
PV Public Contributions secured to date	0 (15)		
PV Private Contributions secured to date	0 (16)		
PV Funding from other Environment Agency functions/sources secured to date	0 (17)		
PV Total Contributions secured to date	0 (18)		

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Quantifying benefits under Outcome measure 2: Households better protected against flood risk											
Number of households in:			Before			After			Change due to scheme		
20% most deprived areas									0	0	
21-40% most deprived areas									0	0	
60% least deprived areas					3,595			-	0	-3,595	
At:	Moderate risk	Significant risk	Very significant risk				Moderate risk	Significant risk	Very significant risk		
Annual damages avoided, compared with a household at low risk											
									0.150	0.600	1.350
Change in household damages, in:			Per year			Over lifetime of scheme			Qual. benefits (discounted)		
20% most deprived areas			£	-					OM2 (20%)	£	-
21-40% most deprived areas			£	-					OM2 (21-40%)	£	-
60% least deprived areas			-£	2,157		-£ 43,140			OM2 (60%)	£	32,813

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:		Before		Damages per household avoided:	
20% most deprived areas		-	-	Annual damages avoided	£ 6 £ 6
21-40% most deprived areas		-	-	Loss expected in	50 20 years
60% least deprived areas		-	-	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)	£ 1 £ 3
		Long-term loss	Medium-term loss		Long-term loss Medium-term loss
Change in household damages, in:		Year 1 loss avoided:		Over lifetime of scheme:	
20% most deprived areas		£ -		OM3 (20%)	£ -
21-40% most deprived areas		£ -		OM3 (21-40%)	£ -
60% least deprived areas		£ -		OM3 (60%)	£ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a Hectares of net water-dependent habitat created	£ 15	OM4a £ -
OM4b Hectares of net intertidal habitat created	£ 50	OM4b £ -
OM4c Kilometres of protected river improved	£ 80	OM4c £ -
		OM4 £ -

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 109,780	5.56p in the £1	£ 6,099
OM2	£ -	45.0	£ -
20% most	£ -	30.0	£ -
21-40%	£ 32,813	20.0	£ 6,563
Least 60%	£ -	45.0	£ -
OM3	£ -	30.0	£ -
20% most	£ -	20.0	£ -
21-40%	£ -	100.0	£ -
Least 60%	£ -		£ -
OM4	£ -		£ -
Total	£ 142,593		£ 12,661

Maximum for Outcomes delivered

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

Raw Score	Contribution for 100% Score
119%	0
95%	603
119%	-
119%	-
84%	1,742
82%	1,933

As scenario above
 Sensitivity 1 - Change in PV Whole Life Cost (25% increase)
 Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk before
 Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss
 Sensitivity 4 - Increase Duration of Benefits by 25%
 Sensitivity 5 - Reduce Duration of Benefits by 25%

END OF WORKSHEET



FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 7 April 2013

Project Name

Unique Project Reference

Key

 	Input cells
 	Calculated cells

All figures are in 'thousands of pounds' (£k)
 Figures in Blue to be entered onto MTP

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score	328% (1)	Scheme Benefit to Cost Ratio: 46.61 to 1
External Contribution or saving required to achieve an Adjusted Score of 100%	0 (2)	Effective return to taxpayer: 46.61 to 1
Adjusted Partnership Funding Score (PF)	328% (3)	Effective return to area: n/a to 1
PV FCRM GiA towards the up-front costs of this scheme (Cost for Approval)	8,571 (4)	

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17).

1. Scheme details

Risk Management Authority type of asset maintainer	EA (5)	Yes (6)
Duration of Benefits (years)	20 (7)	Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided ?
PV Whole-Life Benefits:	399,503 (8)	
PV Costs		
PV Appraisal Costs	0 (9)	
PV design & Construction Costs	8,571 (10)	
Sub Total - PV Cost for Approval (appraisal,design,construction)	8,571 (11)	
PV Post-Construction Costs	0 (12)	
PV Total Whole-Life Costs:	8,571 (13)	
PV Contributions secured to date		
PV Local Levy secured to date	0 (14)	
PV Public Contributions secured to date	0 (15)	
PV Private Contributions secured to date	0 (16)	
PV Funding from other Environment Agency functions/sources secured to date	0 (17)	
PV Total Contributions secured to date	0 (18)	

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.
 This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both the ongoing and up-front costs (Cost for Approval), and should be entered into cells(14-17).

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Quantifying benefits under Outcome measure 2: Households better protected against flood risk

Number of households in:

	Before			After			Change due to scheme		
20% most deprived areas							0	0	
21-40% most deprived areas							0	0	
60% least deprived areas			4,101			-	0	-4,101	
At:	Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk	Moderate risk	Significant risk	Very significant risk

Annual damages avoided, compared with a household at low risk

	0.150	0.600	1.350
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Change in household damages, in:

	Per year		Over lifetime of scheme		Qual. benefits (discounted)		
20% most deprived areas	£	-	£	-	OM2 (20%)	£	-
21-40% most deprived areas	£	-	£	-	OM2 (21-40%)	£	-
60% least deprived areas	-£	2,461	-£	49,212	OM2 (60%)	£	37,432

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:		Before		Damages per household avoided:	
20% most deprived areas		<div></div>	<div></div>	Annual damages avoided	
21-40% most deprived areas		<div></div>	<div></div>	Loss expected in	
60% least deprived areas		<div></div>	<div></div>	Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)	
		Long-term loss	Medium-term loss	<div></div>	<div></div> years
				Long-term loss	Medium-term loss
Change in household damages, in:		Year 1 loss avoided:		Over lifetime of scheme:	
20% most deprived areas		<div></div>	<div></div>	<div></div>	
21-40% most deprived areas		<div></div>	<div></div>	<div></div>	
60% least deprived areas		<div></div>	<div></div>	<div></div>	
				Qual. benefits (discounted)	
				OM3 (20%) <div></div>	
				OM3 (21-40%) <div></div>	
				OM3 (60%) <div></div>	

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:	Assumed benefits per unit:	Qual. benefits (discounted):
OM4a Hectares of net water-dependent habitat created	£ 15	OM4a £ -
OM4b 11.00 Hectares of net intertidal habitat created	£ 50	OM4b £ 550.00
OM4c Kilometres of protected river improved	£ 80	OM4c £ -
		OM4 £ 550.00

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:	Qual. benefits:	Payment rate:	FCRM GiA contribution:
OM1	£ 361,521	5.56 p in the £1	£ 20,084
OM2	£ -	45.0	£ -
20% most	£ -	30.0	£ -
21-40%	£ 37,432	20.0	£ 7,486
Least 60%	£ -	45.0	£ -
OM3	£ -	30.0	£ -
20% most	£ -	20.0	£ -
21-40%	£ 550	100.0	£ 550
Least 60%	£ 399,503		£ 28,121
OM4			
Total			£ 28,121 Maximum for Outcomes delivered

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

Raw Score	Contribution for 100% Score
328%	0
262%	0
328%	-
328%	-
270%	-
268%	-

As scenario above
 Sensitivity 1 - Change in PV Whole Life Cost (25% increase)
 Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk before
 Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss
 Sensitivity 4 - Increase Duration of Benefits by 25%
 Sensitivity 5 - Reduce Duration of Benefits by 25%

END OF WORKSHEET



FCRM Partnership Funding Calculator for Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Version 7 April 2013

Project Name

FC11-0 Steart Peninsula

Unique Project Reference

Key

Input cells

Calculated cells

All figures are in 'thousands of pounds' (£k)

Figures in Blue to be entered onto MTP

SUMMARY: prospect of FCRM GiA funding

Raw Partnership Funding Score

66% (1)

External Contribution or saving required to achieve an Adjusted Score of 100%

6,673 (2)

Adjusted Partnership Funding Score (PF)

66% (3)

PV FCRM GiA towards the up-front costs of this scheme (Cost for Approval)

- (4)

Scheme Benefit to Cost Ratio: 1.02 to 1

Effective return to taxpayer: 1.02 to 1

Effective return to area: n/a to 1

Cell (2) shows the minimum amount of contributions and/or reductions in scheme cost that are required to raise the Adjusted PF Score to at least 100%. Further increases on this will improve this scheme's chances of an FCRM GiA allocation in the desired year. Planned savings and contributions should be entered into cells(9,10,12) and cells(14-17).

1. Scheme details

Risk Management Authority type of asset maintainer

EA (5)

Yes (6)

Duration of Benefits (years)

20 (7)

Is evidence available that a Strategic Approach has been taken, and that double counting of benefits has been avoided?

PV Whole-Life Benefits:

20,178 (8)

PV Costs

PV Appraisal Costs

0 (9)

PV design & Construction Costs

19,694 (10)

Sub Total - PV Cost for Approval (appraisal,design,construction)

19,694 (11)

PV Post-Construction Costs

0 (12)

PV Total Whole-Life Costs:

19,694 (13)

All costs and benefits must be on a Present Value (PV) Whole-Life basis over the Duration of Benefits period. Where Contributions are identified these should also be on a Present Value basis.

The total value of any necessary contributions will depend on whether maintenance (ongoing costs) is funded through revenue FCRM GiA, or by other means.

This scheme is to be maintained by the EA (ref cell 5). Any contributions needed (ref cell 2) are to help fund both the ongoing and up-front costs (Cost for Approval), and should be entered into cells(14-17).

PV Contributions secured to date

PV Local Levy secured to date

0 (14)

PV Public Contributions secured to date

0 (15)

PV Private Contributions secured to date

0 (16)

PV Funding from other Environment Agency functions/sources secured to date

0 (17)

PV Total Contributions secured to date

0 (18)

WARNING: Contributions less than minimum required in cell (2)

2. Qualifying benefits under Outcome Measure 2: households better protected against flood risk

Number of households in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Before		
At:	Moderate risk	Significant risk
	Significant risk	Very significant risk

After		
	Moderate risk	Significant risk
	Significant risk	Very significant risk

Change due to scheme		
	Moderate risk	Significant risk
	Significant risk	Very significant risk

Annual damages avoided, compared with a household at low risk

0.150 0.600 1.350

Change in household damages, in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Per year	
£	-
£	-
£	-

Over lifetime of scheme	
£	-
£	-
£	-

Qual. benefits (discounted)	
OM2 (20%)	£ -
OM2 (21-40%)	£ -
OM2 (60%)	£ -

3. Qualifying benefits under Outcome Measure 3: households better protected against coastal erosion

Number of households in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Before	
	Long-term loss
	Medium-term loss

Damages per household avoided:
Annual damages avoided
Loss expected in
Present value of Year 1 loss (i.e. first year damages, discounted based on when loss is expected)

£	6	£	6
£	50	£	20
£	1	£	3
	Long-term loss		Medium-term loss

Change in household damages, in:

20% most deprived areas

21-40% most deprived areas

60% least deprived areas

Year 1 loss avoided:	
£	-
£	-
£	-

Over lifetime of scheme:	
£	-
£	-
£	-

Qual. benefits (discounted):	
OM3 (20%)	£ -
OM3 (21-40%)	£ -
OM3 (60%)	£ -

4. Qualifying benefits under Outcome Measure 4: statutory environmental obligations met

Payments under:

OM4a

OM4b

OM4c

252.00	Hectares of net water-dependent habitat created
	Hectares of net intertidal habitat created
	Kilometres of protected river improved

Assumed benefits per unit:

£	15
£	50
£	80

Qual. benefits (discounted):

OM4a	£ -
OM4b	£ 12,600.00
OM4c	£ -
OM4	£ 12,600.00

5. Qualifying benefits arising from the overall scheme, for entry into the Medium-Term Plan

OM, deprivation:

Qual. benefits:

Payment rate:

OM	Qual. benefits	Payment rate
OM1	£ 7,578	5.56p in the £1
OM2	£ -	45.0
	20% most	£ -
	21-40%	£ -
	Least 60%	£ -
OM3	£ -	45.0
	20% most	£ -
	21-40%	£ -
	Least 60%	£ -
OM4	£ 12,600	100.0
Total	£ 20,178	

FCRM GiA contribution:

£	421
£	-
£	-
£	-
£	-
£	-
£	-
£	-
£	12,600
£	13,021

Maximum for Outcomes delivered

Sensitivity Testing. It is important that users of this calculator appreciate the implications on funding from changes to input data which may become necessary as the project develops and better information is available. Five typical tests are provided below. Users should consider how appropriate these are to their project, what other tests may be appropriate and how best to use the information with all those that may be involved in the project.

Raw Score	Contribution for 100% Score
66%	6,673
53%	11,597
66%	6,673
66%	6,673
11%	17,626
10%	17,817

As scenario above

Sensitivity 1 - Change in PV Whole Life Cost (25% increase)

Sensitivity 2 - Change in OM2 - 50% of households in Very Significant (Before) risk may already be in Significant Risk

Sensitivity 3 - Change in OM3 - 50% of households in Medium Term loss (Before) may already be in Long Term loss

Sensitivity 4 - Increase Duration of Benefits by 25%

Sensitivity 5 - Reduce Duration of Benefits by 25%

END OF WORKSHEET





Appendix Q : Health and Safety Log





LOCATION					HEALTH AND SAFETY ISSUES
Relevant placename	SMP2 policy unit	Strategic flood sub-cell	Strategic sub-reach	FRM asset description	
Penarth	PEN2	FC1-P	SR1-P	Penarth sea defence/high ground	Close proximity of residents/tourists to any FRM activity (transport, construction or degradation). Possible tidal working conditions for contractors.
Tremorfa	CAR2	FC1-0	SR1-CF	Rock armoured high made ground	Close proximity of industry (steel works) and residents to any FRM activity (transport, construction or degradation). Possible tidal/mudflats working conditions for contractors.
			SR1-RRWB	Coastal frontage and river Rhyhney West Bank, general hard top ground level.	
			SR1-RRWB1	River Rhyhney West Bank, variable FRM assets.	
Wentlooge Levels	CAR3, WEN1, WEN2	FC1-1	SR1-RREB	Grassed embankment	Close proximity of commerce to any FRM activity (transport, construction or degradation). Possible tidal/mudflats working conditions for contractors.
			SR1-0	Rock armoured embankment (clay core)	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible tidal/mudflats working conditions for contractors.
			SR1-1	Grass embankment (clay core) with managed foreshore	
			SR1-2	Grass embankment (clay core) with managed foreshore	
			SR1-3	Grass embankment (clay core)	
			SR1-4	Concrete revetment	
			SR1-5	Concrete revetment	
			SR1-6	Grass embankment (clay core)	
			SR1-REWB	Grass embankment (clay core)	
River Ebbw - River Usk	NEW1, NEW2	FC1-2	SR1-REEB	Grass embankment (clay core)	Close proximity of industry (docks, power station) and residents (Newport) to any FRM activity (transport, construction or degradation). Potential for land contamination issues near Newport. Difficult access in built up areas. Possible fluvial-tidal working conditions for contractors.
			SR1-RUWB1	General ground level (Ebbw to Transporter bridge)	
			SR1-RUWB2	Non flood defence wall, to SDR bridge	
			SR1-RUWB3	SDR bridge to Clarence Place Bridge	
Caldicot Levels	NEW4, NEW5, CALD1	FC2-0	SR2-RUEB1	Uskmouth power station, high made ground levels	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible tidal/mudflats working conditions for contractors.
			SR2-RUEB2	Julians Pill to Transporter Bridge	
			SR2-RUEB3	Transporter Bridge to Clarence Place Bridge	
			SR2-RUEB4	CP Bridge to flood defence	
			SR2-RUEB5	Glebelands	
			SR2-0	Revetment with seawall	
			SR2-1	Concrete revetment	
			SR2-2	Concrete revetment	
			SR2-3	Grass embankment (clay core)	
			SR2-4	Rock armoured embankment	
Mathern	CALD3	FC2-1	SR2-5	Rock armoured embankment	
			SR2-6	Grass embankment (clay core)	
			SR2-7	Rock armoured embankment	
			SR2-8	Grass embankment (clay core)	



LOCATION					HEALTH AND SAFETY ISSUES
Relevant placename	SMP2 policy unit	Strategic flood sub-cell	Strategic sub-reach	FRM asset description	
Tidenham	TID1	FC3-1	SR3-0	High ground (MU 9C west)	Degradation due to no maintenance needs to be managed to ensure public safety.
			SR3-1	Sturch Pill embankment (MU 9C west)	
			SR3-2	High ground (MU 9B west)	
Stroat	FC3-2	FC3-2	SR3-3	Railway embankment (failed tide flaps) (MU 9B west)	
			SR3-4	High ground (MU9B west)	
Lydney	TID2	FC3-3	SR3-5	Grassed embankment with lower rock armouring (MU 9A west)	Remote access in rural areas although harbour and associated infrastructure is also present. Railway present. Possible tidal/mudflats working conditions for contractors.
Purton	GLO1	FC4-1	SR4-0	High ground/short lengths of railway retaining wall (MU 10B, 10A, 11A west)	Remote access in rural areas. Railway present. Possible tidal/mudflats working conditions for contractors.
Blakeney	GLO2	FC4-2	SR4-1	Grassed embankment	Remote access in rural areas. Possible tidal/mudflats working conditions for contractors.
Awre		FC4-3	SR4-2	Grassed embankment with some masonry (MU 12E west)	
Bullo	GLO3	FC4-4	SR4-3	Medium level ground/embankment (MU 12D, 12C west)	Degradation due to no maintenance needs to be managed to ensure public safety.
Ruddle		FC4-5	SR4-3	Medium level ground/embankment (MU 12D, 12C west)	
Newnham-on-Severn	GLO4	FC4-6	SR4-3	Medium level ground/embankment (MU 12D, 12C west)	Close proximity of residents to any FRM activity (transport, construction or degradation). Possible tidal working conditions for contractors.
Westbury-on-Severn and Rodley	GLO5	FC4-7	SR4-4	Grassed embankment (MU 12B west)	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible tidal conditions for contractors.
			SR4-5	High ground (MU 12B west)	
			SR4-6	Grassed embankment (MU 12A west)	
Wallmore Common	GLO7	FC4-8	SR4-8	Grassed embankment (MU 13E west)	
Minsterworth	GLO8	FC4-9	SR4-9	Grassed embankment/high ground (MU 13D, 13C west)	Remote access for any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible fluvial-tidal conditions for contractors.
Minsterworth Ham	MAI1	FC4-10	SR4-10	Grassed embankment (MU 13B west)	
River Leaddon	MAI2	FC4-11	SR4-11	NA	Degradation due to no maintenance needs to be managed to ensure public safety.



LOCATION					HEALTH AND SAFETY ISSUES
Relevant placename	SMP2 policy unit	Strategic flood sub-cell	Strategic sub-reach	FRM asset description	
The Rea	MAI6	FC5-3	SR5-0	High ground/grassed embankment (MU 13A east)	Proximity of local communities to any FRM activity (transport, construction or degradation). Overhead power lines are present. Possible fluvial-tidal conditions for contractors.
Stonebench	SHAR1	FC5-4	SR5-1	High ground/grassed embankment (MU 13B&C east)	
Elmore Back		FC5-5	SR5-2	Grassed embankment (MU 13D east)	Close proximity of residents to any FRM activity (transport, construction or degradation). Remote access in more rural areas. Overhead power lines present. Possible fluvial-tidal working conditions for contractors.
Longney	SHAR2	FC5-6	SR5-3	Grassed embankment (MU 13E east)	
Upper Framilode	SHAR3, SHAR5	FC5-7	SR5-4	Grassed embankment (MU 12A&B east)	Close proximity of residents to any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.
			SR5-6	Grassed embankment (MU 12C east)	
Arlingham	SHAR4	FC5-8	SR5-5	Grassed embankment	Proximity of local communities to any FRM activity (transport, construction or degradation). Limited access routes. Overhead power lines are present. Possible fluvial-tidal conditions for contractors.
Slimbridge	SHAR6, SHAR7	FC5-9	SR5-7	Canal banks (MU 11A est)	Remote access in rural areas. Limited access routes. Possible fluvial-tidal working conditions for contractors.
			SR5-8	Grassed embankment, Slimbridge (MU 11B east)	
Berkeley	SEV1	FC6-1	SR6-0	Grassed embankment (MU 9A east)	Remote access and working in more rural areas. Nuclear Power Station and overhead powerlines. Possible tidal/mudflats working conditions for contractors.
Shepperdine	SEV2, SEV3, SEV4	FC6-2	SR6-1	Grassed embankment (MU 9B east)	Remote access and working in more rural areas. Possible tidal/mudflats working conditions for contractors.
			SR6-2a	Grassed embankment (MU 9C east)	
			SR6-2b	Grassed embankment (MU 9C east)	
			SR6-2c	Grassed embankment (MU 9C east)	
Littleton-upon-Severn	SEV5	FC6-3	SR6-3	Grassed embankment (MU 9D east)	
			SR6-4	Grassed embankment/high ground (MU 7A east)	
Avonmouth to Aust	BRIS1, BRIS2, BRIS3	FC7-0	SR7-0	Grass embankment (clay core)	Close proximity of industry and residents to any FRM activity (transport, construction or degradation). Significant range of overhead and underground services, particularly in the south. Contaminated land sites are also present. Unexploded UXOs could be present. Possible tidal/mudflats working conditions for contractors.
			SR7-1	Severn Beach wave wall	
			SR7-2	Rock armoured embankment	
			SR7-3	Wave wall	
			SR7-4	Railway embankment	
			SR7-5	BPC defences, variable types (steep)	
			SR7-6	BPC defences, variable types (shallow)	
			SR7-7	BPC defences, variable types (steep)	
Portbury	BRIS6	FC8-0	SR8-0	Grass embankment (clay core), Portbury Wharf	Remote access and working in more rural areas, adjacent to industry (Portbury Docks). Possible tidal/mudflats working conditions for contractors.
Woodhill	PORT2	FC8-1	SR8-1	Concrete wall/slope, Woodhill	Degradation due to no maintenance needs to be managed to ensure public safety.



LOCATION					HEALTH AND SAFETY ISSUES
Relevant placename	SMP2 policy unit	Strategic flood sub-cell	Strategic sub-reach	FRM asset description	
Clevedon to Weston-Super-Mare	KIN1, KIN3	FC9-0	SR9-0	High vertical wall and ground	Close proximity of residents in urban frontages for any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.
			SR9-1	Steep wall with small recurve	
			SR9-2	Grass embankment (clay core)	
			SR9-3	High ground and embankment	
			SR9-4	Lower rock revetment, upper grassed embankment	Remote access in rural locations, for any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.
			SR9-5	Lower asphalt revetment, upper grassed embankment	
			SR9-6	Asphalt revetment with middle berm	
			SR9-7	Lower rock revetment, upper grassed embankment	
			SR9-CYRB	Congresbury Yeo right bank, Grass embankment (clay core)	
			SR9-CYLB	Congresbury Yeo left bank, Grass embankment (clay core)	
			SR9-8	Upper asphalt revetment, lower rock armour	
			SR9-RBRB	River Banwell right bank, Grass embankment (clay core)	
			SR9-RBLB	River Banwell left bank, Grass embankment (clay core)	
			SR9-9LS	Wide sand dunes (Sand Bay)	Close proximity of residents in urban frontages for any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.
			SR9-9	Wide sand dunes (Sand Bay)	
			SR9-10	New vertical concrete wall defences (W-S-M)	
			SR9-11	High level vegetated dunes	
Brean to Burnham-on-Sea	7d43-46, 7e01-06	FC10-0	SR9-12	River Axe right bank, Grass embankment (clay core)	Remote access in rural locations, and [proximity to tourism, for any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.
			SR9-13	River Axe left bank, Grass embankment (clay core)	
			SR10-0	Rock armour with vertical wall	
			SR10-1	Gabion/masonry wall	
			SR10-2	Ancient wide dunes	
			SR10-3	Modern thin dunes	
			SR10-4	Ancient wide dunes	Close proximity of residents in urban frontages for any FRM activity (transport, construction or degradation). Overhead power lines present. Possible fluvial-tidal working conditions for contractors.
			SR10-5	Concrete wall	
			SR10-6	Revetment with 3.2m wave wall	
			SR10-7	River Brue right bank, Brick wall	
Huntpill	7d42	FC10-1	SR10-8	River Brue right bank, Grass embankment (clay core)	Remote access and working in more rural areas. Drogue and UXOs could be present. Possible tidal/mudflats working conditions for contractors.
			SR10-9a	River Brue left bank, grassed embankment	
			SR10-9b	River Brue left bank, grassed embankment	
Pawlett		FC10-2	SR10-9c	Huntpill, revetment/embankment	
			SR10-RPRBa	River Parrett right bank, Grass embankment (clay core)	
			SR10-RPRBb	River Parrett right bank, Grass embankment (clay core)	
Stear Peninsula	7d32-37	FC11-0	SR10-RPRBc	River Parrett right bank, Grass embankment (clay core)	
			SR11-RPLB	River Parrett left bank, grassed embankment	
			SR11-0	Low bank on ground	
			SR11-1	Informal embankment	
			SR11-2	Shingle bank	
			SR11-3	Grass embankment (clay core)	
SR11-4	Grass embankment (clay core) with fronting rock armour				
SR11-5	Grass embankment (clay core) with fronting rock armour				



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