



Medway Estuary and Swale Strategy

Information to the Secretary of State according to Regulations 64(5) and 66(2) of the Habitats Regulations

IMSE100406

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A: Administration details

Information	Details
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B: Site details

Name of European site(s) affected: Medway Estuary and Marshes SPA & Ramsar, The Swale SPA & Ramsar and the Thames Estuary and Marshes SPA & Ramsar

These sites are:

Tick box	Site designation
	Special Area of Conservation (SAC) - designated under the Habitats Directive
✓	Special Protection Area (SPA) - classified under the Wild Birds Directive
	site in the process of becoming a SAC or SPA (known as Sites of Community importance (SCI), candidate SACs, possible SACs and potential SPAs)
✓	a Ramsar site

Does the site host a priority habitat and/or species?

A summary of the habitats, species and qualifying species is presented.

Interest Features

Habitats and Species

- 1.12 Estuarine and intertidal habitats
- 3.04 Birds of lowland wet grasslands
- 3.05 Birds of lowland dry grassland
- 3.06 Birds of lowland freshwaters and their margins
- 3.07 Birds of farmland
- 3.08 Birds of coastal habitats
- 3.09 Birds of estuarine habitats

Qualifying Features

Individual Species:

Avocet, Little Tern, Common Tern, Bewick's Swan, Black-tailed Godwit, Common Greenshank, Dark-bellied Brent Goose, Dunlin, Eurasian Teal, Eurasian Wigeon, Grey Plover, Northern Plover, Pintail, Red Knot, Redshank, Ruddy turnstone, Ringed Plover, Shelduck, Northern Shoveler, Black-tailed Godwit, Hen Harrier

Over-winter waterfowl assemblage:

Red throated diver, Great Crested Grebe, Cormorant, Bewick's Swan, Dark-bellied Brent Goose a, Shelduck, Eurasian wigeon, Eurasian Teal, Mallard, Pintail, Northern Plover, Common Pochard, Oystercatcher, Avocet, Ringed Plover, Grey Plover, Lapwing, Red Knot, Dunlin, Black-tailed Godwit, Ruddy Turnstone, Curlew, Redshank, Gadwell

Other species:

Wetland and non-wetland invertebrates

C: Plan or project having an effect on the site

Background

The Medway Estuary and Swale Coastal Flood and Erosion Strategy has been developed, with the aim of providing a Flood and Coastal Erosion Risk Management (FCERM) Strategy for the Tidal Medway Estuary, mainland Swale and the Isle of Sheppey. The aim of the Strategy is to protect people, properties, designated habitats and agricultural land. As with all flood and erosion risk management work, the wider impacts must be considered. This means that the best technical solutions for flood and erosion 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 Medway Estuary and Swale Coastal Flood and Erosion Strategy will build upon previous work including the Medway Estuary and Swale SMP (2010) and the Isle of Grain to South Foreland SMP (2010). To help develop the Strategy, a wide range of studies have been carried out to understand the likely impacts of climate change and sea level rise over the short, medium and long-term on:

- The existing flood and erosion defences (type, standard of protection and current maintenance regime);
- The flood and erosion risk to communities and infrastructure; and
- Internationally important habitat and other land.

This Strategy could result in significant changes to the local area so it is important that local communities and landowners are involved in shaping the schemes. Local knowledge will enhance resilience and help identify opportunities for local amenity, access and recreation improvements.

The outcome will be a Strategy Business Case which will recommend the preferred options for coastal erosion and flood risk management over the next 100 years and will be presented to the Environment Agency's Large Project Review Group (LPRG) for approval. A key element of this is a Strategy Implementation Plan, which will be adopted by the Environment Agency and the Local

Authorities (Medway Borough Council, Swale Borough Council, Tonbridge and Malling Borough Council and Kent County Council).

Location

The Strategy area is illustrated in Figure 1 and includes the whole of the shoreline around the Isle of Sheppey. It also includes the Medway and Swale estuaries including the large urban areas of the Medway Towns (Rochester, Strood, Chatham and Gillingham), major industrial and commercial areas, as well as large swaths of rural farmland and extensive saltmarsh and mudflats. Many of the rural areas are internationally designated and protected for their heritage, landscape and biodiversity value. Furthermore, large areas of the designated farmland are under stewardship, providing economic benefits to the area through wildlife friendly farming.

As the MEASS frontage is approximately 120km in length, and there are complex interactions between the different land uses, MEASS 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 as shown in Figure 1.

Figure 1: Medway Estuary and Swale Strategy area. The blue line delineates the extent of potential flooding under a 0.5% Annual Exceedance Probability (1 in 200 year) event if no defences were in place. Based on this worst-case scenario approximately 17,226 properties are thought to be at risk of flooding over the next 100 years.



The boundaries of the Strategy, as shown in Figure 1, are:

- Southern: Allington Sluice as the upstream tidal limit of the Medway
- Northern/Western: the village of Stoke on the Hoo Peninsula
- Eastern: the Sportsman Public House on Cleve Marshes near Faversham

Currently, the majority of the Strategy frontage is defended, especially around the Isle of Sheppey to protect the important port at Sheerness, and along the tidal River Medway to protect the Medway Towns. However, a significant proportion of the defences in the area are nearing the end of their design lives and therefore maintenance costs and risk of failure during a storm event is high. It is not considered sustainable in the long term to continue to maintain defences in their current position.

Project Timeframe

The Strategy was submitted to the LPRG in August 2018 and recommended for approval by LPRG in January 2019. Initial freshwater surveys to help provide data for the implementation of the Strategy are currently being planned by the Kent and South London Environment Agency Area Team to be undertaken within the first year of implementation. The implementation of the Strategy is then planned from 2019 onwards.

D: Assessment of the negative effects on the site

Table 1 below details the relevant European sites and their interest features, which are potentially sensitive and exposed to hazards arising from the Strategy. These were determined following an initial screening of all European sites and their features with respect to Likely Significant Effects (LSE) in Chapter 4 of the HRA. This screening then focussed the Appropriate Assessment process only on those features where there is likely to be a significant effect. The precautionary principle was applied, so if there was any uncertainty as to if there are LSEs on a feature, then it was included as an LSE.

Table 1: Features of the Natura 2000 Sites for Consideration

ID	Qualifying Features	Application has associated hazards to which features are sensitive?	Details of Hazard/s
Medway Estuary & Marshes SPA			
3.04 Birds of lowland wet grasslands 3.05 Birds of lowland dry grassland 3.06 Birds of lowland freshwaters and their margins 3.09 Birds of estuarine habitats	Article 4.1: During the breeding season: Avocet, Little Tern, Common Tern Over winter: Avocet, Bewick's Swan Article 4.2: On passage: Ringed Plover Over winter: Black-tailed Godwit, Common Greenshank, Dark-bellied Brent Goose, Dunlin, Eurasian Teal, Eurasian Wigeon, Grey Plover, Northern Plover, Pintail, Red Knot, Redshank, Ruddy turnstone, Ringed Plover, Shelduck Assemblage qualification: Over-winter waterfowl assemblage: Red throated diver, Great Crested Grebe, Cormorant, Bewick's Swan, Dark-bellied Brent Goose a, Shelduck, Eurasian wigeon, Eurasian Teal, Mallard, Pintail, Northern Plover, Common Pochard, Oystercatcher, Avocet, Ringed Plover, Grey Plover, Lapwing, Red Knot, Dunlin, Black-tailed Godwit, Ruddy Turnstone.	Yes	Habitat loss Physical damage Changes to physical regime Changes in water table / level Changes to surface water flooding Turbidity Changes to water chemistry / salinity Habitat / community simplification Disturbance Changes to flow and velocity regime
Medway Estuary and Marshes Ramsar Site			
1.12 Estuarine and intertidal habitats 3.04 Birds of lowland wet grasslands 3.05 Birds of lowland dry grassland. 3.06 Birds of lowland freshwaters and their margins 3.09 Birds of estuarine habitats	Ramsar criterion 2 The site supports several nationally scarce plants, a total of at least twelve British Red Data Book species of wetland invertebrates, and a significant number of non-wetland British Red Data Book invertebrate species also occur Ramsar criterion 5 Species with peak counts in winter: Waterfowl Ramsar criterion 6 Species with peak counts in spring/autumn: Grey plover, Common redshank, Species with peak counts in winter: Dark-bellied Brent Goose, Common shelduck, Northern pintail, Ringed Plover, Red Knot, Dunlin Species/populations identified after designation for possible future consideration under criterion 6 Species with peak counts in spring/autumn: Black-tailed godwit	Yes	Habitat loss Physical damage Changes to physical regime Changes in water table / level Changes to surface water flooding Turbidity Changes to water chemistry / salinity Habitat / community simplification Disturbance Changes to flow and velocity regime
The Swale SPA			
3.06 Birds of lowland freshwaters and their margins 3.07 Birds of farmland 3.08 Birds of Coastal Habitats	Article 4.2 Over winter: Dark Bellied Brent Goose, Dunlin, Redshank Assemblage qualification: Over-winter waterfowl assemblage: Dark Bellied Brent Goose, Gadwall, Teal, Oystercatcher, Ringed Plover, Grey Plover, Dunlin alpina, Curlew, Redshank	Yes	Habitat loss Physical damage Changes to physical regime Changes in water table / level Changes to surface water flooding

ID	Qualifying Features	Application has associated hazards to which features are sensitive?	Details of Hazard/s
3.09 Birds of estuarine habitats			Turbidity Changes to water chemistry / salinity Habitat / community simplification Disturbance Changes to flow and velocity regime
The Swale Ramsar Site			
1.12 Estuarine and intertidal habitats 3.06 Birds of lowland freshwaters and their margins 3.07 Birds of farmland 3.08 Birds of coastal habitats 3.09 Birds of estuarine habitats	Ramsar criterion 2 The site supports nationally scarce plants and at least seven British Red data book invertebrates Ramsar criterion 5 Species with peak counts in winter: Waterfowl Ramsar criterion 6 Species with peak counts in spring/autumn: Common redshank Species with peak counts in winter: Dark-bellied Brent Goose, Grey Plover Species/populations identified subsequent to designation for possible future consideration under criterion 6 Species with peak counts in spring/autumn: Ringed Plover Species with peak counts in winter: Eurasian Wigeon, Northern Pintail, Northern Shoveler, Black-tailed Godwit	Yes	Habitat loss Physical damage Changes to physical regime Changes in water table / level Changes to surface water flooding Turbidity Changes to water chemistry / salinity Habitat / community simplification Disturbance Changes to flow and velocity regime
Thames Estuary and Marshes SPA			
3.04 Birds of lowland wet grasslands 3.06 Birds of lowland freshwater and their margins 3.08 Birds of coastal habitats 3.09 Birds of estuarine habitats	Article 4.1: Over winter: Avocet, Hen Harrier Article 4.2: Over winter: Black Tailed Godwit, Dunlin, Grey Plover, Red Knot, Redshank Assemblage qualification: Over-winter waterfowl assemblage: Black-tailed Godwit, Dunlin, Grey Plover, Avocet, Red Knot, Redshank	Yes	Habitat loss Habitat/community simplification Changes to physical regime
Thames Estuary & Marshes Ramsar Site			
1.12 Estuarine and intertidal habitats 3.04 Birds of lowland wet grasslands 3.06 Birds of lowland freshwaters and their margins 3.08 Birds of coastal habitats 3.09 Birds of estuarine habitats	Ramsar criterion 2: The site supports one endangered plant species and at least 14 nationally scarce plants of wetland habitats. The site also supports more than 20 British Red Data Book invertebrates. Ramsar criterion 5: Species with peak counts in winter: Waterfowl. Ramsar criterion 6: Species with peak counts in spring/autumn: Ringed Plover, Black-tailed Godwit Species with peak counts in winter: Grey Plover, Red Knot, Dunlin, Common Redshank	Yes	Habitat loss Habitat / community simplification Changes to physical regime

E: Modifications or restrictions considered

Formulation of the Strategy has involved extensive consideration of a range of environmental aspects, carried out with regular input from Stakeholders – members of the various teams within the Environment Agency, Natural England, Kent Wildlife Trust and the RSPB for example. This has allowed the various options and their relative implications to be understood. This consultation, allied with the extensive environmental input from the project team throughout the project, means that the Strategy recommendations have therefore been formed by ensuring that the most sustainable, most appropriate options have been recommended. Information on these assessments can be found in the Appraisal Summary Tables (Technical Appendix E of the Strategy).

There are a large number of constraints and pressures in the area which impact the formulation of the Strategy and have influenced the decision making process in developing the preferred policies. This includes the large areas of residential housing, commercial areas, nationally important infrastructure, high value agricultural land and important historical assets which are at risk of flooding should the current defences not be maintained. However, another key pressure in the area is from sea level rise, particularly on the intertidal habitat which will cause coastal squeeze. The coastline is constrained in terms of where the coastline can naturally roll back to allow intertidal habitat to develop as sea levels rise. In particular, generally where there are low lying areas which would be suitable for roll back, these are often freshwater habitat of national or international importance.

When specifically developing the options for the Managed Realignment sites, a number of constraints were considered to compare the large number of Managed Realignment sites identified within the Shoreline Management Plans and present the most suitable to take forward. Key constraints were considered which were identified as issues which could identify an area as not suitable for Managed Realignment. Assessment of secondary constraints was then undertaken to allow prioritisation of the most suitable Managed Realignment sites. These constraints are presented below in Table 2.

As this is a Strategy plan, rather than specific construction works, mitigation actions are identified more as monitoring, surveying and further study and consultation requirements. This includes the requirement for freshwater habitat surveys which are being led by the Kent and South London Area Team to provide more detailed information on the interest features of the designated sites and the suitability of the freshwater habitat which is being considered for compensation. The Strategy Implementation Plan (Technical Appendix H of the Strategy) identifies for each section of the Strategy the mitigation actions, timeframes and owners of these actions.

It should be noted that the Strategy outlines requirement for habitat development, management and creation over long timescales (100 years). Currently the actions specifically for habitat creation lie with the Kent and South London Area team, however there is an overall control on the requirements and targets for habitat creation at a national level within the Environment Agency through the Kent & South London Area Habitat Creation Programme. The required figures at the local level identified within this Strategy will be fed up to the national level, as well as to the national management team for Natural England and up to DEFRA. This will ensure there is long term governance and monitoring of the actions outlines within the Strategy, as well as the Local Area Team monitoring and updates.

Table 2: Key constraints and secondary constraints considered in the development of the Managed Realignment options

Key constraints	Secondary constraints
<p>Topography.</p> <p>Impact on adjacent coastlines and wider estuary morphology.</p> <p>Adverse impact on flood risk.</p> <p>Location of landfill sites.</p> <p>Potential functionality of created habitat (i.e. whether it could provide SPA/Ramsar habitat compensation).</p>	<p>Impact on freshwater habitat (with the consideration of the quality and value of that freshwater habitat).</p> <p>Land use.</p> <p>Grade/quality of agricultural land.</p> <p>Infrastructure present.</p> <p>Landowner and stakeholder feedback.</p>

F: Alternative solutions considered

The Habitats Regulation Assessment detailed how alternative solutions had been considered.

Table 3 presents the summary of the consideration of alternatives. However, it should be noted that whilst the table below considers each BA individually, a higher-level assessment was also considered. The modelling of Managed Realignment sites showed that if all short-listed sites were taken forward, the impacts on water levels within the estuaries would be a significant increase, which would put more pressure on the Hold the Line areas of defences. Furthermore, this increase in water coming into the estuaries would increase current speeds and scour and could have an adverse impact on the existing areas of saltmarsh and mudflat. Therefore, whilst Managed Realignment sites were preferred on an individual BA assessment, an overall Strategy view was also undertaken as part of the option assessment process. Modelling of the whole Strategy frontage was used to inform where Managed Realignment sites could have adverse impacts on the overall estuary. Modelling of the final Strategy preferred option after alternatives were proposed was also undertaken to ensure the sustainable future evolution of the estuaries.

Table 3: Consideration of Alternatives

Benefit Area	Initial Strategy Option	Alternative Option Available?	Justification
1.2	Maintain defences until year 8. Then raise (sustain) the embankment, seawall and rock revetment in year 8.	No	There is major infrastructure located within this area which needs to be protected from overtopping and flooding.
1.3	Ongoing maintenance until year 25, followed by No Active Intervention (NAI).	Yes – a managed realignment site at Abbots Court	There are areas of key infrastructure (pipelines) and also Hoo Marina in the area, however the Managed Realignment site at Abbots Court will provide compensatory habitat for coastal squeeze.
1.4	No Active Intervention (NAI).	No	This is a cliffed area and designated as under SSSI designation and therefore not suitable for Managed Realignment.
2.1	Raise (sustain) embankments, walls, flood gates and revetments.	No	Defences protect important industry, heritage and residential and commercial properties in the area.
2.2	Raise (sustain) embankments, walls, flood gates and revetments in localised areas.	No	Defences protect important industry, heritage and residential and commercial properties in the area.
2.3	Raise (sustain) embankments, walls, flood gates and revetments.	No	Defences protect important industry, heritage and residential and commercial properties in the area.
3.1	No Active Intervention (NAI).	No	The topography is not advantageous for Managed Realignment, and the modelling undertaken showed that too many managed realignment sites increased water levels and current speeds in the estuary. The location of

			this area is located a further distance away from the SPA/Ramsar site so would not be suitable compensation habitat.
3.2	Construct new setback embankments at Halling Marshes. Raise (sustain) embankments, walls and flood gates in localised areas.	No	Already located a Managed Realignment site here and the village of Halling needs to be continued to be protected.
3.3	Raise (sustain) embankments, walls and flood gates from year 20.	No	Defences protect a number of residential properties, commercial areas, and industries as well as valuable arable land.
3.4	Raise (sustain) embankments, walls and flood gates in localised areas.	No	Defences protect a number of residential properties, commercial areas, and industries as well as valuable arable land.
3.5	No Active Intervention (NAI)	No	The topography is not advantageous for Managed Realignment, and the modelling undertaken showed that too many managed realignment sites increased water levels and current speeds in the estuary. The location of this area is located a further distance away from the SPA/Ramsar site so would not be suitable compensation habitat.
4.1	Raise (sustain) embankments, walls and flood gates around other areas.	Yes – Managed Realignment site at Danes Hill	Construct Managed Realignment site at Danes Hill to provide compensatory habitat for coastal squeeze. The rest of the frontage requires Hold the Line policy to protect the road and the Riverside Country Park which is important recreational space as well as residential properties.
4.2a	No Active Intervention (NAI),	No	Southern Water assets and high ground in this area make this frontage unsuitable for Managed Realignment.
4.2b	Ongoing maintenance until year 15, followed by No Active Intervention (NAI).	No	There is important agricultural land here and the freshwater habitat is of very high quality and important for the overall integrity of the SPA/Ramsar.
4.3	No Active Intervention (NAI).	No	Site ties into high ground and is therefore not suitable for Manged Realignment.
4.4	Raise (sustain) embankment and revetment in localised areas.	No	The village of Lower Halstow needs to continue to be protected due to the number of residential properties at risk. The rest of the area is used as important recreation and mooring sites, or ties into high ground.
4.5	No Active Intervention (NAI).	No	This area is a historic landfill site and therefore there would be concerns around potential contamination if Managed Realignment was undertaken here. Further, the current management of the freshwater designated sites is undertaken very well by the landowner.
4.6	No Active Intervention (NAI).	No	The topography here moves very quickly to high ground and is therefore not suitable for Managed Realignment.
4.7	Ongoing maintenance until year 15, followed No Active Intervention.	Yes – Managed Realignment at Tailness and Managed Realignment Habitat Adaptation for rest of the site	A Managed Realignment site is not feasible due to a number of reasons including very low topography, risks of increasing scour and current speeds by Queenborough, large requirements for freshwater habitat compensation in the short term and impacts to nationally important infrastructure. However, a more adaptive approach to reduce impacts on coastal squeeze is proposed.
5.1	Maintain defences until year 20. Raise (sustain) embankments and walls from year 20.	No	A large number of industry and commercial properties to be protected.
5.2	Raise (sustain) embankments and walls.	No	Residential properties at Sittingbourne to be protected from flood risk. Very limited space available for Managed Realignment.
6.1	No Active Intervention (NAI).	Yes – Hold the Line and increase crest levels with sea level rise	Due to the very large area that would be flooded under NAI, there would be technical difficulties in identifying enough area further inland for compensation of the freshwater impacts. Furthermore, the additional water this large area would bring in to the estuary would adversely affect the estuary through increased current speeds and water levels.
6.2	Ongoing maintenance until year 20, followed by No Active Intervention.	Yes – Managed Realignment in second epoch	Change to Managed Realignment to reduce impacts on coastal squeeze and provide compensatory saltmarsh habitat. There is a large area which provides opportunity for a large Managed Realignment site. Due to risks around interaction with important infrastructure near the site, this is not planned till year 20.

7.1	Ongoing maintenance until year 30, followed by No Active Intervention (NAI).	No	Although this goes to NAI after year 30, there are a number of industries in the area which are likely to privately defend their areas. Furthermore, there modelling suggested concerns around impacts on Faversham Creek.
7.2a	Raise (sustain) embankments and walls.	No	HTL required to protect properties and residential areas in Faversham Creek.
7.2b	Maintain defences until year 20. Raise (sustain) embankments and walls from year 20.	No	HTL required to protect properties and residential areas in Faversham Creek.
8.2	No Active Intervention (NAI).	Yes – Hold the Line and increase crest levels with sea level rise	Due to the very large area that would be flooded under NAI, there would be technical difficulties in identifying enough area further inland for compensation of the freshwater impacts (and there would not be space on the Isle of Sheppey for this). Furthermore, the additional water this large area would bring in to the estuary would adversely affect the estuary through increased current speeds and water levels.
8.3	No Active Intervention (NAI).	Yes – Hold the Line and increase crest levels with sea level rise. Managed Realignment at Spitend	Due to the very large area that would be flooded under NAI, there would be technical difficulties in identifying enough area further inland for compensation of the freshwater impacts (and there would not be space on the Isle of Sheppey for this). Furthermore, the additional water this large area would bring in to the estuary would adversely affect the estuary through increased current speeds and water levels. A Managed Realignment site can be undertaken for just part of the frontage and Spitend has been proposed as is adjacent to existing good quality saltmarsh and has preferable topography for the Managed Realignment site.
8.4	No Active Intervention (NAI).	Yes – Managed Realignment	Change to Managed Realignment to reduce impacts on coastal squeeze and provide compensatory saltmarsh habitat. Ties into high ground so reduces need for setback embankments and has existing creeks and low topography.
8.5	No Active Intervention (NAI).	No	Much of the frontage ties back into high ground.
9.1	Maintain (with capital works) walls, groynes and beach.	No	Cliffed frontage and therefore not suitable for Managed Realignment.
9.2	Maintain (with capital works) embankments walls, groynes and beach. No Active Intervention (NAI) and localised property adaptation along Warden Cliffs.	No	Eastern part is important tourist town and beach, and the western part of the frontage is a cliffed frontage and therefore not suitable for Managed Realignment.
10.1	No Active Intervention (NAI) with localised property adaptation (potentially not GiA funded).	No	Cliffed frontage and therefore not suitable for Managed Realignment.
11.1	Maintain embankments, walls, flood gates, groynes and beach.	No	Erosional frontage and therefore not suitable for Managed Realignment.
11.2	Raise (sustain) embankments, walls, flood gates, groynes and beach.	No	Defences required to protect a large number of residential and commercial properties, industry and heritage assets.

G: Imperative reasons of overriding public interest

Tick box	Reasons
✓	imperative reasons of overriding public interest, including those of a social or economic nature (in the absence of priority habitat/species)
✓	human health
✓	public safety
✓	beneficial consequences of primary importance for the environment
	other imperative reasons of overriding public interest

It has been determined that the Strategy will, in continuing to protect towns, settlements and maintaining essential infrastructure assets, result in adverse impacts to Natura 2000 Sites through coastal squeeze. In addition, active managed realignment or allowing certain lengths of coastal defence line to naturally deteriorate will, while restoring more natural processes to the estuary, adversely impact on freshwater components of the European sites. It is therefore necessary to consider the imperative reasons of overriding public interest (IROPI) in taking the Strategy forward.

The Strategy is of overriding public interest, as it will focus defences where they will benefit and protect local populations, whilst allowing/promoting the ingress of seawater into other areas. If the Strategy were not adopted, coastal flood and erosion risk within the Medway estuary and the Swale would not be managed in a coordinated manner, with a number of risks likely to be realised.

Major flooding events would likely be uncontrolled and uncoordinated, with adverse effects on private properties, residential areas and infrastructure (the road and rail network, water supplies and sewerage, power etc) as well as inundation of designated freshwater habitat. As such, uncontrolled flooding events would likely present serious risk to human health and public safety as well as designated sites. Alongside this, the size of the Strategy area, and the population sizes and densities within it, mean that large flooding events would present notable adverse economic and social consequences.

Currently, across the Strategy area, the standard of protection offered by the defences is low, with some rural areas having only a standard of protection to a 50% AEP. Aging defences, rising sea levels and climate change mean that coastal flood and erosion risk to people, properties, habitats, and agricultural land will significantly increase in the coming years. Over the next 100 years it is predicted that 17,226 properties will be at an increased risk of tidal flooding (up to a 0.1%AEP event) within the MEASS area. A further 979 properties are at risk of erosion over the next 100 years. The Hold the Line sections within MEASS are required to protect these properties which includes total estimated economic savings of £1,324 million over 100 years. The breakdown of these benefits across different assets is provided in Table 4.

Table 4: Summary of the strategy wide present value (PV) damages should the Strategy not be implemented.

Assets assessed	Total Present Value Damages (£k)
Residential Properties	£720,000k
Commercial Properties	£501,000k
Vehicle and Health Damages	£12,000k
Emergency services	£13,000k
Agricultural Land	£17,000k
Roads and Railways	£10,000k
Recreation	£11,000k
Erosion	£41,000k
TOTAL	£1,324,000k

The Strategy is therefore of overriding public interest, to provide a systematic approach to managing flood and erosion risk, and the consequent associated risk to the safety and health of the public. Its adoption will ensure that the likely economic costs associated with loss of, or damage to, assets and infrastructure are minimised as far as possible. It represents the most appropriate, least damaging, most coordinated and sustainable means of protecting the area from flood and erosion risk, whilst also acting to minimise the effects on the Designated Sites and their Qualifying Features.

Whilst adverse effects on the integrity of Natura 2000 sites are predicted, the Strategy presents the most appropriate way to manage the defences in the Strategy area in an integrated and sustainable manner, given the constraints and pressures that inevitably affect them (see Section E). It addresses the ongoing and unavoidable coastal squeeze, and serves to best manage this,

such that its ecological functioning, and the effects on Qualifying Features are minimised. It identifies, alongside the SMP, that the overall approach of Managed Realignment where possible, to reduce coastal squeeze impacts, and relocate freshwater habitat further inland, is a sustainable approach to managing the designated sites within the estuaries. As such, given the pressures in the Strategy area, it is considered to be of primary importance to the designated sites.

H: Compensatory measures

The overarching Strategy is predicted to impact designated saltmarsh as coastal squeeze manifests itself, reducing the area of these habitats available to the interest features listed. The potential loss of saltmarsh habitat has been calculated within the Mott MacDonald Coastal Processes Study (see Appendix E of the Habitats Regulation Assessment). Table 5 and 6 summarise the impacts from the preferred Strategy on intertidal SPA/Ramsar habitat and freshwater SPA/Ramsar habitat.

Table 5: Summary of Strategy impacts on intertidal saltmarsh habitat due to coastal squeeze

Strategy epoch	Projected loss of intertidal saltmarsh SPA/Ramsar habitat (ha)
Epoch 1 (0-20 years)*	110.3 ha
Epoch 2 (21-50 years)	134.8 ha
Epoch 3 (51-100 years)	290 ha

*Includes historic loss since SMP

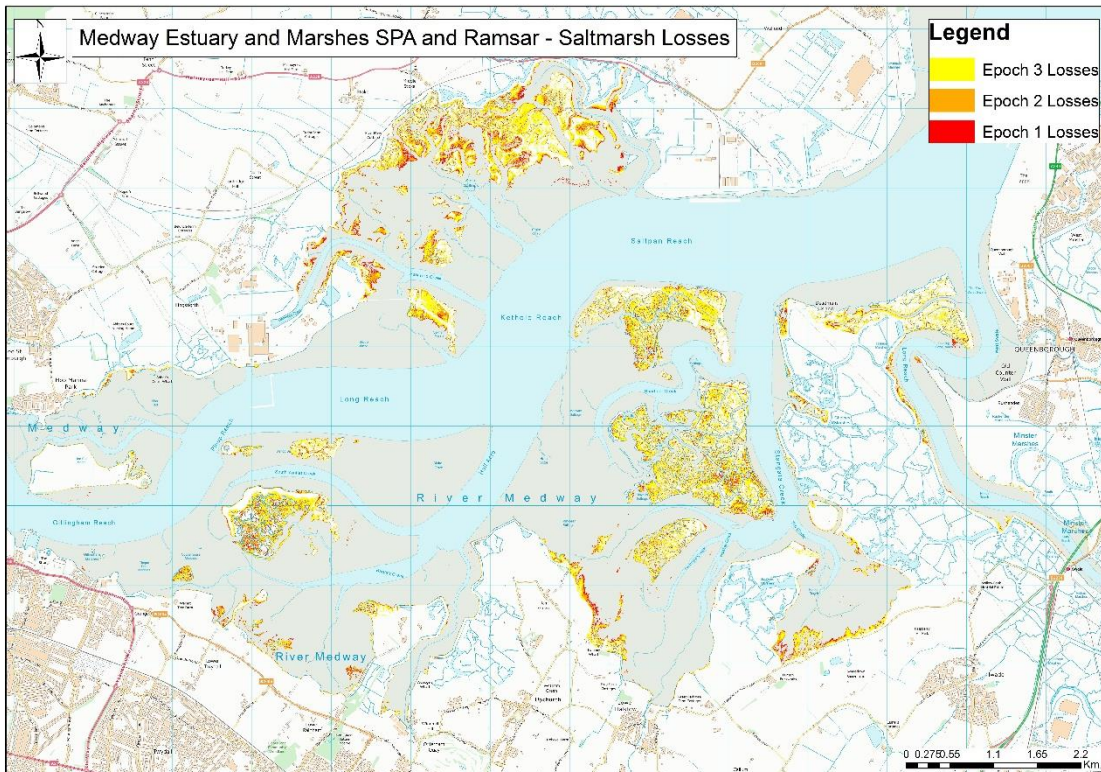
Table 6: Summary of Strategy impacts on freshwater SPA/Ramsar habitat due to increased flooding

Strategy epoch	Projected loss of freshwater SPA/Ramsar habitat (ha)
Epoch 1 (0-20 years)	289 ha
Epoch 2 (21-50 years)	584 ha
Epoch 3 (51-100 years)	0*

*Although increased loss would be expected with sea level rise, the figures for Epochs 1 and 2 have been calculated using modelling which has already accounted for rise in sea level.

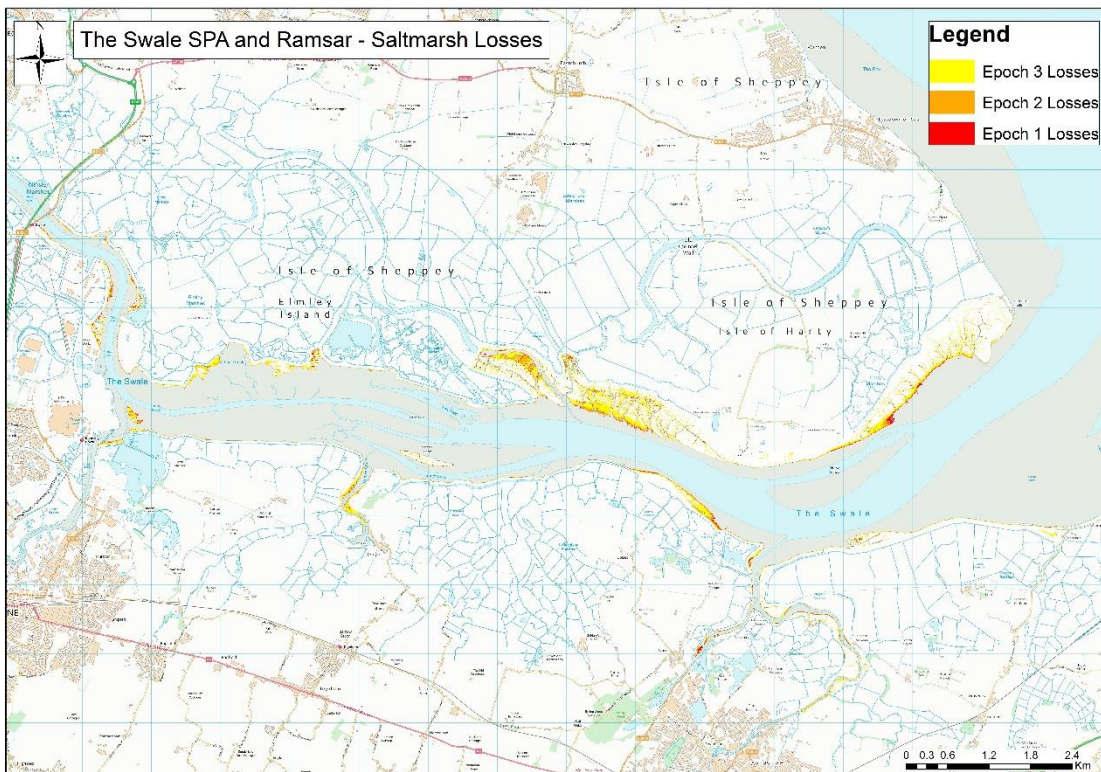
These areas are presented in Figure 2 and 3. There is a projected growth of mudflat habitat expected as saltmarsh areas within the estuary become mudflats due to coastal squeeze.

Figure 2: Coastal squeeze of saltmarsh in Medway Estuary and Marshes SPA and Ramsar Site over the next 100 years.



Source: Coastal Processes Study, Mott MacDonald (Appendix E).

Figure 3: Coastal squeeze of saltmarsh in Swale SPA and Ramsar over the next 100 years.



Source: Coastal Processes Study, Mott MacDonald (Appendix E).

Compensation for the loss of intertidal habitats due to coastal squeeze

The loss of saltmarsh habitat in both estuaries due to coastal squeeze is ongoing and unavoidable due to the need to hold defence locations within parts of the MEASS area. One of the two main objectives of the project is to maintain the integrity of European sites, and the proposed MR sites will help to achieve this, by providing an equivalent area of compensatory intertidal habitats.

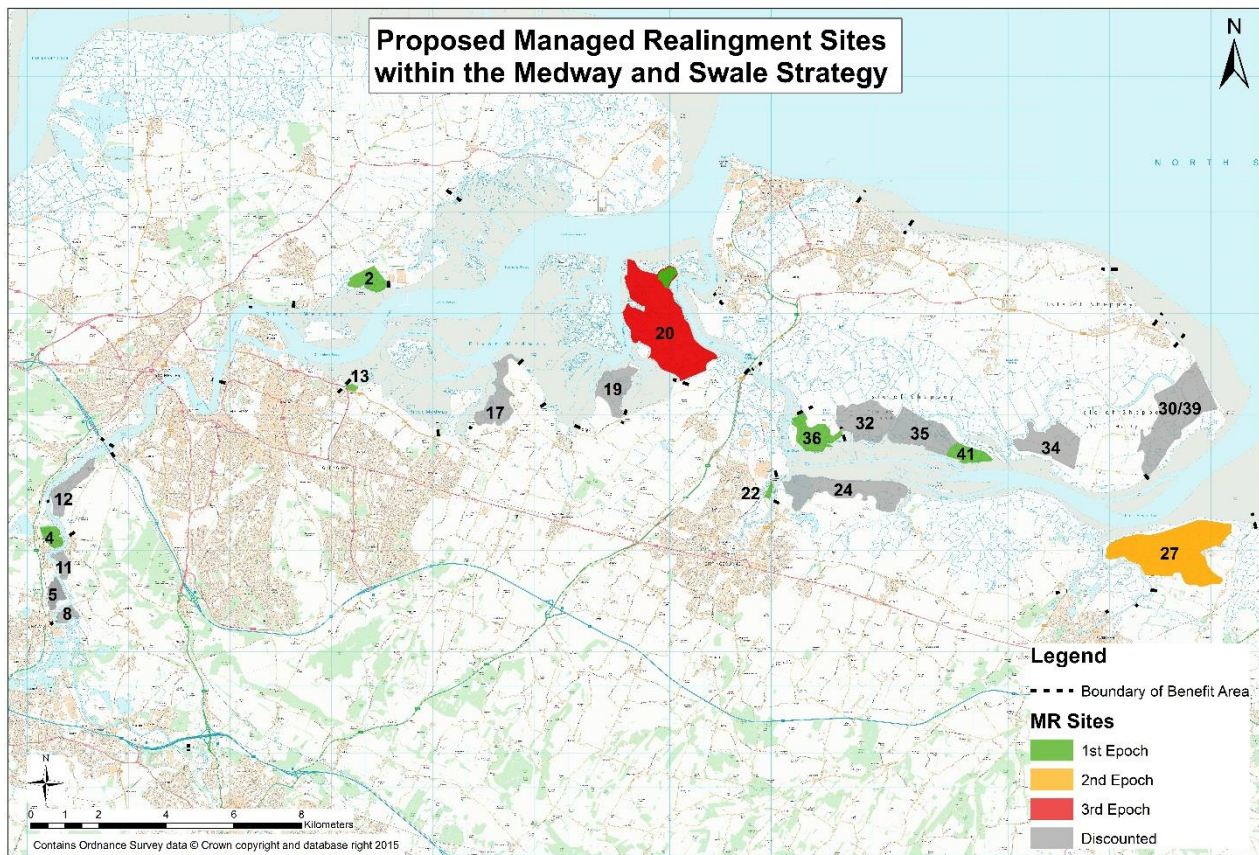
The proposed compensation of saltmarsh for the Strategy will be realised over three epochs, with the majority of MR sites being required for compensation within the first epoch. Table 7 and Figure 4 outline in which epoch the proposed managed realignment sites for the Strategy will be realised.

Table 7: The MR sites proposed to be taken forwards based on a Strategy Wide assessment

Epochs	MR Site	Area of saltmarsh habitat (ha)	Total Ha provided	Cumulative compensation (ha)
1	22 – Kemsley	4.8	115.4	115.4
	13 – Danes Hill	1.9		
	41 – Spitend	7.3		
	36 – Elmley	66.2		
	# Tailness Marsh	5.6		
	2 – Abbotts Court	29.6		
2	27 - Cleve Hill	202.7	202.7	318.1
3	20 - Chetney Marsh	175	175	493.1

Source: Mott MacDonald, 2017

Figure 4: Map of the proposed MR sites across the Strategy area. The “discounted” Managed Realignment sites were discounted following the assessment of the primary and secondary constraints (see Section E) and the test for alternatives (see Section F).



Source: Mott MacDonald, 2018

First Epoch Intertidal Habitat Compensation

Within the first epoch of the Strategy, six Managed Realignment sites are proposed to provide compensatory habitat for SPA and Ramsar saltmarsh losses. The Strategy Implementation Plan has set out requirements for surveys of freshwater and intertidal habitat within the first two years of the Strategy. This will better define the current functionality of the designated areas, and in particular the invertebrates found on the sites, and allow more detailed identification of compensation required. It will also focus initially on defining whether the currently proposed sites can deliver the compensation required for the interest features at that site. It is to be noted that the Strategy further identifies a Managed Realignment site at Halling marshes (Site 4) which will contribute to non-designated coastal squeeze compensation as well as flood protection.

Second Epoch Intertidal Habitat Compensation

MR site 27 (Cleve Hill) has the potential to provide a large amount of the required compensation. However, the Project team are aware of a proposed solar park at Cleve Hill. There remains uncertainty about the future of the site which we have allowed for within the Strategy. If the solar park does not go ahead the whole site can be used as a managed realignment site or if the solar farm is only in operation until year 40 then it could be utilised by the Strategy following decommission. Therefore, managed realignment of this site is delayed until the 2nd epoch until it is clear how the site is to be used in the long-term. If the site becomes unsuitable, Chetney Marshes adaptation policy could be accelerated with additional management/breaches to create the required intertidal habitat earlier. This would require slightly earlier compensation for impacts on freshwater habitat at Chetney, however as the plans have a conservative approach implementation

of the freshwater compensation would only be bought forward by 4 years, whilst still maintaining enough contingency to ensure the programme is sufficient for securing the compensatory habitat.

Third Epoch Intertidal Habitat Compensation

In the third epoch Chetney Marsh will be realised as a managed realignment site, under a Habitat Adaption approach. The Managed Realignment: Habitat Adaptation option looks to undertake Managed Realignment over a longer period of time, predominantly through natural coastal processes, overtopping and breaches rather than artificially creating a breach and channels/creeks. Further details on this proposed management technique has been provided in the Implementation Plan. Modelling of this site has shown that the current topography has the potential to provide an area for saltmarsh habitat to “rollback”, which avoids immediate adverse impacts on the freshwater designated sites. This indicates that this option may allow adaptation of the habitat rather than immediate loss of all the freshwater habitat. However, it is less certain when the saltmarsh habitat in this area will develop, so although the option will be implemented within the first epoch, the intertidal habitat which develops will only be considered for compensatory habitat in the third epoch. Built into this option is the requirement to compensate for impacts on the freshwater habitat which is programmed for early on in the option (year 25). Depending on the adaptation of the habitat which occurs (which will be assessed through surveys), the requirement for freshwater habitat compensation could be reduced or delayed. Currently within the Strategy a worst-case scenario has been used.

Addressing uncertainties in delivery of intertidal compensatory habitat

It should be noted that due to the uncertainties in the future implementation of the Strategy, this HRA and the Strategy have focussed on setting out the compensation requirements for the first 50 years of the Strategy. Table 7 demonstrates that currently there is a shortfall of 41.9ha of intertidal compensation habitat for the third epoch. Studies and review of the potential to provide this through currently identified Managed Realignment sites, or additional ones, will be undertaken as part of the Implementation Plan in Year 10 following the initial development of Managed Realignment Sites for epoch 1 and additional surveys. This will be the responsibility of the Kent & South London Area Habitat Creation Programme.

There are risks with the delivery of managed realignment sites, which may not be fully understood until a project reaches a detailed design stage. Should there be specific risks which are realised when developing the MEASS Managed Realignment Sites, this will be highlighted by the Kent & South London Area Habitat Creation Programme and alternative sites will be assessed. In line with European Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora (also known as the ‘Habitats Directive’) compensation for impacts to Natura 2000 sites should be delivered as close to the impact as possible. Therefore, the ideal solution with regard to intertidal loss within a designated estuary site is that it is delivered in the same estuary. This has been the approach for MEASS, with all the compensation being currently delivered in the Medway and Swale estuaries. This principle is in line with DEFRA guidance on compensation regarding location.

However, Coastal Habitat Management Plans (CHaMPs) established an acceptable approach for impacts to coastal habitat for Natura 2000 sites where suitable compensation habitat was not available within the ‘Estuary Complex’ being impacted. In these circumstances, an acceptable solution could be to deliver the compensation elsewhere in the CHaMP area for that estuary. An example was the creation of Medmerry to address the impacts occurring in the Solent, as Medmerry was seen to be within the Greater Solent CHaMP area although it is situated on the open coast in West Sussex.

There is therefore a precedent from other coastal developments around the UK that compensation under the HRA can be provided outside of the estuary where it is occurring which could be applied on MEASS should it not be achievable to provide sufficient intertidal habitat compensation within the MEASS area. For example, the St Mary’s Marshes site being developed under TE2100 would be within the same CHaMP area (the Greater Thames Area) and is located in close proximity to the Medway Estuary. This suggests that there may be an ecological functional link between the

proposed managed realignment site and the projected Natura 2000 habitat loss in the Medway. Further study will be carried out to identify whether the functional link exists, and whether the impacts on birds and other species are not likely to be significant. The potential requirements of these studies and surveys have been discussed further in the MEASS Implementation Plan.

Compensation for the loss of freshwater habitat due to managed realignment sites and areas of No Active Intervention

It will be necessary to compensate for the loss of designated freshwater grazing marsh and associated habitats due to Managed Realignment and NAI policies. Table 8 below shows the amount of freshwater habitat that will be required through the life of the Strategy, to compensate for that lost to Managed Realignment and NAI locations. It is to be noted that there are no areas with a HTL Maintain policy which are also located next to freshwater designated habitat, and therefore there are no impacts from increased overtopping from sea level rise in HTL areas.

Table 8: Hectares of freshwater habitat compensation required. It is to be noted that this assessment has considered the direct impacts for each frontage, however the Strategy has then gone on to model and project impacts to habitat using an estuary-wide modelling approach. Therefore, even where the LSE is considered low for a frontage, the modelling undertaken to assess flood risk and overall Strategy impacts on habitat has included the whole area. This ensures any potential indirect impacts are also captured.

Year	Policies causing freshwater impacts	Ha of freshwater compensation
EPOCH 1		289
5	MR site at BA8.3, and BA8.4	143
9	NAI policy at BA4.2a – estimated will become at risk by year 9 due to deterioration of defence condition.	32
11	MR site at BA1.3	37
20	NAI policy at BA4.5 - estimated will become at risk by year 20 due to deterioration of defence condition.	77
EPOCH 2		584
21	NAI policy at BA4.2b - estimated will become at risk by year 21 due to deterioration of defence condition.	88
25	BA4.7 Managed Realignment – Habitat Adaptation Policy.	385
30	NAI policy at BA7.1 - estimated will become at risk by year 30 due to deterioration of defence condition.	111

160.4 ha of compensatory freshwater habitat has already been procured to compensate for the loss of freshwater habitat at Elmley and Spitend Marshes (a total of 143ha is needed), through the Kent & South London Area Habitat Creation Programme. This is located at Great Bells Farm on the Isle of Sheppey, a location that means this new habitat will be contiguous with the extensive existing freshwater habitats already in this area. Great Bells Farm is planned to provide compensatory habitat for MR sites at BA8.3 and 8.4, and part compensation for the NAI policy at BA4.2a, subject to surveys planned over the next couple of years to see what is establishing at the site.

A total of 52ha of compensatory habitat for the loss of freshwater grazing marsh at Abbott's Court and NAI at BA4.2a would need to be secured as a priority in the first 2 years of the Strategy implementation. Provisional areas at Stoke Marshes on the Isle of Grain has been identified through discussions with Natural England. The Kent and South London Area Team will be assessing these in more detail through the freshwater habitat surveys in 2020 and in parallel to discussions with landowners and desktop assessments for further freshwater compensation sites.

Over 100ha have potential to be developed here which would habitat compensation for BAs 1.3 and 4.2a.

Longer term, freshwater habitat needs to be planned and developed to implement by year 20. This action is set out for the Kent and South London Area Team to develop a freshwater habitat plan in the first five years of the Strategy within the Implementation Plan for the Strategy. Provisionally, potential suitable areas have already been discussed with Natural England and land within BA6.1 (the area between Sittingbourne and Conyer) is likely to be one of the first areas investigated further. There is potential for around 150 ha in this area.

Longer term, around 250 to 300 ha will potentially be identified on the Isle of Sheppey with an addition 100 ha within the Medway Marshes area and 100ha within the upper Medway Estuary.

It is acknowledged that time is required to identify, develop and survey freshwater designated sites and that surveys are required to identify exact compensation requirements and ratios. To provide confidence that the Strategy can be implemented the following risk mitigation measures have been built into the Strategy:

- The habitat required earlier on in the Strategy is located in an area close to Great Bells Farm compensatory site. More habitat is available at Great Bells Farm than required in the first 5 years of the Strategy in case a ratio more than 1:1 is required.
- Overall it has been assumed that more habitat may be required than a 1:1 ratio and part of the risk budget associated with the freshwater sites cost provides flexibility for this.
- Potential areas for freshwater compensation identified in the SMP have been taken forward in the Strategy and discussed further with Natural England. Natural England have identified areas that are currently being managed under agri-environmental stewardships. Focusing on these areas are likely to reduce the time frame required to develop the habitat and reduce costs.
- Initially a draft plan for the surveys and funding required has been created (which initially covers the first two years of the implementation but will be expanded to cover all freshwater habitat surveys). The Implementation Plan highlights that the Habitat Creation Programme Report will need to be updated within year 1 of implementation, and the Benefit Area specific implementation plans updated following these surveys in year 4. The surveys will allow further detail and consideration on the time which will be required to develop the required compensatory habitat.

I: Supporting documentation

- Medway Estuary and Swale Strategy- Technical Appendix K Habitat Regulation Assessment (including Appendix E Coastal Processes Report which covers the calculation of coastal squeeze impacts)
- Medway Estuary and Swale Strategy- Technical Appendix J Strategic Environmental Assessment
- Medway Estuary and Swale Strategy- Technical Appendix H Implementation Plan
- Medway Estuary and Swale Strategy- Technical Appendix E Appraisal Summary Tables