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Environment Agency

Medway Estuary and Swale Coastal Flood and Erosion Risk Strategy

Technical Appendix E - Appraisal Summary Tables

May 2018

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Contents

1 Overview

The Environment Agency has appointed Mott MacDonald (MM) to develop the Medway Estuary and Swale Coastal Flood and Erosion Strategy (hereafter known as MEASS), with the aim of providing a Flood and Coastal Risk Management (FCRM) Strategy for the Tidal Medway Estuary, the Swale Estuary, and the Isle of Sheppey. The aim of MEASS is to assess how to best manage the coastline to protect people, properties, designated habitats, and agricultural land from coastal flood and erosion risk. As with all flood and coastal risk management work, the wider impacts must be considered. This means that the best technical solutions for defences need to be found, while also considering the impacts and benefits for local communities, the environment, and the cost to the tax payer.

The Strategy that has been produced consists of a Strategy Appraisal Report (StAR) document which summarises the business case and key financial information. The StAR document is supported by several Technical Appendices, which together, provide the details behind the decisions made within the StAR. Due to the large area of the Strategy and the large amount of data, Appraisal Summary Tables are used to present the data clearly and concisely.

1.1 Strategy Area

The Strategy area includes the Isle of Sheppey, the tidal extents of the Medway Estuary and the Swale estuary. The boundaries of the strategy area are:

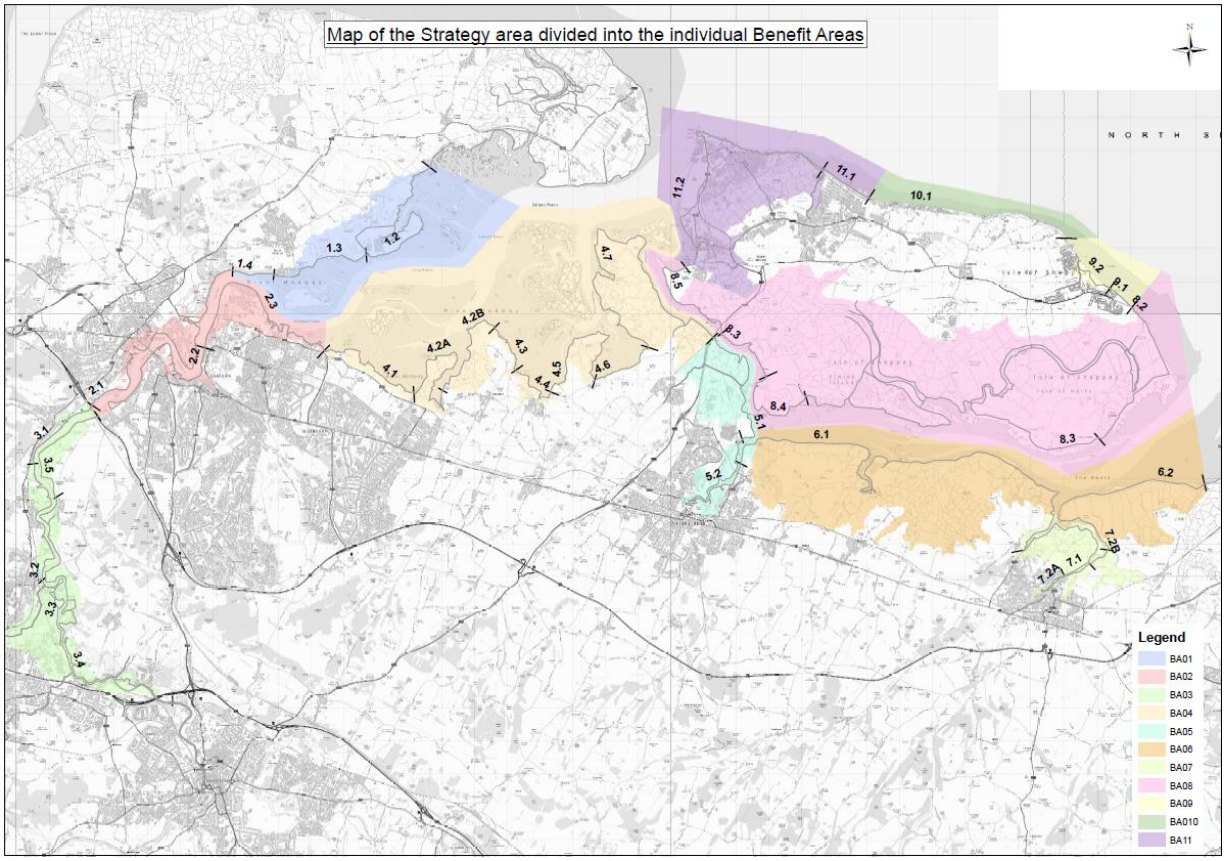
- Allington Sluice as the upstream tidal limit of the Medway;
- the village of Stoke on the Hoo Peninsula; and
- the Sportsman Public House on Cleve Marshes near Faversham.

MEASS encompasses the large urban areas of the Medway Towns including Rochester, Strood, Chatham and Gillingham; major industrial and commercial areas along the estuaries; and large swathes of rural farmland and extensive salt marsh and mudflats. Many of the rural areas are highly designated and protected for their heritage, landscape, and environmental value.

1.2 Benefit Areas

As the Strategy frontage is approximately 120km in length, and there are complex interactions between the different land uses, the MEASS area has been broken down into a series of Benefit Areas (BAs) based on the extent of discrete flood cells. These BAs have been broken down further into 35 sub-Benefit Areas based on the SMP Policy Units (Figure 1).

Figure 1: The division of the frontage into 11 BAs and 35 sub BAs based on discrete flood cells (determined from modelling) and land use. Please note that BA1.1 is now included in the Thames Estuary 2100 Strategy. BA8.1 and 8.2 were merged to form BA8.2 to reflect the interconnectivity between these areas.



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1.3 Aims of the Strategy

MEASS will assess and consider a variety of economic, environmental, and technical approaches to manage the coastal flood and erosion risk, in order to balance the wide range of features and interests within the area.

The vision statement of MEASS is to "*work with the community to plan how we will sustainably reduce flood risk to 17,226 homes in the Medway Estuary, Swale and Sheppey over the next 100 years (under a 0.1%AEP event), whilst also protecting and enhancing the local environment*."

Building on from this vision statement a series of primary and secondary objectives for MEASS have been developed (Table 1) to drive the delivery of an effective FCRM strategy which supports as many local plans and aspirations as possible.

Table 1: MEASS Primary and Secondary Objectives

Primary Objectives		Secondary Objectives	
1)	Reduce flood and erosion risk to properties and infrastructure at significant or very significant risk in light of coastal change over the next 100 years.	3)	Favour options that reduce the whole life costs of current defences.
2)	Maintain the integrity of Natura 2000 sites (protected under the Habitats and Birds Directives) assuming the loss due to coastal squeeze of 113ha of saltmarsh habitat between years 0-20 and a further 140ha of saltmarsh habitat between years 20-50.	4)	Favour options that support delivery of the Thames River Basin Management Plan.
		5)	Help enable local plan objectives to be realised where possible.

1.4 Aim of the ASTs

The AST is a tool that has been developed to help the project team with the appraisal of the short list of options to determine the preferred option. The aim of the ASTs is to allow the positive and negative impacts associated with flood/ erosion risks to be recorded, along with the benefits and opportunities of the proposed solutions to manage these risks. Therefore, these ASTs aim to summarise all the work that has been undertaken as part of the Strategy to date. It should be noted that due to the extensive amount of work that has been undertaken these ASTs provide a summary, with much of the supporting evidence to be provided in the associated reports that will be delivered as part of the overall strategy.

1.5 What's included

Included within this Report are the ASTs for MEASS. There is a file for each Benefit Area. Section 2 of this Report present information on how the ASTs are put together and help read and understand the ASTs.

2 How to read the ASTs

2.1 Overview

The ASTs have been developed in line with FCERM-AG (Environment Agency, 2010). The aim of the ASTs is to allow the positive and negative impacts associated with the coastal flood and erosion risk to be recorded, along with the benefits and opportunities of the proposed solutions to manage these risks and any assumptions made. These ASTs have been used as a tool to help determine the preferred options, and record the decision making process. The ASTs present the information that is discussed and analysed in Technical Appendix C (Damage assessment), Technical Appendix D (Options Technical report) and Technical Appendix G (Economic Report) and as such further information on the methodologies and assessments can be found in these Reports.

The ASTs are divided into individual Benefit Areas which aim to cover discrete flood cells and land use. These ASTs build upon the proformas that were developed by the project team at the long list to short list stage, and as such provide a record of the decisions made as the Strategy has progressed.

The information below will provide a general summary of the contents of the AST and should help with the review.

2.2 Section 1 – General background information

The first section of the AST was developed in the first phase of the project. This section outlines:

- Current defences in place (type, length, residual life and SoP);
- The SMP policy;
- A map of the BA; and
- Assessment of the impacts under a Do Nothing scenario for both a small flood (high frequency event) and an extreme flood event (low frequency event). This is further broken down to outline the potential impacts based on current sea level and sea level in 100 years.

2.3 Section 2 – Long list to short list

This table outlines the list of potential measures that could be implemented at the site. These measures were used to develop the long list of options.

This table was used to refine the long list of options to the short list of options. To determine the short list of options each option was tested against the objectives, as well as an assessment of the current condition, SoP provided and the potential assets at risk.

2.4 Section 3 – Short list of options

This table presents the final list of short list of options which were then taken forward for more detailed assessments.

2.5 Section 4 – Assessment of short list

The AST table summarises all the information that has been assessed and developed during the appraisal of the short list of options. There are a number of criteria used to assess the short list and these are presented with a description of these below.

Due to the large amount of information that has been reviewed these tables aim to be brief to ensure that the review of them is manageable, but still allow informed discussions. Further detailed information on the assessment of environmental impacts sits within the Technical Appendix J (SEA Report).

The table below provides a more detailed description of the criteria that have been included in the AST.

Table 2 Criteria used to assess the short listed options in the ASTs

	Criteria	Description
	Description	Provides a brief outline of what the option involves
	Technical Issue	Outlines any technical issues which need to be considered e.g. residual life of the assets, potential risks to landfill sites, the amount of engineering required to implement a scheme e.g. if a managed realignment site ties back to high ground, or if new set-back embankments will be required.
	Assumptions/ Uncertainties	Assumptions included when developing the costing of the options.
	SOP Provided	Standard of protection provided following the capital works on the defences, at the end of the 100 years, including climate change for Do Something Options. Shown as the %AEP. 0.5% = 1 in 200 year; 1% = 1 in 100 years; 2% = 1 in 50 years; 5% = 1 in 20 years; 20% = 1 in 5 years; 50% = 1 in 2 years. The SoP is calculated based on the crest height of the defences.
Value of Economics	Present Value (PV) Capital Costs	The total cost of the capital works for the option, discounted over the 100 years of the appraisal period.
	PV Maintenance Costs	The total cost of the maintenance works for the option, discounted over the 100 years of the appraisal period.
	PV Other Costs	Accounts for the appraisal and detailed design costs for the scheme. These costs are discounted based on the year of implementation.
	Total Cost (including Optimism Bias) (PV)	This is the total cost of the option i.e. capital, maintenance and other costs discounted over the 100 year appraisal process. However, this is not the sum of the previous 3 criteria as optimism bias (OB) (risk) has been added to the cost. In line with guidance and previous experience a 60% OB score has been added to the costs.
	Value of Benefits (PV)	This criteria includes the total value of the benefits for each of the options, discounted over the 100 years of the appraisal period. The benefits have been calculated based on the damages avoided.
	Benefit Cost Ratio (BCR)	The BCR has been calculated to compare the ratio between the costs and the benefits for each option (calculated by dividing benefit by cost). Based on FCERM-AG (government funding guidance) the BCR should be greater than 1 to qualify for FDGiA funding.
	Partnership Funding (PF) Score	The PF score calculated using the Partnership Funding calculator tool before contributions are considered (raw PF) to determine potential for FDGiA funding.
	Further funding required to achieve 100% Partnership Funding (PF) Score	Partnership contributions required for 100% funding of the scheme.
Flood/ erosion	Number of Residential Properties	For BAs where the risk is from flooding this criteria uses the worst case i.e. the highest number of properties affected under each return period which are used to derive the Annual Average Damage (AAD). For BAs where the risk is from erosion this criteria outlines the total number of properties at risk over the 100 year appraisal period.

	Value of Residential Properties	The value of the damages / losses is used in the Annual Average Damage (AAD) calculations. The AADs are calculated based on taking a % of the flood / erosion damages and losses for each of the return periods assessed in the Strategy. The equation used to calculate this is taken from FCERM-AG guidance. The calculation of the value of residential properties is based on Multi-Coloured Manual (MCM) guidance and the current market value for the property for erosion and damages relating to flood depth for flooding. For BAs where properties are lost to erosion the value is calculated based on discounting the value of the property to the year of loss. Note this also includes mobile homes.
	Number of Commercial Properties	For BAs where the risk is from flooding this criteria uses the worst case i.e. the highest number of properties affected under each return period to which are used to derive the Annual Average Damage (AAD). For BAs where the risk is from erosion this criteria outlines the total number of properties at risk over the 100 year appraisal period.
	Value of Commercial Properties	The value of the damages / losses is used in the Annual Average Damage (AAD) calculations. The AADs are calculated based on taking a % of the flood / erosion damages and losses for each of the return periods assessed in the Strategy. The equation used to calculate this is taken from FCERM-AG guidance. The calculation of the value of commercial properties is based on Multi- Coloured Manual (MCM) guidance and the current market value for the property for erosion and damages relating to flood depth for flooding. For BAs where commercial properties are lost to erosion the value is calculated based on discounting the value of the property to the year of loss.
	Critical Infrastructure	Descriptive criteria which builds upon the information provided at the long-list to short-list stage outlining the infrastructure that has been noted at risk following the results of the flood modelling and erosion predictions. Where applicable this criteria includes power stations, sewage works, electricity sub-stations, ports, hospitals, and schools.
	Value of Impacts on Road and Rail	The value of the damages / losses is calculated based on the Annual Average Damage (AAD) calculations. The AADs are calculated based on taking a % of the flood damages for each of the return periods assessed in the Strategy. The equation used to calculate this is taken from FCERM-AG guidance. The calculation of the impacts on road and rail are calculated following the guidance in the Multi- Coloured Manual (MCM). This criteria includes the value of the impacts on the road/ railway network
	Value of Tourism and Recreation Impacts	The value of the damages / losses is calculated based on the Annual Average Damage (AAD) calculations. The AADs are calculated based on taking a % of the flood damages and erosion losses for each of the return periods assessed in the Strategy. The equation used to calculate this is taken from FCERM-AG guidance. The calculation of the impacts on tourism and recreation are calculated following the guidance in the Multi- Coloured Manual (MCM). This includes parks, natural reserves, and coastal resorts.
	Value of Agriculture Impacts	The value of the damages / losses is calculated based on the Annual Average Damage (AAD) calculations. The AADs are calculated based on taking a % of the flood damages and erosion losses for each of the periods assessed in the Strategy. The equation used to calculate this is taken from FCERM-AG guidance. The calculation of the agricultural impacts is calculated following the guidance in the Multi- Coloured Manual (MCM), based on Natural England's classification of agricultural grade. Also provides information on the hectares of land at risk of flooding.
Stakeholders	Statutory Stakeholders/ Stakeholder Engagement Group (SEG)	Summarises the comments received on the options in the Stakeholder Engagement Group meetings and from statutory stakeholders.
	Landowners	Summarises the comments received from the landowners during landowner consultation
Technical Feasibility of the MR Options	Site Specific	This criteria relates to the feasibility of the MR options based on the results of the flood modelling. Feasibility is based on the potential intertidal habitat created at the site e.g. an option is technically feasible if intertidal habitat is created, especially under spring tide conditions. For HTL options a n/a is scored as there is no opportunity for intertidal habitat creation.
	Strategy Wide	Assesses the technical feasibility of the MR site within the wider Strategy area e.g. the impacts of one option on the wider estuary. This criteria mainly focuses on those sites being considered for MR based on the results of the initial MR site modelling where all sites were considered.

Water Framework Directive (WFD)	Compliance assessment outcome	Presents the preliminary results of the Water Framework Directive (WFD) assessment. At this stage assessment is based on the heavily modified water bodies and the diffuse pollution (e.g. impacts from agricultural run-off).To provide a score of the options a numeric approach has been applied to represent the WFD scoring criteria: - - (double negative) - 1 e.g. improving sea defences and continuing to hold the line i.e. maintaining a heavily modified water body (HMWB). - (negative) - 2 e.g. continuing to hold the defences but there may be some overtopping/ failure of the defences over time. 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - potential imminent failure of defences, or significant overtopping of the defence which could revert to a more natural estuary over time. + + (double positive) - 5 - removal of defences and reverting to a more natural estuary.
Habitat Regulation Assessment (HRA)	Impact on SPA/ Ramsar qualifying features (beneficial or adverse) NB: Criteria may not be applicable for all sites. These are given a 0 (neutral) score	Assesses the potential impacts of the option on the HRA and Ramsar qualifying features and assemblages. Negative impacts are scored with a low score, and positive impacts receive a high score. This assessment is based on the results of the HR01 assessment. - - (double negative) - 1 - adverse impact to SPA/ Ramsar qualifying features and cited habitats. - (negative) - 2 - marginal impact on SPA/Ramsar qualifying features and cited habitats e.g. limited overtopping/very small areas e.g. less than 1 hectare. 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - marginal/slight improvement to the environment for SPA/ Ramsar qualifying features. + + (double positive) - 5 - notable improvement to the environment for SPA/ Ramsar qualifying features.
	Impact on freshwater habitat (beneficial or adverse) NB: Criteria may not be applicable for all sites. These are given a 0 (neutral) score	Assesses the potential impacts of the option on the qualifying features which might be affected by changes to the freshwater SPA/ Ramsar sites e.g. if the species in the site cannot tolerate saline intrusion this would be a negative impact. - - (double negative) - 1 - Notable impact to freshwater habitat within the SPA/ Ramsar e.g. MR over a freshwater designated site. - (negative) - 2 - some potential impact on freshwater SPA/Ramsar qualifying features e.g. risk of overtopping overtime. 0 (neutral) - 3 - neither beneficial or adverse impacts. Also used if the site is not designated SPA/ Ramsar. + (positive) - 4 - some improvement to the freshwater habitat within the SPA/ Ramsar e.g. improvement of defences, but there may be occasional overtopping in the future with sea level rise. + + (double positive) - 5 - improvement to the freshwater habitat within the SPA/ Ramsar e.g. improvement to the SOP and very minimal risk of overtopping.
	Impacts on intertidal habitats (beneficial or adverse) NB: Criteria may not be applicable for all sites. These are given a 0 (neutral) score	Assesses the potential impacts of the option on the qualifying features which could be affected by changes to the intertidal habitats e.g. if the species at the site require intertidal habitat, and this is lost through coastal squeeze this is a negative impact. - - (double negative) - 1 - Notable adverse impact on intertidal SPA/ Ramsar habitats, with consequent adverse impacts on qualifying features e.g. due to coastal squeeze. - (negative) - 2 - intertidal SPA/ Ramsar habitats, with consequent adverse impacts on qualifying features e.g. some loss of intertidal habitat overtime. 0 (neutral) - 3 - neither beneficial or adverse impacts. Also, might be used if the site is not designated SPA/ Ramsar. + (positive) - 4 - some improvement to the environment for intertidal SPA/ Ramsar qualifying features e.g. creation of new intertidal habitat, but might be more mudflat than saltmarsh. + + (double positive) - 5 - significant improvement to the environment for intertidal SPA/ Ramsar qualifying features e.g. creation of new intertidal habitat, especially saltmarsh.

	Impact on habitat connectivity i.e. allowing the functioning of the habitat (beneficial or adverse) NB: Criteria may not be applicable for all sites. These are given a 0 (neutral) score	Assesses the potential impact of the option on the function of the site within the wider estuary e.g. will the species be able to use other areas of the estuary, or will their habitat be lost, leading to a reduction in habitat connectivity. An adverse impact on the ecological functioning of the site would be given a negative score. - - (double negative) - 1 - Notable adverse impact on the ecological functioning of the SPA/ Ramsar at an estuary-wide level, with likely impacts on the qualifying features using the site. Considers distribution of habitats, known usage patterns, fragmentation etc. e.g. loss of habitat that is essential to the functioning of the wider SPA/ Ramsar site. Impacts can be either from loss of intertidal or freshwater habitat. - (negative) - 2 - Some potential impact on the ecological functioning of the SPA/ Ramsar at an estuary-wide level, with likely impacts on the qualifying features using the site. e.g. limited loss of essential habitat/ loss in the future with SLR. Impacts can be either from loss of intertidal or freshwater habitat. 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - some improvement to the ecological functioning of the SPA/ Ramsar at an estuary-wide level, with likely benefits on the qualifying features using the site. e.g. some improvement to the wider SPA/ Ramsar (might be the creation of mudflat rather than saltmarsh). + + (double positive) - 5 - some improvement to the ecological functioning of the SPA/ Ramsar at an estuary-wide level, with likely benefits on the qualifying features using the site. e.g. creation of new larger area of habitat to support the SPA/ Ramsar features in the first epoch.
Strategic Environmental Assessment (SEA)	Historic Environment	Outlines if there are any observable historical assets, listed buildings, scheduled monuments, conservation areas, locally listed buildings, registered parks and gardens and undesignated historical assets at risk. Also highlights the risk to potential unknown heritage assets, scoring also reflects type and number of historic assets and historic setting in towns. To provide a score of the options a numeric approach has been applied to represent the SEA scoring criteria: - - (double negative) - 1 - significant risk to historical assets from flooding or erosion e.g. assets to be at regular risk of inundation or completely eroded. - (negative) - 2 - some potential for impact to historical assets from flooding or erosion e.g. some risk of overtopping with sea level rise/ potential partial erosion of assets. 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - Historic assets protected but may be few in number or assets may not include scheduled monuments. + + (double positive) - 5 - Scheduled monuments and/or historic townscapes protected.
	Effects on population	Assesses the potential risks to community, amenities, and livelihoods. This does not include the cost of the asset (included in the economic benefits) but refers to the intangible effects e.g. human health/ social impacts. To provide a score of the options a numeric approach has been applied to represent the SEA scoring criteria: - - (double negative) - 1 - major impact on the population e.g. increased health risks/ loss of community due to increased risk of flooding. - (negative) - 2 - impact on the population e.g. increased health risks/ loss of community due to some increased risk of flooding. 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - some improvement to the defences to reduce the risk/ impact on the population. + + (double positive) - 5 - major improvement to the defences to ensure that there are no impacts on the population.
	Impact on plans/ programmes	This criteria focusses on the Local Plans and Development Plans within the area and draws out the key issues associated with these. It should be noted that there are a lot more plans that have been reviewed as part of the SEA and these are included in the main SEA document. Where the option differs from the CFMP it will be noted. To provide a score of the options a numeric approach has been applied to represent the SEA scoring criteria: - - (double negative) - 1 - significant impact on a proposed development site e.g. MR over the site. - (negative) - 2 - some impact on a development site e.g. increased risk of overtopping over time. 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - improved defences, but there might be some risk of overtopping in the future with sea level rise. + + (double positive) - 5 - improved defences to provide complete protection of the development site.

	Freshwater Biodiversity	Assesses the potential risks to freshwater habitats and species within the scope of a Strategy. Include species protected under SSSIs and local conservation designations and other non-aquatic species to the level of a Strategy. To provide a score of the options a numeric approach has been applied to represent the SEA scoring criteria: - - (double negative) - 1 - Potential significant impacts on the freshwater biodiversity e.g. MR over freshwater site. - (negative) - 2 - Potential impacts on the saline biodiversity e.g. increased risk of overtopping 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - some increase/ improvement to saline biodiversity e.g. defence levels increased so the risk of overtopping is minimal. + + (double positive) - 5 - significant increase/ improvement to saline biodiversity e.g. defence levels increased so there is no risk of overtopping.
	Saline Biodiversity	Assesses the potential risks to saline habitats and species within the scope of a Strategy. Include species protected under SSSIs and local conservation designations to the level of a Strategy. To provide a score of the options a numeric approach has been applied to represent the SEA scoring criteria: - - (double negative) - 1 - Potential significant impacts on the saline biodiversity e.g. significant coastal squeeze. - (negative) - 2 - Potential impacts on the saline biodiversity e.g. some loss of intertidal habitat through coastal squeeze. 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - some increase/ improvement to saline biodiversity e.g. increase the area of intertidal habitat. + + (double positive) - 5 - significant increase/ improvement to saline biodiversity e.g. significant increase in the area of intertidal habitat, especially saltmarsh.
	Soil	Assesses the potential risks to agricultural land and woodland soils. To provide a score of the options a numeric approach has been applied to represent the SEA scoring criteria: - - (double negative) - 1 - major impact/ loss of agricultural soil and woodland soil also takes into account quantities lost from natural or managed processes. - (negative) - 2 - impact/ loss of agricultural soil and woodland soil. 0 (neutral) - 3 -neither beneficial or adverse impacts. + (positive) - No loss of soils but overall area protected is small or of poor quality. + + (double positive) - Majority of soils protected from saline intrusion, no loss agricultural soils from managed realignment and/or good quality soils protected.
	Water	Focusses on the risk to Source Protection Zones (SPZ), aquifers, and the risk of the release of contaminants from landfill sites. To provide a score of the options a numeric approach has been applied to represent the SEA scoring criteria: - - (double negative) - 1 - potential significant impact on SPZ or risk of release of contaminants from landfill sites. - (negative) - 2 - potential significant impact on SPZ or risk of release of contaminates from landfill sites. 0 (neutral) - 3 -neither beneficial or adverse impacts. + (positive) - 4 - Water is protected but it is not on major aquifer. + + (double positive) - 5 - High level of protection for groundwater either major aquifer or SPZ.
	Landscape (visual impact and landscape change)	Assesses the balance of change to the landscape character area. It is important to note that this criteria focuses on the timescale and amount of change rather than what people perceive as good/ bad landscape to remove the subjectivity. This also reflects changes to landscape character as the landscape is comprised of both natural and manufactured landscapes. To provide a score of the options a numeric approach has been applied to represent the SEA scoring criteria: - - (double negative) - 1 - significant change that will occur within the first epoch e.g. MR in the first epoch. - (negative) - 2 - significant change, but it may occur in the future e.g. MR in the second or third epochs. 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - very gradual return to natural landscape but with limited space to replicate freshwater assets locally. + + (double positive) - 5 - Very gradual return to natural processes with replacement of existing habitats in the form of roll back.

	Carbon Storage	Assesses the impact of the options on the carbon cost e.g. the loss of carbon storage due to habitat change, but also carbon used in the construction/ maintenance of the defences. It should be noted that the MR sites sometime have a lower score as a conservative assumption has been made that it might be mudflat that is developed and this stores less carbon that freshwater/ saltmarsh. To provide a score of the options a numeric approach has been applied to represent the SEA scoring criteria: - - (double negative) - 1 - significant loss of carbon storage. - (negative) - 2 - loss of carbon storage. 0 (neutral) - 3 - neither beneficial or adverse impacts. + (positive) - 4 - potential increase to carbon storage. + + (double positive) - 5 - significant increase to carbon storage.
Ecosystem Services	Qualitative Score	The final total score from the results of the qualitative ecosystem services assessment. Ecosystem services takes account of the more intangible criteria that are not necessarily assessed in the economics and environmental assessments. This assessment has taken account of many different criteria including climate regulation, cultural heritage, food provisioning and disease regulation. It should be noted that ecosystem services are not required to be assessed under the appraisal guidance, but we have decided to include it to help provide an increased understanding of the potential impacts of the options.
	Comments	Summary of the key factors that have influenced the qualitative score for the ecosystem services. It should be noted that this has been summarised for the ASTs as there is a lot of information that could be included. All of this information will be included in the final reporting.
To what extent does the option meet the objectives?	1- Reduce Flood Risk	Tests how well the option meets primary objective 1 (reduce flood risks to property and infrastructure at significant or very significant risk of flooding in light of coastal change over the next 100 years).
	2 - Natura 2000 sites	Tests how well the option meets primary objective 2 (maintain the integrity of the Natura 2000 sites assuming the loss due to coastal squeeze of 113ha of intertidal habitat between years 0-20 and a further 140ha of intertidal habitat between years 20 and 50).
	3- Reduce maintenance	Tests how well the option meets secondary objective 3 (Favour options that reduce the long-term maintenance costs and liabilities to the tax payer and result in a shorter net length of formal defences that require maintenance).
	4 - WFD	Tests how well the option meets secondary objective 4 (favour options that support delivery of the Thames River Basin Management Plan).
	5 - Local Plans	Tests how well the option meets secondary objective 5 (Help enable local plan objectives to be realised, where possible).

2.6 Environmental Scores

The scoring methodology has been used to compare those impacts that are difficult to measure in monetary value. The scoring of the options is used to distinguish between the impacts caused by the options for each criteria. The scoring ranges from 0-100, with the best option scoring 100 and the worst option scoring 0. All the remaining options are then assigned a score between 0 and 100 depending on how close they are to the worst/best options.

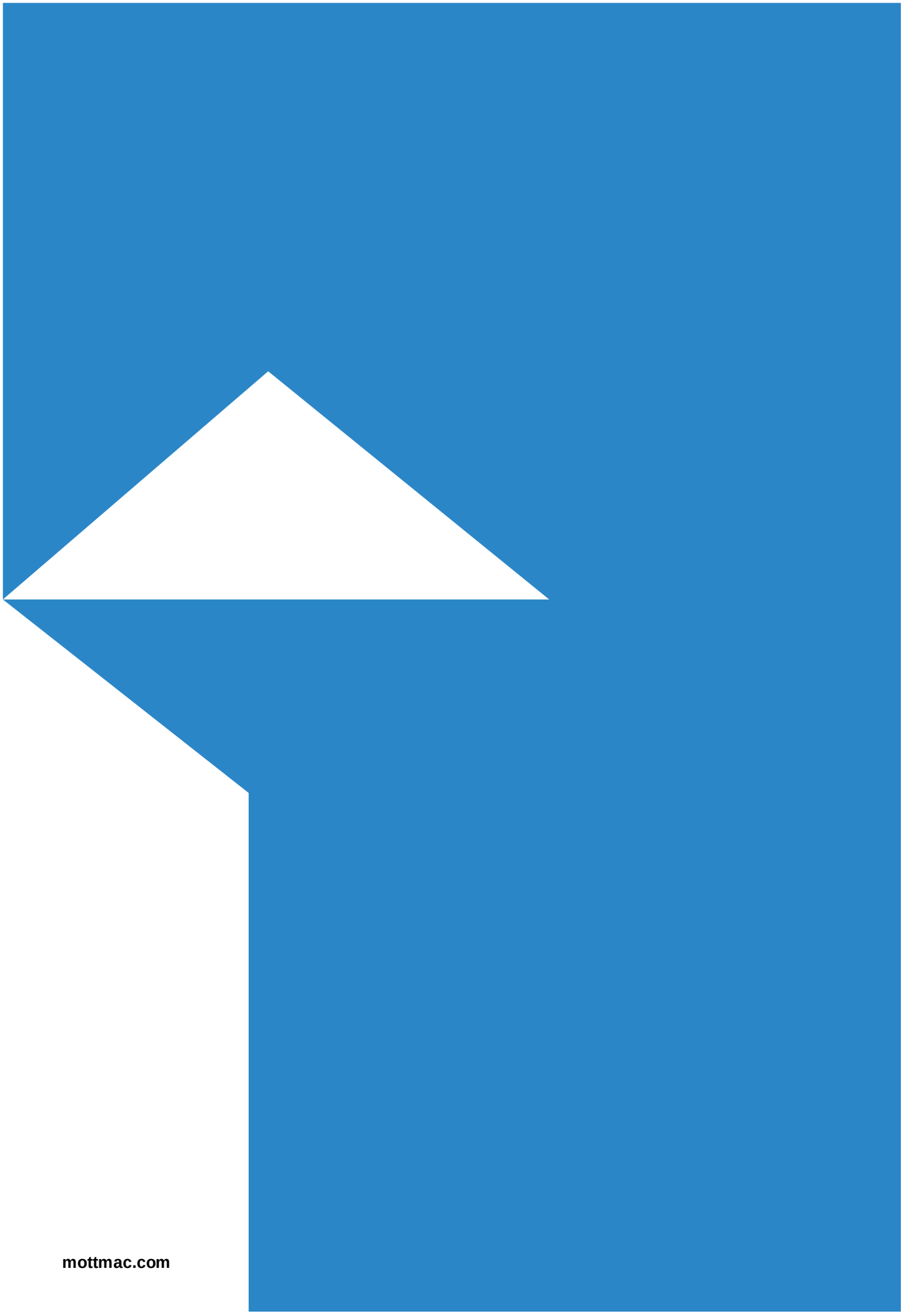
2.7 Summary of results

This table summarises the key criteria that will be used to help decide the preferred option based on appraisal guidance. Both the summary of the economic results and the environmental scoring are presented and the scores are ranked. These results fed into the Draft Leading Options One (DLO1) (Technical Appendix G of MEASS).

2.8 Preferred Option Decision Making

This section presents the process from the preferred option decision making that was undertaken following the economic assessment of the short list to choose the preferred option. It

presents the final short listed option and the summary economics associated with this. This decision making process is described in detail in the Technical Appendix G of MEASS.



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