

Medway Estuary and Swale Shoreline Management Plan SMP

Appendix G – Scenario Testing

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Approved by
1	0	Consultation Draft	01/05/07	N Pontee
	1	Amendments following public consultation and QRG review	31/10/08	N Pontee

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Appendix G: Scenario Testing

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Contents by Policy Unit

Note the geographic breakdown of the appraisals presented in this Appendix is not necessarily the same as the final Policy Units (PU). Here the breakdown has been based upon coastal process and morphological changes along the shoreline. For ease of reference, the following table identifies the page number on which appraisals relevant to each PU start.

	Policy Unit	Shoreline Response	Theme & page number		Preferred Policy Scenario
			Objective Appraisal	Proposed Policy Options	
E4 01	Grain Tower to Colemouth Creek	3	93	208	216
E4 02	Colemouth Creek to Bee Ness Jetty	7	99	208	216
E4 03	Kingsnorth Power Station	12	104	208	216
E4 04	Kingsnorth Power Station to Cockham Wood	12	108	209	216
E4 05	Cockham Wood	16	112	209	216
E4 06	Lower Upnor to Medway Bridge	19	115	209	216
E4 07	Medway Bridge to North Halling	22	118	209	216
E4 08	North Halling to Snodland	28	121	209	217
E4 09	Snodland to Allington lock	31 & 34	125	209	217
E4 10	Allington Lock to North Wouldham	37 & 39	128	209	217
E4 11	Wouldham Marshes	39	133	210	217
E4 12	Medway Bridge to West St Mary's Island	43	135	210	217
E4 13	St Mary's Island to The Strand	45	137	210	217
E4 14	The Strand to west Motney Hill	48	140	210	217
E4 15	Motney Hill to Ham Green	52	143	210	218
E4 16	Ham Green to East of Upchurch	52	147	210	218
E4 17	East of Upchurch to East Lower Halstow	52	151	210	218
E4 18	Barksore Marshes	52	154	210	218
E4 19	Funton to Raspberry Hill	52	158	211	218
E4 20	Chetney Marshes	52	161	211	218
E4 21	Kingsferry Bridge to Milton Creek	61	164	211	218
E4 22	Milton Creek	66	168	211	218
E4 23	Murston Pits to Faversham	66	172	211 & 212	219
E4 24	Faversham to Nagden	66	178	212	219
E4 25	Shell Ness to Sayes Court	73	183	212	219
E4 26	Sayes Court to North Elmley Island	73	187	212	219
E4 27	North Elmley Island to Kingsferry Bridge	73	191	212	219
E4 28	Kingsferry Bridge to Rushenden	82	195	213	219
E4 29	Rushenden to Sheerness	88	200	213	219
E4 30	Medway Islands		205		220

The Supporting Appendices

This appendix and the accompanying documents provide all of the information required to support the Shoreline Management Plan. This is to ensure that there is clarity in the decision-making process and that the rationale behind the policies being promoted is both transparent and auditable. The appendices are:

A: SMP Development	This reports the history of development of the SMP, describing more fully the plan and policy decision-making process.
B: Stakeholder Engagement	All communications from the stakeholder process are provided here, together with information arising from the consultation process.
C: Baseline Process Understanding	Includes baseline process report, defence assessment, NAI and WPM assessments and summarises data used in assessments.
D: SEA Environmental Baseline Report (Theme Review)	This report identifies and evaluates the environmental features (natural environment, landscape character, historic environment, land use, infrastructure and material assets, and population and human health).
E: Issues & Objective Evaluation	Provides information on the issues and objectives identified as part of the Plan development, including appraisal of their importance.
F: Initial Policy Appraisal & Scenario Development	Presents the consideration of generic policy options for each frontage, identifying possible acceptable policies, and their combination into 'scenarios' for testing.
G: Scenario Testing	Presents the policy assessment and appraisal of objective achievement towards definition of the Preferred Plan (as presented in the Shoreline Management Plan document).
H: Economic Appraisal and Sensitivity Testing	Presents the economic analysis undertaken in support of the Preferred Plan.
I: Metadatabase and Bibliographic database	All supporting information used to develop the SMP is referenced for future examination and retrieval.
J: Appropriate Assessment	Presents an assessment of the effect the plan will have on European sites.
K: SEA Report	Presents the Strategic Environmental Assessment of the Plan.
L: Retrospective WFD Assessment	Presents a retrospective Water Framework Directive Assessment.

G1 Introduction

This Appendix presents the assessment and appraisal of policies.

There have been two main stages:

- assessment of shoreline interactions and response; and,
- assessment of achievement of objectives.

The process analysis has been developed using the understanding of shoreline behaviour from the baseline process report and the two baseline scenarios, No Active Intervention and With Present Management (Appendix C).

From this analysis, maps of predicted erosion zones have been produced to identify those features affected (Annex C2). The next stage was to appraise the achievement of objectives using this information. This has been recorded in the Issues and Objectives Table (Appendix E).

In order to sensibly assess potential shoreline response for each of the proposed scenarios, assumptions regarding the likely implementation measures that would be used to achieve these policies were made.

From these assessments a set of Proposed Policy Options (Section G4.1) were identified and put to the Coastal Steering Group for discussion. The outcome of this discussion resulted in the identification of a Preferred Policy Scenario (Section G4.2) for the SMP frontage.

G2 Policy Scenario Shoreline Response Assessment

G2.1 INTRODUCTION

Following on from the broad-level assessment of the Defra generic policies, which combined policy options along the various sections of the shoreline; and policy appraisal, which included feedback from the stakeholders; the preferred policy scenarios were assessed (Appendix F).

For each scenario, broad assumptions were made regarding implementation for each location. At this stage, the Policy Units were more or less defined and therefore the locations are more or less applicable to the final Policy Units presented in the plan.

The following tables assess the shoreline interactions and responses along discrete sections of the shoreline for each identified policy to be assessed. Implications for defence requirements are also included.

G2.2 SCENARIO TESTING: SHORELINE INTERACTION AND RESPONSE

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
MEDWAY – NORTH/WEST BANK			
NORTH GRAIN VILLAGE TO COLEMOUTH CREEK			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	<p>Maintenance, improvement and/or replacement of wooden groynes and concrete revetment at Grain will be required within this period (<20 years). If the beach is lost, additional toe protection will be required to protect the concrete revetment. Earth embankments with upper concrete block revetments, concrete aprons and lower rock revetments around Grain Power Station would remain (>20 years). Concrete seawalls around Grain Container Terminal would remain (>20 years).</p>	<p>Replacement of groynes, and maintenance/ improvement of concrete revetment at Grain will be required to maintain the integrity of the beach. Maintenance and improvement (raising) of earth embankments, revetments, concrete aprons and concrete seawalls would be required during this epoch.</p>	<p>Further replacement, improvement (raising) and maintenance of all defences will be required to allow for the combined effects of sea level rise and climate change.</p>
	<p>The exposed shingle beach at Grain near the estuary mouth is likely to continue to experience coastal squeeze during this epoch. Depending on the rates of sediment supply, sediment loss, sea level rise and wave energy, this is likely to result in further beach narrowing (the beach currently narrows considerably towards the east, with very little shingle remaining in this section). Consequently defences would become increasingly exposed to wave and tidal action. Replacement of groynes may be required to keep the integrity of the beach. Additional toe protection may be</p>	<p>The shingle beach at Grain is likely to undergo continued coastal squeeze and narrowing during this epoch as sea levels rise. Continual defence improvement, maintenance and replacement will be necessary to maintain the integrity of the beach and protect the backing defences. If the beach narrows considerably and is eventually lost, maintenance, improvement (raising) and /or replacement of concrete and rock revetment at Grain will be required. It is assumed that mudflat erosion would continue in the confined areas near the estuary mouth. Consequently defences would become increasingly susceptible to erosion</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. If the beach at Grain remains, coastal squeeze of the beach will be exacerbated with sea level rise. With sea level rise, tidal prism within the estuary will increase, resulting in increased flows through the narrow channel near the mouth. Mudflat erosion is therefore likely to continue in these confined areas. In these locations and in areas where there is no foreshore, defences would become increasingly susceptible to toe erosion; therefore additional defence protection will be</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>required to stop undermining of the concrete revetment and toe scour as the beach narrows.</p> <p>Over this epoch, the wide intertidal mudflat areas in front of the shingle beach at Grain are likely to remain. Mudflat areas in the more confined channel areas around the estuary mouth, in front of defences around Grain Power Station, are predicted to continue to erode as at present. Consequently defences would become increasingly susceptible to erosion in these locations.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>The economic assets and infrastructure along the frontage and low lying flood risk areas will continue to be protected.</p>	<p>and toe scour in these locations. Any loss of designated habitat may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>The economic assets and infrastructure along the frontage and low lying flood risk areas will continue to be protected.</p>	<p>required.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>The economic assets and infrastructure along the frontage and low lying flood risk areas will remain protected.</p>
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Infill and reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing the defence line will narrow the channel further in an already constrained location, moving the estuary away from its ideal form. Consequently flow speeds through the constriction are likely to increase and erosion of present intertidal areas enhanced.</p> <p>There is potential to create new habitat landward of the defences or use land for development. Detrimental</p>	<p>Flow speeds through the narrow channel are assumed to increase and erosion of intertidal areas and defences will be enhanced as sea levels rise.</p> <p>Safe navigation of maritime traffic may become compromised due to the increased flow speeds.</p> <p>The channel will remain fixed in position, restricting natural estuary processes.</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>With sea level rise, tidal prism within the estuary will increase.</p> <p>Fast tidal flows resulting from the additional narrowing of the channel by advancing the defence line are likely to further increased. Mudflat erosion would consequently be</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>environmental impacts will occur with the loss of designated habitats. Any loss of designated habitat may need to be compensated for elsewhere.</p> <p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to the Isle of Grain's economic and residential assets and infrastructure will continue.</p>	<p>Flood and erosion protection to the Isle of Grain's economic and residential assets and infrastructure will continue.</p>	<p>amplified in these confined areas, resulting in complete foreshore loss in places and potential deepening of the main channel.</p> <p>Consequently defences would become increasingly susceptible to undermining in these locations.</p> <p>Safe navigation of maritime traffic may be compromised further.</p> <p>The channel will continue to be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to the Isle of Grain's economic and residential assets and infrastructure will be increased.</p>
Scenario 3	Hold the Line	Managed Retreat	Managed Retreat

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Maintenance, improvement and/or replacement of wooden groynes and concrete revetment at Grain will be required within this period (<20 years) along with beach recharge to retain the amenity value and defence properties of the beach.</p> <p>If the beach is lost, additional toe protection will be required to protect the concrete revetment.</p> <p>Earth embankments with upper concrete block revetments, concrete aprons and lower rock revetments around Grain Power Station would remain (>20 years). Concrete seawalls around Grain Container Terminal would remain (>20 years).</p>	<p>New defences will need to be constructed landwards of the present defences.</p>	<p>New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.</p>
	<p>The exposed shingle beach at Grain near the estuary mouth is likely to continue to experience coastal squeeze during this epoch. Depending on the rates of sediment supply, sediment loss, sea level rise and wave energy, this is likely to result in further beach narrowing (the beach currently narrows considerably towards the east, with very little shingle remaining in this section). Consequently defences would become increasingly exposed to wave and tidal action.</p> <p>Replacement of groynes may be required to keep the integrity of the beach. Additional toe protection may be required to stop undermining of the concrete revetment and toe scour as the beach narrows.</p>	<p>Removal or relocation of existing infrastructure and economic assets may be required dependant on the chosen line of retreat.</p> <p>Managed retreat at Grain would allow the shingle beach to naturally roll landward towards the higher land.</p> <p>Managed retreat opportunities around the majority of the Isle of Grain will be limited due to the existence of high land around Grain village.</p> <p>Inundation of any low lying areas (frontage beside Colemouth Creek) seaward of a retreated defence line would encourage the creation of new intertidal habitat which will develop over existing habitats. Any loss of designated habitat may need to be compensated for elsewhere.</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>The shingle beach at Grain is likely to continue to migrate landwards under rising sea levels until constrained by high land. In this case, the beach at Grain is predicted to start to erode as it experiences coastal squeeze as sea levels rise.</p> <p>Habitat in realigned areas will become more established throughout this epoch and new channels will become more defined.</p> <p>Downstream flow speeds are likely to increase as the tidal prism increases due to a greater intertidal area at this location and as sea levels rise. Foreshore erosion will</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Over this epoch, the wide intertidal mudflat areas in front of the shingle beach at Grain are likely to remain. Mudflat areas in the more confined channel areas around the estuary mouth, in front of defences around Grain Power Station, are predicted to continue to erode as at present. Consequently defences would become increasingly susceptible to erosion in these locations.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>The economic assets and infrastructure along the frontage and low lying flood risk areas will continue to be protected.</p>	<p>Flows into and out of these intertidal areas are likely to create new channels or result in the expansion of the existing creek network over time.</p> <p>The new intertidal areas will effectively increase the width of the estuary at this confined location, moving it towards a more ideal form.</p> <p>An increase in the width of the estuary will increase tidal prism, downstream flows and the potential for erosion in confined areas, e.g. at Sheerness.</p> <p>Large scale retreat downstream, e.g. on the Isle of Grain, has the potential to increase tidal levels upstream in the estuary.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Remaining economic assets and infrastructure along the frontage and low lying flood risk areas will remain protected.</p>	<p>therefore be exacerbated towards the estuary mouth e.g. at Sheerness.</p> <p>Remaining economic assets and infrastructure along the frontage and low lying flood risk areas will remain protected.</p>
COLEMOUTH CREEK TO BEE NESS JETTY (Stoke Marshes)			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Earth embankment, some short sections revetted with stone would remain (> 20 years).	Maintenance, improvement /and or replacement of earth embankments and stone revetments would be required.	Replacement, improvement (raising) and maintenance of defences will be required to allow for the combined effects of sea level rise and climate change.
	<p>The frontage consists of wide tidal mudflats and extensive saltmarsh areas seaward of defences.</p> <p>Over this epoch, these intertidal mudflat and saltmarsh</p>	<p>It is assumed that intertidal saltmarsh and mudflat evolution will continue in the same pattern as in the previous epoch where it is predicted that net saltmarsh accretion is likely to</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>As sea levels rise, tidal prism and tidal flows will increase.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>areas are assumed to continue to evolve as at present where it is predicted that saltmarsh at Colemouth Creek and around Bee Ness Jetty would continue to experience net accretion and saltmarsh in the north near Middle Stoke village would continue to experience erosion. Maintaining the current defence line would fix the shoreline position at the level of Mean High Water Springs.</p> <p>The infrastructure, residential assets at Middle Stoke and freshwater habitats behind defences along the frontage and low lying flood risk areas will remain protected.</p>	<p>continue around Colemouth Creek and around Bee Ness Jetty, and net erosion near Middle Stoke village. However, there may be a detrimental impact on environmentally designated habitats due to the increased potential for coastal squeeze of intertidal habitats, in known areas of erosion (e.g. at the seaward edge of marshes and near Middle Stoke village) as sea levels rise.</p> <p>Any loss of designated habitat may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the shoreline position.</p> <p>Infrastructure, residential assets at Middle Stoke and freshwater habitats and low lying flood risk areas will remain protected throughout this epoch.</p>	<p>There is therefore likely to be an increased potential for coastal squeeze in areas where net erosion is prevalent e.g. near to Middle Stoke village.</p> <p>This is likely to result in the loss of environmentally designated habitat. Any loss of designated habitat may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the shoreline position.</p> <p>Infrastructure, residential assets at Middle Stoke and freshwater habitats and low lying flood risk areas will continue to be protected.</p>
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing the defence line will narrow the channel in an area that is wider than the ideal form at this location. This is likely to reduce the tidal prism, potentially reduce downstream erosion and move the estuary toward a more ideal form.</p> <p>There is potential to create new freshwater and terrestrial</p>	<p>Any new habitat landward of defences will become more established.</p> <p>With sea level rise, tidal prism within the estuary will increase, in turn potentially increasing flow speeds in the main channel.</p> <p>Advancing the defence line seawards will move defences</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>Any new habitat will be established landward of the defences.</p> <p>Increased tidal prism, tidal flows and erosion of intertidal areas are likely to be exacerbated as sea levels rise.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>habitat landward of the defences, or use the land for development. This however would develop over existing environmentally designated habitats. The intertidal habitats lost in this unit are very important to the whole designated site due to the local accretion rates counteracting coastal squeeze effects over the whole site. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will provide flood and erosion protection to infrastructure, residential assets at Middle Stoke and freshwater habitats.</p>	<p>towards the main Medway channel. The reduced width of foreshore in front of these defences is likely therefore to be subject to increased erosion and potential coastal squeeze as sea levels rise.</p> <p>The channel will be fixed in position, at MHWS, restricting natural estuary processes.</p> <p>Advanced defence lines will continue to provide flood and erosion protection to infrastructure, residential assets and freshwater habitats.</p>	<p>The channel will be fixed in position, at MHWS, restricting natural estuary processes.</p> <p>Advanced defence line will provide flood and erosion protection to infrastructure, residential assets and freshwater habitats.</p>
Scenario 3	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>Removal or relocation of infrastructure may be required dependant on the chosen line of retreat.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the</p>	<p>Habitat formed in realigned areas will become more established throughout this epoch and new channels will become more defined.</p> <p>Downstream flow speeds are expected to increase as the tidal prism increases due to an increased intertidal area and as sea levels rise. Foreshore erosion therefore, is likely to be exacerbated towards the estuary mouth at Sheerness</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>Increases in tidal prism, flow speeds and erosion in confined areas and locations downstream, due to sea level rise, and a wide estuary mouth are likely to be exacerbated during this epoch. Consequently, new channels and creeks formed in realigned areas are likely</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>existing creek network over time.</p> <p>Realignment of defences at Colemouth Creek could potentially create a second estuary channel and mouth (dependant on the policy for the open coast), by connecting Yantlet Creek to the open coast. This would have the potential to increase the width of the estuary at the mouth, which is narrower than the ideal form at present. Creation of a second estuary mouth would therefore move the estuary towards a more ideal form.</p> <p>Large scale retreat downstream, e.g. at Stoke Saltings, has the potential to increase tidal levels upstream in the estuary.</p> <p>In the north east of the frontage, loss of designated freshwater habitats will result. Loss of designated habitat may need to be compensated for elsewhere. Retreat along the remaining frontage, between Middle Stoke and Bee Ness Jetty will potentially increase estuary width further (at this location the estuary is already wider than the ideal form) moving the estuary away from its ideal form.</p> <p>Resulting increases in tidal prism are likely to increase tidal flows and the potential for increased erosion in confined areas immediately downstream (i.e. at the mouth of the Medway, and the second mouth at Yantlet Creek).</p>	<p>and at the mouth of Yantlet Creek, which is also likely to undergo channel expansion.</p> <p>Economic and residential assets, infrastructure and low lying flood risk areas will remain protected.</p>	<p>to undergo erosion and expansion.</p> <p>New habitats will be established in realigned areas.</p> <p>Economic and residential assets, infrastructure and low lying flood risk areas will remain protected.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary. Economic and residential assets, infrastructure and low lying flood risk areas will remain protected.		
Scenario 4	No Active Intervention	No Active Intervention	No Active Intervention
	The earth embankment with some short sections revetted with stone (>20 years) would remain.	Earth embankment and stone revetment is expected to fail within this period (>20 years).	No defences.
	Over this epoch, the intertidal mudflat and saltmarsh areas are assumed to continue to evolve as at present where it is predicted that saltmarsh at Colemouth Creek and around Bee Ness Jetty would continue to experience net accretion and saltmarsh in the north near Middle Stoke village would continue to experience erosion. The infrastructure, residential assets at Middle Stoke and freshwater habitats behind defences along the frontage and low lying flood risk areas will remain protected.	<p>Failure of defences will be haphazard during this epoch, resulting in uncontrolled periodic flooding of low lying areas and to infrastructure.</p> <p>In low lying areas, sporadic defence failure will create new transitional and intertidal habitats within the realigned areas. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network.</p> <p>Eventual complete failure of defences could result in the estuary channel increasing in size as the shoreline realigns towards the infrastructure. This will potentially move the estuary away from the ideal form in an already wide section of the estuary.</p> <p>Large scale inundation downstream, e.g. at Stoke Saltings, has the potential to increase tidal levels upstream in the estuary.</p> <p>Release of sediment may potentially reduce erosion rates or</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. With predicted increases in sea level rise, and eventual breaching of infrastructure, further inundation of low lying areas is anticipated.</p> <p>A breach at Colemouth Creek, may potentially create a second estuary channel and mouth, by connecting Yantlet Creek to the open coast (dependant on policy for the open coast). This connection would have the potential to increase the width of the estuary at the mouth, which is narrower than the ideal form at present. A second estuary mouth would move the estuary towards a more ideal form.</p> <p>The estuary system would benefit by becoming a more natural system through this epoch. New habitats and creeks would become more established.</p> <p>Tidal prism and tidal flows are likely to increase as the</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
		<p>increase rates of accretion elsewhere in the estuary. Tidal prism and tidal flows are likely to increase as the Medway widens and sea levels rise, resulting in the potential for downstream erosion, e.g. at the mouth of the Medway.</p> <p>Over the long term, the loss of designated freshwater habitats will potentially result in the north east of the frontage. Loss of designated habitat may need to be compensated for elsewhere.</p>	<p>Medway widens further and sea levels rise, resulting in the potential for downstream erosion, e.g. at the mouth of the Medway, and the second mouth at Yantlet Creek. Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p>
BEE NESS JETTY TO HOO MARINA			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	<p>Earth embankment (some sections revetted with rock) around Kingsnorth Power Station would remain (>20 years). Earth embankments along undeveloped sections of frontage will remain (>20 years). Concrete seawall, steel sheet piling and rock revetments along the Hoo Marina frontage would remain (>20 years).</p>	<p>Maintenance and improvement of all defences along this frontage would be required during this epoch.</p>	<p>Replacement, improvement (raising) and maintenance of defences will be required to allow for the combined effects of sea level rise and climate change.</p>
	<p>This section of the estuary comprises of wide tidal mudflats and areas of saltmarsh in sheltered locations. Over this epoch, the saltmarsh areas in front of defences are likely to continue to respond as at present; Oakham Marsh (connected to the mainland by Oakham Ness Jetty) would continue to suffer marsh erosion, consequently defences on this island will be increasingly subject to erosion.</p>	<p>It is assumed that intertidal saltmarsh and mudflat evolution will continue in the same pattern as in the previous epoch where it is predicted that net saltmarsh erosion is likely to continue around Oakham Marsh, along Hoo St Werburg frontage and on the eastern tip of Hoo Saltmarsh Island. This erosion and potential for coastal squeeze will potentially be exacerbated with sea level rise and may have a detrimental effect on environmentally designated habitats.</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. As sea levels rise, tidal prism and tidal flows are predicted to increase. There will therefore be increased potential for coastal squeeze in areas where net erosion is prevalent and in constrained sections of the channel e.g. around Oakham Marsh, along Hoo St Werburg frontage and on the eastern tip of Hoo Saltmarsh Island.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Saltmarsh along the Hoo St Werburg frontage and at the eastern tip of Hoo Saltmarsh Island are expected to continue to suffer erosion.</p> <p>Mudflat erosion may also be experienced in the narrow channel between Hoo Marina and Hoo Saltmarsh Island. Defences would therefore be subject to increased erosion and undermining at this location during this epoch.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Economic, residential and commercial assets, and freshwater habitats behind defences along the frontage, as well as low lying flood risk areas will remain protected.</p>	<p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Economic, residential and commercial assets, and freshwater habitats behind defences along the frontage, as well as low lying flood risk areas will remain protected.</p>	<p>This is likely to result in the loss of environmentally designated habitat. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Economic, residential and commercial assets, and freshwater habitats behind defences along the frontage, as well as low lying flood risk areas will remain protected.</p>
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing the defence line will narrow the channel in an area that is wider than the ideal form at this location. This will potentially reduce the tidal prism and downstream erosion and move the estuary toward a more ideal form.</p> <p>There is potential to create new habitat landward of the</p>	<p>Any new habitat landward of defences will become more established.</p> <p>With sea level rise, tidal prism within the estuary is likely to increase, in turn increasing flow speeds in the main channel.</p> <p>Advancing the defence line seawards will move defences</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>New habitat will be established landward of the defences.</p> <p>Tidal prism, tidal flows and erosion of intertidal areas are expected to increase as sea levels rise.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>defences or use land for development. This however would develop over existing environmentally designated habitats. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will provide flood and erosion protection to economic, residential and commercial assets, freshwater habitats and low lying land.</p>	<p>towards the main Medway channel. The reduced width of foreshore in front of these defences is likely therefore to be subject to increased erosion and potential coastal squeeze as sea levels rise.</p> <p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will provide flood and erosion protection to economic, residential and commercial assets, freshwater habitats and low lying land</p>	<p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will provide flood and erosion protection to economic, residential and commercial assets, freshwater habitats and low lying land.</p>
Scenario 3	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>Removal or relocation of infrastructure and economic assets may be required dependant on the chosen line of retreat.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network over time.</p> <p>Release of sediment may potentially reduce erosion rates</p>	<p>New habitat in realigned areas will become more established throughout this epoch and new channels will become more defined.</p> <p>Downstream flow speeds are expected to increase as the tidal prism increases due to a larger intertidal area and as sea levels rise. Foreshore erosion will potentially therefore be exacerbated towards the estuary mouth at Sheerness and the Isle of Grain.</p> <p>Economic, residential and commercial assets and low lying flood risk areas will remain protected.</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>Increases in tidal prism, flow speeds and erosion in confined areas and locations downstream, due to sea level rise, and a wide estuary mouth are likely to be exacerbated during this epoch.</p> <p>New habitats will be established.</p> <p>Economic, residential and commercial assets and low lying flood risk areas will remain protected.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>or increase rates of accretion elsewhere in the estuary.</p> <p>Realignment of defences would have the potential to increase the width of the estuary at an already wide location, which would move the estuary further away from the ideal form.</p> <p>Resulting increases in tidal prism are likely to increase tidal flows and the potential for increased erosion in confined areas downstream (i.e. at the mouth of the Medway).</p> <p>Loss of designated freshwater habitats, west of Kingsnorth Power Station, may need to be compensated for elsewhere.</p> <p>Economic, residential and commercial assets and low lying flood risk areas will remain protected.</p>		
Scenario 4	Hold the Line	No Active Intervention	No Active Intervention
	Earth embankment (some sections revetted with rock) around Kingsnorth Power Station would remain (>20 years). Earth embankments along undeveloped sections of frontage will remain (>20 years). Concrete seawall, steel sheet piling and rock revetments along the Hoo Marina frontage would remain (>20 years).	The earth embankments, rock revetments, steel sheet piling and concrete seawalls (>20 years) are expected to fail within this period.	No defences.
	<p>This section of the estuary comprises of wide tidal mudflats and areas of saltmarsh in sheltered locations.</p> <p>Over this epoch, the saltmarsh areas in front of defences are likely to continue to respond as at present; Oakham</p>	<p>Failure of defences will be haphazard during this epoch, resulting in uncontrolled periodic flooding of low lying areas and to economic, residential and commercial assets.</p> <p>In low lying areas, sporadic defence failure would create</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>The estuary would move further away from its ideal form as defences fail. This, along with sea level rise, will</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Marsh (connected to the mainland by Oakham Ness Jetty) would continue to suffer marsh erosion, consequently defences on this island will be increasingly subject to erosion.</p> <p>Saltmarsh along the Hoo St Werburg frontage and at the eastern tip of Hoo Saltmarsh Island are expected to continue to suffer erosion.</p> <p>Mudflat erosion may also be experienced in the narrow channel between Hoo Marina and Hoo Saltmarsh Island.</p> <p>Defences would be subject to increased erosion and undermining at this location during this epoch.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Economic, residential and commercial assets, and freshwater habitats behind defences along the frontage, as well as low lying flood risk areas will remain protected.</p>	<p>new transitional and intertidal habitats within the realigned areas. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network.</p> <p>Eventual complete failure of defences is likely to result in the estuary channel increasing in size as the shoreline realigns. This will move the estuary further away from the ideal form in an already wide section of the estuary.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Tidal prism and tidal flows are likely to increase as the Medway widens and sea levels rise, resulting in the potential for downstream erosion, e.g. at the mouth of the Medway. Saltmarsh erosion trends as per the previous epoch will be expected to continue.</p> <p>Over the long term, loss of designated freshwater habitats west of Kingsnorth Power Station may need to be compensated for elsewhere.</p>	<p>increase the tidal prism and the potential for downstream erosion in the estuary. Saltmarsh erosion trends as per the previous epochs, will be exacerbated.</p> <p>Uncontrolled loss of economic, commercial and residential assets will occur.</p> <p>Higher land on Hoo Salt Marsh Island would begin to erode (approximately <0.5m/yr).</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>The estuary system would become a more natural system through this epoch. New habitats and creeks would become more established.</p>
HOO MARINA TO LOWER UPNOR (Cockham Wood)			
Scenario 1	No Active Intervention	No Active Intervention	No Active Intervention
	Vertical concrete and masonry seawalls, sheet piling and rock revetments would remain (>20 years).	Defences are expected to fail within this period.	No defences.
	<p>The Cockham Wood frontage comprises a narrow natural shingle beach fronted by narrow tidal mudflats and backed by clay cliffs.</p>	<p>The shingle beach at Cockham Wood would be expected to narrow further under coastal squeeze as sea levels rise. Ultimately this is likely to result in the complete loss of this</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. Reactivated cliffs at Cockham Wood are assumed to</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>As sea levels rise, the shingle beach is likely to experience coastal squeeze as the hinterland cannot accommodate roll back. Historic map analysis indicates a beach erosion rate of approximately 0.4m/yr.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Intertidal mudflat areas in front of remaining defences are likely to continue to respond as at present, frontages around Lower Upnor would expect to continue to undergo mudflat erosion due to the confined nature of the channel at this location.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Residential and commercial assets behind defences at Lower Upnor will remain protected.</p>	<p>feature. Consequently clay cliffs behind the beach may be reactivated and suffer erosion (approximately 0.5m/yr).</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Intertidal mudflat erosion/accretion trends are assumed to continue as per the previous epoch, where frontages in confined areas around Lower Upnor would continue to undergo mudflat erosion.</p> <p>No active intervention would not result in the estuary channel increasing significantly in size due to a high hinterland along the majority of this frontage.</p>	<p>continue to erode.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Mudflat erosion trends as per the previous epochs, are likely to be exacerbated due to an increased tidal prism as sea levels rise.</p> <p>The estuary at this location would become a more natural system through this epoch.</p>
Scenario 2 (Heritage Feature locations only)	Hold the Line (Heritage features only)	Hold the Line (Heritage features only)	Hold the Line (Heritage features only)
	New defences will need to be constructed around the heritage feature.	Defences will require maintenance and improvement over this epoch.	Defences will require maintenance, improvement and replacement over this epoch.
	<p>The Cockham Wood frontage comprises a narrow natural shingle beach fronted by narrow tidal mudflats and backed by clay cliffs.</p> <p>New defences will protect the heritage assets at Cockham Wood.</p> <p>As sea levels rise, the shingle beach is likely to experience coastal squeeze adjacent to the defences as</p>	<p>The shingle beach at Cockham Wood would be expected to narrow further under coastal squeeze as sea levels rise. Ultimately this is likely to result in the complete loss of this feature. Consequently clay cliffs behind the beach (where no defences exist) may be reactivated and suffer erosion (approximately 0.5m/yr).</p> <p>Loss of designated habitat may need to be compensated for</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>Reactivated cliffs (where no defences) at Cockham Wood are expected to continue to erode. Undermining of the adjacent defences is likely to be ongoing; this will be exacerbated with sea level rise.</p> <p>Mudflat erosion trends as per the previous epoch, are</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>the hinterland cannot accommodate roll back. Historic map analysis indicates a beach erosion rate of approximately 0.4m/yr.</p> <p>Intertidal mudflat areas in front of the new defences are likely to undergo mudflat erosion due to coastal squeeze as sea levels rise. This may begin to undermine the defences over time, requiring increased maintenance and improvement works.</p>	<p>elsewhere.</p> <p>Coastal squeeze of the beach will undermine the adjacent defences. Consequently these defences may require enlarging/extending to maintain the required standard of protection to protect the heritage feature. This may become increasingly unsustainable over time.</p> <p>It is assumed that tidal mudflats in front of the defences will narrow further with coastal squeeze as sea levels rise. Defences will continue to protect the heritage assets at Cockham Wood.</p>	<p>likely to be exacerbated due to an increased tidal prism as sea levels rise.</p> <p>Defences will continue to protect the heritage assets at Cockham Wood.</p>
Scenario 3	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>Limited opportunities exist for managed retreat along this frontage due to high land backing the shoreline.</p> <p>There is no requirement to manage cliff retreat as there are no assets at risk on the cliffs.</p> <p>As sea levels rise, the shingle beach at Cockham Wood is expected to experience coastal squeeze as the hinterland cannot accommodate roll back. Historic map analysis indicates a beach erosion rate of approximately 0.4m/yr.</p> <p>Release of sediment may potentially reduce erosion rates</p>	<p>The shingle beach at Cockham Wood would be expected to narrow further under coastal squeeze as sea levels rise. Ultimately this is likely to result in the complete loss of this feature. Consequently clay cliffs behind the beach may be reactivated and suffer erosion (approximately 0.5m/yr).</p> <p>There is no requirement to manage cliff retreat as there are no assets at risk on the cliffs.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>Reactivated cliffs at Cockham Wood are expected to continue to erode.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>or increase rates of accretion elsewhere in the estuary. Loss of designated habitat may need to be compensated for elsewhere.</p>		
LOWER UPNOR TO MEDWAY (M2) BRIDGE			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	<p>Between Lower and Upper Upnor concrete/masonry walls, steel sheet piling and rock revetments will remain (>20 years). Earth embankments and rock revetments at Whitewall Creek will remain (>20 years). Steel sheet piled walls between Whitwall Creek and Chatham Ness will remain (>20 years). Timber and concrete walls and earth embankments between Rochester Bridge and Medway Bridge would require replacement within this period (<20 years).</p>	<p>All defences would require increased maintenance, improvement and replacement works during this epoch.</p>	<p>To allow for sea level rise and the effects of climate change, defences would require more frequent levels of maintenance, improvement and replacement.</p>
	<p>In this location the estuary channel takes on a fluvial form with an almost constant width and limited area of intertidal flats. Some saltmarsh patches are located in sheltered embayments along this frontage.</p>	<p>Sea level rise and the potential for increased fluvial flows with climate change are likely to increase water levels and pressure on existing defences. With sea level rise, tidal prism will increase and the constrained channel may</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. With sea level rise, tidal prism within the estuary is expected to increase, resulting in increased flows through</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Over this epoch, the intertidal mudflat and saltmarsh areas in front of defences are likely to continue to respond as at present and existing channels and small pockets of saltmarsh would continue to be stable. Maintaining the current defence line would fix the channel position, restricting natural channel processes. Will protect the economic assets of the frontage and low lying flood risk areas from flooding and erosion.</p>	<p>become subject to increased erosion. This may also potentially lead to an increased likelihood of overtopping and scour of footings. Such changes are likely to lead to the requirement for increased defence maintenance and improvement works, which in turn may also increase the potential for erosion of the limited intertidal areas along this frontage. Maintaining the current defence line would fix the channel position, restricting natural channel processes. Will protect the economic assets of the frontage and low lying flood risk areas from flooding and erosion.</p>	<p>the narrow channel. Mudflat erosion is likely to continue in these confined areas. In these locations and in areas where there is no foreshore, defences could become increasingly susceptible to toe erosion; therefore additional defence protection will be required. Maintaining the current defence line would fix the channel position, restricting natural channel processes. Will protect the economic assets of the frontage and low lying flood risk areas from flooding and erosion.</p>
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Infill and reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing the defence line will narrow the channel further in an already constrained location, moving the estuary away from its ideal form. Consequently flow speeds through the constriction are likely to increase and erosion of present intertidal areas enhanced. Flood risk may be increased due to reduced channel capacity. There is potential to create new habitat landward of the defences or use land for development. Loss of intertidal habitat will result from seaward movement of defences. Loss of designated habitat may need to be compensated</p>	<p>Flow speeds through the narrow channel are likely to increase and erosion of intertidal areas and defences will be enhanced. This may also potentially lead to an increased likelihood of overtopping and scour of footings. Safe navigation of maritime traffic may become compromised due to the increased flow speeds. The channel will remain fixed in position, restricting natural estuary processes. Flood and erosion protection to economic, commercial and residential assets and infrastructure will be maintained.</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. With sea level rise, tidal prism within the estuary is predicted to increase. Fast tidal flows resulting from the additional narrowing of the channel by advancing the defence line may therefore be exacerbated further. Mudflat erosion is likely to be amplified in these confined areas. Resulting in complete foreshore loss in places and potential deepening of the channel.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>for elsewhere.</p> <p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to economic, commercial and residential assets and infrastructure will be maintained.</p>		<p>Consequently defences may become increasingly susceptible to undermining in these locations.</p> <p>Safe navigation of maritime traffic may be compromised further.</p> <p>The channel will continue to be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to economic, commercial and residential assets and infrastructure will be maintained.</p>
Scenario 3 (Whitewall Creek)	Managed Retreat (Whitewall Creek)	Managed Retreat (Whitewall Creek)	Managed Retreat (Whitewall Creek)
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>Managed retreat opportunities are limited as the Whitewall Creek area is confined by important infrastructure on both sides of the creek. The new defence line constructed will be required to provide an adequate standard of protection to protect the important infrastructure (Medway Tunnel and A289 road).</p> <p>Inundation of the low lying area seaward of a retreated defence line would encourage the creation of new intertidal habitat in the realigned areas.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Flows into and out of these intertidal areas are likely to</p>	<p>New habitat in realigned areas is likely to become more established throughout this epoch and new channels will become more defined.</p> <p>Downstream flow speeds are expected to increase as the tidal prism increases as sea levels rise. Foreshore erosion will therefore be exacerbated in confined areas.</p> <p>Will protect the economic assets of the frontage and infrastructure from flooding and erosion.</p>	<p>In the Medway sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>Habitats in realigned areas and new channels will be more established.</p> <p>Increased tidal prism and associated intertidal erosion, downstream and in confined areas, are likely to be exacerbated during this epoch with sea level rise and climate change.</p> <p>Will protect the economic assets of the frontage and infrastructure from flooding and erosion.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>create new channels or result in the expansion of the existing creek network over time.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Retreat is likely to result in localised increased flows in the creek mouth as well as increasing tidal prism and downstream flow speeds.</p> <p>Will protect the economic assets of the frontage and infrastructure from flooding and erosion.</p>		

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
MEDWAY (M2) BRIDGE TO NORTH HALLING (WEST BANK)			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	<p>Natural channel banks, flood embankments, concrete and timber walls (<5 years) would require improvements, maintenance, and/or replacement within the first 5 years of this period and throughout this epoch.</p>	<p>Defences would need to be raised, improved and replaced.</p>	<p>All defences would require increased levels of maintenance, improvement and replacement at varying times throughout this epoch due to the combined effects of sea levels rise and climate change.</p>
	<p>In this location the channel is fluvial in form, and narrows in width as it moves inland. The foreshore is characterised by narrow intertidal mudflat.</p> <p>Over this epoch, the intertidal areas in front of defences are likely to continue to respond as at present where</p>	<p>Sea level rise and the potential for increased fluvial flows with climate change are likely to increase water levels and pressure on existing defences, potentially leading to an increased likelihood of overtopping and scour of footings.</p> <p>This is likely to lead to the requirement for increased</p>	<p>With sea level rise, tidal prism within the estuary will increase, resulting in faster flows through the narrow channel. The constrained channel will potentially therefore become subject to increased erosion in confined areas (along the whole of this frontage) and on</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>channels are assumed to be stable.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line; consequently, natural channel meandering processes would be restricted.</p> <p>Will protect the infrastructure and residential assets along the frontage and backing flood risk areas.</p>	<p>maintenance, improvement works and eventual replacement of current defences with larger structures.</p> <p>More substantial defences would result in increased erosion of intertidal areas and deepening of the channel during these epochs.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line; consequently, natural channel meandering processes would be restricted.</p> <p>Will protect the infrastructure and residential assets along the frontage and backing flood risk areas.</p>	<p>the outside of meanders (e.g. North Halling and north Cuxton).</p> <p>Mudflat erosion would also continue in these confined areas. In these locations and in areas where there is no foreshore, defences would become increasingly susceptible to toe erosion; therefore additional defence protection may be required.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the infrastructure and residential assets along the frontage and backing flood risk areas.</p>
Scenario 2 (where no railway – under the Medway Bridge)	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences to protect infrastructure.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>Limited opportunities exist for managed retreat along this frontage due to high land backing the shoreline and the railway line.</p> <p>The frontage spanning from under the Medway Bridge to just north of Cuxton would present the only location where managed retreat would be possible.</p> <p>Inundation of this small area of low lying land would encourage the creation of new intertidal habitat in the realigned area. This would develop over existing habitats.</p> <p>Loss of designated habitat may need to be compensated</p>	<p>New habitat in realigned areas will become more established throughout this epoch.</p> <p>As sea levels rise tidal prism is expected to increase and consequently downstream flow speeds will also increase.</p> <p>Foreshore erosion is likely therefore to be exacerbated in constrained channel reaches (e.g. along the whole frontage) and on the outside of meanders (North Halling and north of Cuxton).</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p>	<p>Increases in tidal prism, flow speeds and erosion in confined areas and locations downstream, due to sea level rise, are likely to be exacerbated during this epoch.</p> <p>New habitats will be established.</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will continue to protect the infrastructure and residential assets along the frontage and backing flood risk areas.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>for elsewhere.</p> <p>A small amount of sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary. Realignment would result in a small increase in estuary width which would increase tidal prism and flows immediately downstream of the realignment.</p> <p>Over this epoch, the intertidal areas in front of defences are likely to continue to respond as at present where they are assumed to be stable.</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will continue to protect the infrastructure and residential assets along the frontage and backing flood risk areas.</p>	<p>Will continue to protect the infrastructure and residential assets along the frontage and backing flood risk areas.</p>	
Scenario 3 (where no railway– under the Medway Bridge)	No Active Intervention	No Active Intervention	No Active Intervention
	Flood embankments, concrete and timber walls (<5 years) would be expected to fail during the first half of this period.	No defences.	No defences.
	<p>Failure of defences will be haphazard during this epoch, resulting in uncontrolled periodic flooding of low lying areas and to infrastructure.</p> <p>In low lying areas, sporadic defence failure will create new transitional and intertidal habitats within the realigned areas. Flows into and out of these new intertidal areas are likely to create new channels.</p>	<p>Eventual complete failure of defences is likely to result in the estuary channel increasing in size slightly as the shoreline realigns towards the infrastructure.</p> <p>Failure of defences would result in a small increase in estuary width which is likely to increase tidal prism and flows immediately downstream of defence failure.</p> <p>Release of sediment may potentially reduce erosion rates or</p>	<p>With predicted increases in sea level rise, and eventual breaching of infrastructure, further inundation of low lying areas is anticipated.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Habitats will continue to become more established.</p> <p>Loss of designated habitat may need to be compensated</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Failure of defences would result in a small increase in estuary width which is likely to increase tidal prism and flows immediately downstream of defence failure.</p>	<p>increase rates of accretion elsewhere in the estuary.</p> <p>New habitat in realigned areas will become more established at the expense of existing habitats.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Tidal prism and tidal flows will increase with sea level rise, resulting in the potential for downstream erosion and increased erosion on the outside of meanders (north of Cuxton) and in confined sections of channel (along this whole section).</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p>	<p>for elsewhere.</p> <p>Tidal prism and tidal flows are expected to increase with sea levels rise, resulting in the potential for downstream erosion and increased erosion on the outside of meanders (north of Cuxton) and in confined sections of channel (along this whole section).</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p>
Scenario 4	Hold the Line	Managed Retreat	Managed Retreat
	Natural channel banks, flood embankments, concrete and timber walls (<5 years) would require improvements, maintenance, and/or replacement within the first 5 years of this period and throughout this epoch.	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.
	<p>Over this epoch, the intertidal areas in front of defences are likely to continue to respond as at present where channels are assumed to be stable.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line; consequently, natural channel meandering processes would be restricted.</p>	<p>Limited opportunities exist for managed retreat along this frontage due to high land backing the shoreline.</p> <p>The frontage spanning from under the Medway Bridge to just north of Cuxton would present the only location where managed retreat could be possible.</p> <p>Managed retreat north of Cuxton would require removal or relocation of major infrastructure and residential and</p>	<p>Habitat in realigned areas will become more established throughout this epoch.</p> <p>As sea levels rise tidal prism is expected to increase and consequently downstream flow speeds will also increase.</p> <p>Foreshore erosion will therefore potentially be exacerbated in constrained channel reaches (e.g. along the whole frontage) and on the outside of meanders</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Will protect the infrastructure and residential assets along the frontage and backing flood risk areas.</p>	<p>commercial assets. Inundation of these small areas of low lying land would encourage the creation of new intertidal habitat in the realigned areas, this would develop over existing habitats. Loss of designated habitat may need to be compensated for elsewhere. A small amount of sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary. Realignment would result in a small increase in estuary width which would increase tidal prism and flows immediately downstream of the realignment. Over this epoch, the intertidal areas in front of defences are likely to continue to respond as at present where they are assumed to be stable. Will allow more room for channel meandering and accommodation of flood waters. Some residential assets will remain protected.</p>	<p>(North Halling and north of Cuxton). Will allow more room for channel meandering and accommodation of flood waters. Some residential assets and low lying flood risk areas will remain protected.</p>
Scenario 5	Hold the Line	No Active Intervention	No Active Intervention
	<p>Natural channel banks, flood embankments, concrete and timber walls (<5 years) would require improvements, maintenance, and/or replacement within the first 5 years of this period and throughout this epoch.</p>	<p>Flood embankments, concrete and timber walls (<5 years) would expect to fail during the first half of this period.</p>	<p>No defences.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Over this epoch, the intertidal areas in front of defences are likely to continue to respond as at present where channels are assumed to be stable.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line; consequently, natural channel meandering processes would be restricted.</p> <p>Will protect the infrastructure and residential assets along the frontage and backing flood risk areas.</p>	<p>Failure of defences will be haphazard during this epoch, resulting in uncontrolled periodic flooding of low lying areas and to major infrastructure, residential and commercial assets. Potential for large increases in estuary width is limited by high land.</p> <p>In low lying areas, sporadic defence failure will create new transitional and intertidal habitats within the realigned areas which would develop over existing habitats. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels.</p> <p>A small amount of sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Failure of defences would result in a small increase in estuary width which is likely to increase tidal prism and flows immediately downstream of the realignment.</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p>	<p>Will result in the loss of infrastructure and residential and commercial assets.</p> <p>Eventual complete failure of defences would result in the estuary channel increasing in size as the shoreline realigns towards the infrastructure. This is likely to result in an increased tidal prism and flows immediately downstream of the realignment.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Natural channel meandering processes would be initiated allowing a more natural system to function.</p> <p>Inundation of low lying areas will allow more room for accommodation of flood waters.</p> <p>Over the long term habitat in realigned areas will become more established throughout this epoch at the expense of existing habitats.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Tidal prism and tidal flows are expected to increase with sea level rise, resulting in the potential for downstream erosion and increased erosion on the outside of meanders (north of Cuxton and North Halling) and in confined sections of channel (along this whole section).</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
NORTH HALLING TO SNODLAND (WEST BANK)			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Concrete walls (>20 years) at Halling would remain. Earth embankments (<5 years) between Halling and Snodland would require maintenance, improvement and replacing within the first 5 years of this period.	Concrete walls at Halling would require maintenance, improvement and replacement during this epoch. Embankments would also need to be raised, improved and replaced.	All defences would require increased levels of maintenance, improvement and replacement at varying times throughout this epoch due to the combined effects of sea levels rise and climate change.
	In this location, the channel is fluvial in form and narrows in width upstream. Over this epoch, the intertidal areas in front of defences are likely to continue to respond as at present where channels are assumed to be stable. The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted. Will protect the residential assets at Halling and Snodland, infrastructure, freshwater marshes and backing flood risk areas.	Sea level rise and the potential for increased fluvial flows with climate change are likely to increase water levels and pressure on existing defences, potentially leading to an increased likelihood of overtopping and scour of footings. This is likely to lead to the requirement for increased maintenance and improvement works. More substantial defences would result in increased erosion of intertidal areas and the deepening of the channel during these epochs. The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted. Will protect the residential assets at Halling and Snodland, infrastructure, freshwater marshes and backing flood risk areas.	With sea level rise, tidal prism within the estuary is assumed to increase, resulting in faster flows through the narrow channel. The constrained channel will therefore become subject to increased erosion in confined locations (along the whole of this frontage) and on the outside of meanders (e.g. Halling and Snodland). Consequently defences would become increasingly susceptible to toe erosion; therefore additional defence protection may be required. Maintaining the current defence line would fix the channel position, restricting natural channel processes. Will protect the residential assets at Halling and Snodland, infrastructure freshwater marshes and backing flood risk areas.

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
Scenario 2	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences to protect the residential assets at Halling and Snodland.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>Opportunities for retreat along this frontage include north of Halling (Halling Marshes) and south of Halling (Holborough Marshes).</p> <p>Retreated defences would be constructed to protect the villages of Halling and Snodland.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas. Existing freshwater habitats would be lost.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network over time.</p> <p>A small amount of sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary. Failure of defences would result in a small increase in estuary width which is likely to increase tidal prism and flows immediately downstream of the realignment.</p>	<p>Habitat in realigned areas is likely to become more established throughout this epoch and new channels will become more defined.</p> <p>As sea levels rise tidal prism is assumed to increase and consequently downstream flow speeds will also increase, leading to potential for foreshore erosion to be exacerbated in constrained channel reaches (e.g. along the whole frontage) and on the outside of meanders (Halling and Snodland).</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will protect the residential assets at Halling and Snodland, infrastructure and backing flood risk areas.</p>	<p>Increases in tidal prism, flow speeds and erosion in confined areas and on outside of meanders, due to sea level rise are likely to be exacerbated during this epoch.</p> <p>New habitats will be established.</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will protect the residential assets at Halling and Snodland, infrastructure and backing flood risk areas.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will protect the residential assets at Halling and Snodland, infrastructure and backing flood risk areas.</p>		
Scenario 3	No Active Intervention	No Active Intervention	No Active Intervention
	Earth embankments (<5 years) would be expected to fail during the first half of this period. Concrete seawalls (>20 years) would remain.	Concrete seawalls are expected to fail within this period.	No defences.
	<p>Failure of earth embankments will be haphazard during this epoch, resulting in uncontrolled periodic flooding of low lying areas, which will threaten infrastructure along the frontage and residential assets at Snodland.</p> <p>Secondary defences at Halling Marshes will confine flooding in this location.</p> <p>Defences at Halling and Snodland will remain throughout this epoch.</p> <p>In low lying areas, at Holborough Marshes and Halling, sporadic defence failure will create new transitional and intertidal habitats within the realigned areas which will develop over existing freshwater habitats. Flows into and out of these new intertidal areas are likely to create new channels and erode defences further.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Sediment will be released back into the estuary system,</p>	<p>Failure of concrete walls at Halling and Snodland will be haphazard during this epoch, resulting in uncontrolled flooding to the villages. All other defences are expected to have failed by this epoch and secondary defences at Halling Marshes would also begin to fail.</p> <p>Eventual complete failure of defences is likely to result in the estuary channel increasing in size as the shoreline realigns, which is likely to increase tidal prism and flows immediately downstream of the realignment. Potential for large scale inundation is however limited by sections of high land along most of this frontage.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Over the long term habitat in realigned areas will become more established throughout this epoch at the expense of existing freshwater habitats.</p>	<p>With predicted increases in sea level rise, further inundation of low lying areas is anticipated.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Habitats in realigned areas will continue to become more established. Their establishment will be governed by the rate of sea level rise and the availability of sediment to allow their vertical accretion within the tidal frame.</p> <p>Tidal prism and tidal flows is assumed to increase with sea level rise, resulting in the potential for downstream erosion and increased erosion on the outside of meanders (Halling and Snodland) and in confined sections of channel (along this whole section).</p> <p>Defence failure will allow more room for accommodation</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary. Failure of defences is assumed to result in an increase in estuary width which is likely to increase tidal prism and flows immediately downstream of the realignment.</p> <p>The inundation of large areas will increase downstream flows, leading to an increased potential for erosion in confined areas.</p> <p>Where defences constrain channel meanders, defence failure would allow the reassertion of natural meandering behaviour, with erosion being concentrated on the outside of meanders.</p> <p>In this section these processes would potentially increase the likelihood of erosion at North Halling, Halling and Snodland.</p> <p>Defence failure will allow more room for accommodation of flood waters.</p>	<p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Tidal prism and tidal flows are assumed to increase with sea level rise, resulting in the potential for downstream erosion and increased erosion on the outside of meanders (Halling and Snodland) and in confined sections of channel (along this whole section).</p> <p>Where defences constrain channel meanders, defence failure would allow the reassertion of natural meandering behaviour.</p> <p>Defence failure will allow more room for accommodation of flood waters.</p>	<p>of flood waters.</p>
LEYBOURNE LAKES (WEST BANK)			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Earth embankments (<5 years) would require maintenance and improvement / replacement within the first 5 years of this period.	Defences would need to be replaced and maintained during this epoch.	All defences along this frontage would need further maintenance, improvement (raising) and replacement with sea level rise and climate change.
	<p>In this section the Medway channel is narrow and fluvial in form.</p> <p>Over this epoch, the intertidal areas in front of defences</p>	<p>Sea level rise and the potential for increased fluvial flows with climate change are expected to increase water levels and pressure on existing defences, potentially leading to an</p>	<p>With sea level rise, tidal prism within the estuary is assumed to increase, resulting in faster flows through the narrow channel. The constrained channel will therefore</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>are likely to continue to respond as at present where channels are assumed to be stable.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted.</p> <p>Will protect the freshwater lakes and backing flood risk areas.</p>	<p>increased likelihood of overtopping and scour of footings. This is likely to lead to the requirement for increased maintenance and improvement of defences.</p> <p>Improved defences are likely to result in increased erosion of intertidal areas and the deepening of the channel.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted.</p> <p>Will protect the freshwater lakes and backing flood risk areas.</p>	<p>become subject to increased erosion in confined locations (along the whole of this frontage) and on the outside of meanders.</p> <p>Consequently defences would become increasingly susceptible to toe erosion; therefore additional defence protection is likely to be required.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the freshwater lakes and backing flood risk areas.</p>
Scenario 2	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences to protect the residential assets at Snodland and New Hythe. The railway line may be incorporated into the design of the new defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>The railway line may have to be relocated if not incorporated in the design of the new defences, dependant on the chosen line of retreat.</p> <p>Inundation of low lying land and lakes seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas. Existing freshwater habitats would be lost. Flows into and out of these new intertidal areas are likely to create new channels over time.</p>	<p>New habitat in realigned areas will become more established throughout this epoch and new channels will be more defined.</p> <p>As sea levels rise, tidal prism is assumed to increase, and consequently downstream flow speeds will also increase.</p> <p>Channel erosion will therefore be exacerbated in constrained channel reaches (e.g. along the whole frontage) and on the outside of meanders.</p> <p>Will allow more room for channel meandering and</p>	<p>Increases in tidal prism, flow speeds and erosion in confined areas and on the outside of meanders, due to sea level rise and the increase in width of the channel are likely to be exacerbated during this epoch.</p> <p>New habitats will be established.</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will protect the residential assets at Snodland and New Hythe, (infrastructure) and backing flood risk areas.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Realignment of defences would have the potential to increase the width of the channel as the lakes join with the river channel. This would move the estuary away from the ideal form, increase tidal prism, flow speeds and therefore erosion in confined areas downstream.</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will protect the residential assets at Snodland and New Hythe, (infrastructure) and backing flood risk areas.</p>	<p>accommodation of flood waters.</p> <p>Will protect the residential assets at Snodland and New Hythe, (infrastructure) and backing flood risk areas.</p>	
Scenario 3	No Active Intervention	No Active Intervention	No Active Intervention
	Earth embankments (<5 years) would be expected to fail during the first half of this period.	No defences.	No defences.
	<p>Failure of earth embankments will be haphazard during this epoch, resulting in uncontrolled inundation of lakes and low lying areas, the railway line and residential assets at Snodland and New Hythe.</p> <p>Sporadic defence failure will create new transitional and intertidal habitats within the realigned areas which will develop over existing freshwater habitats. Loss of designated habitat may need to be compensated for</p>	<p>Uncontrolled flooding of Leybourne Lakes, the railway line and residential assets in Snodland and New Hythe.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Eventual complete failure of defences may result in the inundation of a relatively large area which would increase the width of the estuary and consequently increase flows and erosion downstream.</p>	<p>With predicted increases in sea level rise, further inundation of low lying areas is anticipated.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>New habitats will continue to become more established.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels and erode existing defences further. Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Failure of defences would have the potential to increase the width of the channel as the lakes join with the river channel. This would move the estuary away from the ideal form, increase tidal prism, flow speeds and therefore erosion in confined areas downstream.</p> <p>Where existing defences constrain channel meanders, defence failure would allow the reassertion of natural meandering behaviour, with erosion being concentrated on the outside of meanders.</p> <p>At Snodland a new channel may form, cutting off the existing meander.</p> <p>Defence failure will allow more room for accommodation of flood waters.</p>	<p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Over the long term, habitat in realigned areas will become more established throughout this epoch at the expense of freshwater habitats.</p> <p>Tidal prism and tidal flows will increase with sea level rise, resulting in the potential for downstream erosion and increased erosion on the outside of meanders and in confined sections of channel.</p> <p>Where defences constrain channel meanders, defence failure would allow the reassertion of natural meandering behaviour.</p> <p>Defence failure will allow more room for accommodation of flood waters.</p>	<p>Tidal prism and tidal flows will increase with sea level rise. This will result in the potential for downstream erosion and increased erosion on the outside of meanders and in confined sections of channel.</p> <p>Defence failure will allow more room for accommodation of flood waters.</p>
NEW HYTHE TO ALLINGTON LOCK (WEST BANK)			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	<p>Steel sheet piling, gabions and concrete walls (<20 years) between Aylesford Paper Mills and Aylesford Train Station would require maintenance, improvement and replacement towards the end of</p>	<p>Earth embankments, timber walls and embankments between Aylesford Train Station and Allington Lock would require increased maintenance, improvement and replacement works. Other defences would need to</p>	<p>All defences along this frontage would need further maintenance, improvement and replacement with sea level rise and climate change.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	this period. Earth embankments, timber walls and embankments (>20 years) between Aylesford Train Station and Allington Lock would remain.	be replaced and maintained during this epoch.	
	<p>In this section the estuary is narrow and the channel is fluvial in form.</p> <p>During this epoch, the river channel is likely to continue to respond as at present where channels are assumed to be stable.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted.</p> <p>Will protect the residential, economic and heritage assets of the frontage and backing flood risk areas.</p>	<p>Sea level rise and the potential for increased fluvial flows with climate change are likely to increase water levels and pressure on existing defences, potentially leading to an increased likelihood of overtopping and scour of footings.</p> <p>This is likely to lead to the requirement for increased maintenance and improvement works.</p> <p>More substantial defences would result in increased erosion of the channel and consequently, deepening of the channel.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted.</p> <p>Will protect the residential, economic and heritage assets of the frontage and backing flood risk areas.</p>	<p>With sea level rise, tidal prism within the estuary is expected to increase, resulting in faster flows through the narrow channel. The constrained channel will therefore become subject to increased erosion in confined locations (along the whole of this frontage) and on the outside of meanders.</p> <p>Consequently defences would become increasingly susceptible to toe erosion; therefore additional defence protection may be required.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the residential, economic and heritage assets of the frontage and backing flood risk areas.</p>
Scenario 2	Hold the Line	Managed Retreat	Managed Retreat
	Steel sheet piling, gabions and concrete walls (<20 years) between Aylesford Paper Mills and Aylesford Train Station would require maintenance, improvement and replacement towards the end of this period. Earth embankments, timber walls and embankments (>20 years) between Aylesford Train	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	Station and Allington Lock would remain.		
	<p>In this section the estuary is narrow and the channel is fluvial in form.</p> <p>During this epoch, the river channel is likely to continue to respond as at present where channels are assumed to be stable.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted.</p> <p>Will protect the residential, economic and heritage assets of the frontage and backing flood risk areas.</p>	<p>Limited opportunities exist for managed retreat along this frontage due to the high density of commercial and residential assets and close proximity of infrastructure to the river channel.</p> <p>The small area of land immediately west of Allington, (north of the M20) would present the only location where managed retreat could be possible.</p> <p>Realigned defences would be constructed seaward of the railway line.</p> <p>Inundation of this small area of low lying land would encourage the creation of new intertidal habitat in the realigned area, which would develop over existing habitat.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Realignment of defences would have the potential to increase the width of the channel. This would move the estuary away from the ideal form, increase tidal prism, flow speeds and therefore erosion in confined areas downstream. Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Infrastructure and assets will remain protected.</p>	<p>New habitat in realigned areas will become more established throughout this epoch.</p> <p>As sea levels rise tidal prism is expected to increase and consequently downstream flow speeds will also increase.</p> <p>Foreshore erosion will therefore be exacerbated in constrained channel reaches (e.g. along the whole frontage) and on the outside of meanders.</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Infrastructure and assets will remain protected.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
Medway (east and south bank)			
ALLINGTON LOCK TO MILLHALL (EAST BANK)			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Concrete, masonry, timber, steel sheet piling and short lengths of natural embankment (<5 years) would require improvement and replacement within the first 5 years of this period, followed by maintenance and improvement during the remainder of the epoch.	Defences would require ongoing maintenance, improvement and periodic replacement within this epoch.	All defences would require increased levels of maintenance and improvement, as well as replacement at varying times throughout this epoch as sea levels rise and due to the effects of climate change.
	<p>In this section the river is fluvial in form and is considerably narrower than other sections.</p> <p>During this epoch, the river channel is likely to continue to respond as at present where channels are assumed to be stable.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted.</p> <p>Will protect the residential, economic and heritage assets of the frontage and backing flood risk areas.</p>	<p>Sea level rise and the potential for increased fluvial flows with climate change are expected to increase water levels and pressure on existing defences, potentially leading to an increased likelihood of overtopping and scour of footings.</p> <p>This is likely to lead to the requirement for increased maintenance and improvement works.</p> <p>Improved defences may result in increased erosion of the channel and the deepening of the channel.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted.</p> <p>Will protect the residential, economic and heritage assets of the frontage and backing flood risk areas.</p>	<p>With sea level rise, tidal prism within the estuary is likely to increase, resulting in faster flows through the narrow channel. The constrained channel will therefore become subject to increased erosion in confined locations (along the whole of this frontage) and on the outside of meanders (e.g. Forstal and Aylesford).</p> <p>Consequently defences would become increasingly susceptible to toe erosion; therefore additional defence protection may be required.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the residential, economic and heritage assets of the frontage and backing flood risk areas.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
Scenario 2	Hold the Line	Managed Retreat	Managed Retreat
	Concrete, masonry, timber, steel sheet piling and short lengths of natural embankment (<5 years) would require improvement and replacement within the first 5 years of this period, followed by maintenance and improvement during the remainder of the epoch.	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.
	In this section the river is fluvial in form and is considerably narrower than other sections. During this epoch, the river channel is likely to continue to respond as at present where channels are assumed to be stable. The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted. Will protect the residential, economic and heritage assets of the frontage and backing flood risk areas.	No opportunities exist for managed retreat along this frontage as a whole due to the high density of commercial, residential and heritage assets in close proximity of the river channel. However, small areas of land either side of the M20 and an area of land between Forstal and Aylesford are potentially the only locations where managed retreat could be possible (see Scenario 3).	No opportunities exist for managed retreat along this frontage as a whole due to the high density of commercial, residential and heritage assets in close proximity of the river channel.
Scenario 3 (discrete upstream locations)	Managed Retreat (discrete upstream locations)	Managed Retreat (discrete upstream locations)	Managed Retreat (discrete upstream locations)
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	Small areas of land either side of the M20 and an area of land between Forstal and Aylesford are potentially the only locations where managed retreat could be possible. Inundation of these small areas of low lying land would	New habitat in realigned areas will become more established throughout this epoch and new channels will become more defined. As sea levels rise tidal prism is expected to increase and	Increases in tidal prism, flow speeds and erosion in confined areas and on outside of meanders, due to sea level rise and the increase in width of the channel are likely to be exacerbated during this epoch.

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>encourage the creation of new intertidal habitat in the realigned area, which would develop over existing habitat. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Widening of the channel at this location may potentially cause faster flows and therefore increased erosion in confined channels downstream.</p> <p>Over this epoch, the channels are likely to continue to respond as at present where channels are assumed to be stable.</p> <p>Infrastructure and residential, commercial and heritage assets, and flood risk areas will remain protected.</p>	<p>consequently downstream flow speeds will also increase. Channel erosion will therefore be exacerbated in constrained channel reaches (e.g. Aylesford) and on the outside of meanders (e.g. Forstal and Aylesford).</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Infrastructure and residential, commercial and heritage assets, and flood risk areas will remain protected.</p>	<p>New habitats will be established.</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Infrastructure and residential, commercial and heritage assets, and flood risk areas will remain protected.</p>
MILLHALL TO MEDWAY BRIDGE (EAST BANK)			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Natural and earth embankments (<20 years) along the frontage would require maintenance, improvement and eventually replacement towards the end of the period. Concrete walls (<20 years) opposite Holborough Marshes and at Wouldham would also need maintenance, improvement and possible replacement works during this epoch.	Defences would require ongoing maintenance, improvement and periodic replacement within this epoch.	All defences would require increased levels of maintenance and improvement, as well as replacement at varying times throughout this epoch as sea levels rise and due to the effects of climate change.
	In this section the channel is fluvial in form. The channel	Sea level rise and the potential for increased fluvial flows	With sea level rise, tidal prism within the estuary is

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>in the southern reach of the river is narrow, but widens as it moves towards the Medway Bridge.</p> <p>Over this epoch, the intertidal areas in front of defences are likely to continue to respond as at present where channels are assumed to be stable with no/little change.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted.</p> <p>Will protect the residential and agricultural assets along the frontage, freshwater marshes and backing flood risk areas.</p>	<p>with climate change are likely to increase water levels and pressure on existing defences, potentially leading to an increased likelihood of overtopping and scour of footings.</p> <p>This is likely to lead to the requirement for increased maintenance and improvement works.</p> <p>Improved defences may result in increased erosion of intertidal areas and the deepening of the channel during these epochs.</p> <p>The position of the channel would remain fixed due to the maintenance of the current defence line, consequently, natural channel processes would be restricted.</p> <p>Will protect the residential and agricultural assets along the frontage, freshwater marshes and backing flood risk areas.</p>	<p>assumed to increase, resulting in faster flows through the narrow channel. The constrained channel will therefore become subject to increased erosion in confined locations (along the whole of this frontage) and on the outside of meanders (e.g. Burham Court and Wouldham).</p> <p>Consequently defences would become increasingly susceptible to toe erosion; Additional defence protection may therefore be required.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the residential and agricultural assets along the frontage, freshwater marshes and backing flood risk areas.</p>
Scenario 2	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>Managed retreat along the whole of the frontage would mean the loss / removal of residential and commercial assets, for example at Wouldham and Burham Court, and infrastructure, dependant on the chosen position of the retreated line. Retreat along the whole frontage would encompass a large area, essentially widening the river estuary along approximately 9km of the river. This would</p>	<p>New habitat in realigned areas will become more established throughout this epoch and new channels will become more defined.</p> <p>As sea levels rise tidal prism is expected to increase and consequently downstream flow speeds will also increase.</p> <p>Foreshore erosion will therefore be exacerbated in constrained channel reaches and on the outside of</p>	<p>Increases in tidal prism, flow speeds and erosion in confined areas and on outside of meanders, due to sea level rise are likely to be exacerbated during this epoch.</p> <p>New habitats in realigned areas will be established.</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will protect residential and agricultural assets and</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>have negative impacts on the estuary as a whole, increasing tidal prism and therefore significantly increasing tidal flows and erosion immediately downstream of the realignment, i.e. along the constrained channel section north of the Medway Bridge.</p> <p>Smaller opportunities for retreat along this frontage include Wouldham Marshes and discrete areas along the frontage south of Wouldham. Retreat along these sections of frontage may require removal of infrastructure / loss of properties dependant on the chosen line of retreat. Widening of the channel in discrete areas along this frontage may also potentially cause faster flows and therefore increased erosion in confined channels downstream.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas. Existing freshwater habitats would be lost.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels over time.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p>	<p>meanders (Wouldham and Burham Court).</p> <p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will protect residential and agricultural assets and backing flood risk areas.</p>	<p>backing flood risk areas.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Will allow more room for channel meandering and accommodation of flood waters.</p> <p>Will protect residential and agricultural assets and backing flood risk areas, dependant on the position of the retreated line.</p>		
Scenario 3	No Active Intervention	No Active Intervention	No Active Intervention
	Natural and earth embankments (<20 years) and concrete walls (<20 years) opposite Holborough Marshes and at Wouldham would expect to fail towards the end of this period.	No defences.	No defences.
	<p>Failure of defences will be haphazard during this epoch, resulting in uncontrolled periodic flooding of low lying areas, residential and agricultural assets and freshwater marshes.</p> <p>In low lying areas, sporadic defence failure will create new transitional and intertidal habitats within the realigned areas, which will develop over existing freshwater habitats.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels over time and erode defences further.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase</p>	<p>Uncontrolled flooding to residential, agricultural and freshwater assets.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Over the long term, habitat in realigned areas will become more established throughout this epoch resulting in long term freshwater habitat loss.</p> <p>Eventual complete failure of defences would result in the estuary channel increasing in size. This in conjunction with sea level rise is likely to increase tidal prism, flows downstream and erosion, downstream and on the outside of meanders (Burham Court and Wouldham).</p>	<p>With predicted increases in sea level rise, further inundation of low lying areas is anticipated.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Sediment will be released back into the estuary system, which may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Habitats will continue to become more established.</p> <p>Tidal prism and tidal flows are assumed to increase with sea level rise, resulting in the potential for downstream erosion and increased erosion on the outside of meanders (Burham Court and Wouldham) and in confined sections of channel (along this whole section).</p> <p>Defence failure will allow more room for accommodation of flood waters.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>rates of accretion elsewhere in the estuary.</p> <p>The inundation of large areas will increase immediate downstream flows.</p> <p>Where defences constrain channel meanders, defence failure would allow the reassertion of natural meandering behaviour, with erosion being concentrated on the outside of meanders.</p> <p>Potential erosion hot spots may therefore occur at Burham Court and Wouldham. The meander at Burham may potentially close, cutting off the current meander completely.</p> <p>Intertidal mudflat and saltmarsh areas in front of defences, north of Wouldham, are likely to continue to respond as at present where intertidal areas are expected to be stable in regards to erosion and accretion.</p> <p>Defence failure will allow more room for accommodation of flood waters.</p>	<p>Where defences constrain channel meanders, defence failure would allow the reassertion of natural meandering behaviour.</p> <p>Defence failure will allow more room for accommodation of flood waters.</p>	
	Predicted Change For		
	Years 0 - 20	Years 20 - 50	Years 50 - 100
MEDWAY (M2) BRIDGE TO EAST OF ST MARY'S ISLAND			
Scenario 1	Hold the line	Hold the line	Hold the line
	Vertical defences along this frontage will require maintenance and improvement during this epoch.	Vertical defences along this frontage will require maintenance, improvement and replacement during this epoch.	Vertical defences along this frontage will require increased maintenance, improvement (raising) and replacement as sea levels rise.
	In this location the estuary channel has a fluvial form with	Sea level rise and the potential for increased fluvial flows	In the Medway, sediment supply is predicted to decrease

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>an almost constant width and either no or limited areas of intertidal flats. However, a small isolated patch of saltmarsh exists at Borstal, just north of the Medway Bridge.</p> <p>Over this epoch, the intertidal mudflat and saltmarsh in front of defences are assumed to be stable.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the economic and heritage assets of the frontage and low lying flood risk areas from flooding and erosion.</p>	<p>with climate change are likely to increase water levels and pressure on existing defences.</p> <p>With sea level rise, tidal prism is expected to increase and the constrained channel will become subject to increased erosion. This may also potentially lead to an increased likelihood of overtopping and scour of footings.</p> <p>Such changes are likely to lead to the requirement for increased defence maintenance and improvement works.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the economic and heritage assets of the frontage and low lying flood risk areas from flooding and erosion.</p>	<p>over this epoch, limiting accretion in the estuary.</p> <p>With sea level rise, tidal prism within the estuary is assumed to increase, resulting in increased flows through the narrow channel.</p> <p>Mudflat and saltmarsh erosion would continue in these confined areas, with the potential for total loss in the long term. In these locations and in areas where there is no foreshore, defences would become increasingly susceptible to toe erosion; therefore additional defence protection may be required.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the economic and heritage assets of the frontage and low lying flood risk areas from flooding and erosion.</p>
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Infill and reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing the defence line will narrow the channel further in an already constrained location, moving the estuary away from its ideal form. Consequently flow speeds through the constriction are likely to increase and erosion of present intertidal areas will be enhanced.</p> <p>Flood risk may be increased due to reduced channel</p>	<p>Flow speeds through the narrow channel will increase and erosion of intertidal areas and defences will be enhanced as sea levels rise.</p> <p>Flood risk may be increased due to reduced channel capacity.</p> <p>Safe navigation of maritime traffic may become</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>With sea level rise, tidal prism within the estuary will increase. Resulting faster tidal flows are likely to be exacerbated further. Flood risk may be increased due to reduced channel capacity.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>capacity.</p> <p>There is potential to create new habitat landward of the defences or use land for development.</p> <p>Loss of intertidal habitat will result from seaward movement of defences. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to economic, commercial and residential assets and infrastructure will be maintained.</p>	<p>compromised due to the increased flow speeds.</p> <p>The channel will remain fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to economic, commercial and residential assets and infrastructure will be maintained.</p>	<p>Mudflat erosion may be amplified in confined areas. Resulting in complete foreshore loss in places and potential deepening of the channel.</p> <p>Consequently defences would become increasingly susceptible to erosion in these locations and will require increased maintenance.</p> <p>Safe navigation of maritime traffic may be compromised further.</p> <p>The channel will continue to be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to economic, commercial and residential assets and infrastructure will be maintained.</p>
ST MARY’S ISLAND TO THE STRAND			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Vertical defences along this frontage will require maintenance and improvement during this epoch.	Vertical defences along this frontage will require maintenance, improvement and replacement during this epoch.	Vertical defences along this frontage will require increased maintenance, improvement (raising) and replacement as sea levels rise.
	<p>The estuary begins to widen along this section. The foreshore is typified by narrow intertidal mudflats, as the main channel is close to the shoreline along this frontage.</p> <p>Over this epoch, the intertidal mudflat areas in front of defences are assumed to remain stable.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p>	<p>Sea level rise and the potential for increased fluvial flows with climate change is expected to increase water levels and pressure on existing defences.</p> <p>Tidal prism will increase which may potentially lead to an increased likelihood of overtopping and scour of footings.</p> <p>Such changes are likely to lead to the requirement for increased defence maintenance and improvement works.</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>With sea level rise, tidal prism within the estuary is expected to increase, resulting in increased flows in the main channel. Increased potential for erosion of intertidal areas will result.</p> <p>In locations where there is little or no intertidal mudflat,</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	Will protect the economic, residential and recreational assets of the frontage and low lying flood risk areas from flooding and erosion.	Any loss of designated habitat may need to be compensated for elsewhere. Maintaining the current defence line would fix the channel position, restricting natural channel processes. Will protect the economic, residential and recreational assets of the frontage and low lying flood risk areas from flooding and erosion.	defences would become increasingly susceptible to toe erosion; therefore additional defence protection may be required. Any loss of designated habitat may need to be compensated for elsewhere. Maintaining the current defence line would fix the channel position, restricting natural channel processes. Will protect the economic, residential and recreational assets of the frontage and low lying flood risk areas from flooding and erosion.
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Infill and reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	Advancing the defence line will narrow the channel further in an already constrained location (due to Hoo Saltmarsh island), moving the estuary away from its ideal form. Consequently flow speeds through the constriction are assumed to increase and erosion of present intertidal areas, areas immediately downstream and of Hoo Saltmarsh Island enhanced. Flood risk may be enhanced due to reduced channel capacity. There is potential to create new habitat landward of the defences or use land for development. However, loss of	Flow speeds through the narrowed channel are likely to increase and erosion of intertidal areas and defences will be enhanced. Flood risk may be increased due to reduced channel capacity. Any loss of designated habitat may need to be compensated for elsewhere. Safe navigation of maritime traffic may become compromised due to the increased flow speeds. The channel will remain fixed in position, restricting natural estuary processes.	In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. With sea level rise, tidal prism and flow speeds within the estuary will increase. This in combination with a narrow channel is expected to amplify mudflat erosion in confined areas and immediately downstream. Complete foreshore loss in places and potential deepening of the channel is likely to result. Flood risk may be enhanced due to reduced channel capacity. Any loss of designated habitat may need to be

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>intertidal habitat will result from seaward movement of defences.</p> <p>Any loss of designated habitat may need to be compensated for elsewhere.</p> <p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Protection to economic, residential and recreational assets of the frontage and low lying flood risk areas from flooding and erosion will be maintained.</p>	<p>Protection to economic, residential and recreational assets of the frontage and low lying flood risk areas from flooding and erosion will be maintained.</p>	<p>compensated for elsewhere.</p> <p>Consequently defences would become increasingly susceptible to erosion in these locations.</p> <p>Safe navigation of maritime traffic may be compromised further.</p> <p>The channel will continue to be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to economic, commercial and residential assets and infrastructure will be maintained.</p>
Scenario 3	Hold the Line	Hold the Line	Managed Retreat
	Vertical defences along this frontage will require maintenance and improvement during this epoch.	Vertical defences along this frontage will require maintenance, improvement and replacement during this epoch.	New defences will need to be constructed landwards of the present defences.
	<p>The estuary begins to widen along this section. The foreshore is typified by narrow intertidal mudflats, as the main channel is close to the shoreline along this frontage.</p> <p>Over this epoch, the intertidal mudflat areas in front of defences are assumed to remain stable.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the economic, residential and recreational assets of the frontage and low lying flood risk areas from flooding and erosion.</p>	<p>Sea level rise and the potential for increased fluvial flows with climate change is expected to increase water levels and pressure on existing defences.</p> <p>Tidal prism will increase which may potentially lead to an increased likelihood of overtopping and scour of footings.</p> <p>Such changes are likely to lead to the requirement for increased defence maintenance and improvement works.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes.</p> <p>Will protect the economic, residential and recreational assets of the frontage and low lying flood risk areas from</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>Removal or relocation of economic, residential and recreational assets will be required.</p> <p>Limited opportunities exist for managed retreat along this frontage due to a narrow flood zone and high land backing the shoreline.</p> <p>Inundation of the narrow strip of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing habitats.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
		flooding and erosion.	<p>Any loss of designated habitat may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks over time.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Realignment of defences would have the potential to increase the width of the estuary at an already wider than ideal location, which, would move the estuary further away from the ideal form.</p> <p>Resulting increases in tidal prism, combined with sea level rise, are assumed to increase tidal flows and the potential for increased erosion in confined areas downstream (i.e. at the mouth of the Medway).</p> <p>Will protect the infrastructure from flooding and erosion.</p>
THE STRAND TO WEST OF MOTNEY HILL			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Stone revetted banks (>20 years) would remain.	Stone revetted banks would require maintenance, improvement and eventual replacement during this epoch.	Sea level rise combined with the effects of climate change would result in the need for increased frequency of defence maintenance, improvement and replacement.
	The estuary widens considerably along this section. The frontage differs from those upstream, as it has extensive intertidal and saltmarsh areas and marsh islands.	During these epochs there is uncertainty regarding the evolution of mudflats and saltmarsh in this area. It is assumed however, that intertidal saltmarsh and mudflat	In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. As sea levels rise, tidal prism and tidal flows are predicted

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Over this epoch, the intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present. Erosion at the seaward edge of marshes at Nor Marsh and Rainham Creek would continue, however the remaining areas of saltmarsh would continue to accrete and/or be relatively stable. Erosion of marshes along Rainham Creek would result in the undermining and erosion of landward defences in this area.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes at MHWS level.</p> <p>Will protect the recreational and residential assets and agricultural land of the frontage and backing flood risk areas from flooding and erosion.</p>	<p>evolution will continue in the same pattern as in the previous epoch.</p> <p>Sea level rise is expected to exacerbate erosion in environmentally designated areas such as Nor Marsh and Rainham Creek, while it is assumed that accretion would continue to keep pace with sea level rise in other areas.</p> <p>The loss of designated habitats may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes at MHWS level.</p> <p>Will protect the recreational and residential assets and agricultural land of the frontage and backing flood risk areas from flooding and erosion.</p>	<p>to increase. There will therefore be increased potential for coastal squeeze in areas where net erosion is prevalent e.g. Nor Marsh and Rainham Creek.</p> <p>This will result in the loss of environmentally designated habitat, which may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the channel position, restricting natural channel processes at MHWS level.</p> <p>Will protect the recreational and residential assets and agricultural land of the frontage and backing flood risk areas from flooding and erosion.</p>
Scenario 2	<p>Advance the Line</p> <p>Construct new defences seaward of the present defence line. Reclaim land between the new and former defences.</p>	<p>Advance the Line</p> <p>Maintain the new defences.</p>	<p>Advance the Line</p> <p>Maintain, improve and upgrade advanced defences to allow for sea level rise.</p>
	<p>Advancing the defence line will narrow the channel in an area that is wider than the ideal form at this location. This will reduce the tidal prism, potentially reduce downstream erosion and move the estuary toward a more ideal form.</p> <p>There is potential to create new habitat landward of the defences or use land for development. This would</p>	<p>Any new habitat landward of defences will become more established.</p> <p>With sea level rise, tidal prism within the estuary is expected to increase, in turn increasing flow speeds in the main channel and increasing the erosion potential in environmentally designated areas such as Nor Marsh and</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>New habitat will be established landward of the defences. Increased tidal prism, tidal flows and erosion of intertidal areas and undermining of defences are assumed to be exacerbated as sea levels rise.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>develop over existing environmentally designated habitats. Habitat loss may need to be compensated for elsewhere.</p> <p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will provide continued flood and erosion protection to recreational, residential and agricultural assets.</p>	<p>Rainham Creek. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>It is assumed that accretion would continue to keep pace with sea level rise in other areas.</p> <p>The channel will be fixed in position, restricting natural estuary processes at MHWS level.</p> <p>Advancing defence lines will provide continued flood and erosion protection to recreational, residential and agricultural assets.</p>	<p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will provide continued flood and erosion protection to recreational, residential and agricultural assets.</p>
Scenario 3	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>Removal or relocation of recreational and residential assets may be required, dependant on the chosen line of retreat.</p> <p>The flood plain is narrow along this frontage as land rises quickly away from the shoreline, therefore any managed retreat scheme would be relatively small.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, this would develop over existing habitats.</p> <p>Any loss of designated habitat may need to be compensated for elsewhere.</p>	<p>Habitat in realigned areas will become more established throughout this epoch and new channels will become more defined.</p> <p>Downstream flow speeds are assumed to increase as the tidal prism increases due to a wider estuary channel and as sea levels rise.</p> <p>Foreshore erosion will therefore be exacerbated towards the estuary mouth at Sheerness. Known areas of erosion in environmentally designated areas will also potentially be increased, such as Nor Marsh and Rainham Creek. It is assumed that accretion would continue to keep pace with sea level rise in other areas.</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p> <p>It is assumed that Increases in tidal prism, flow speeds and erosion in confined areas downstream (at the estuary mouth at Sheerness) and in contemporary erosion hot spots, due to sea level rise, and a wider estuary, will be exacerbated during this epoch.</p> <p>New habitats will be established in realigned areas.</p> <p>Infrastructure and agricultural assets will remain protected.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Flows into and out of these new intertidal areas may create new channels or result in the expansion of existing creek networks over time.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Retreat along the frontage will increase estuary width further at an already wide section of estuary, moving it further away from its ideal form.</p> <p>Resulting increases in tidal prism are likely to increase tidal flows and the potential for erosion in confined areas immediately downstream (i.e. at the mouth of the Medway).</p> <p>Over this epoch, the intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present. Erosion at the seaward edge of marshes at Nor Marsh and Rainham Creek would continue, however the remaining areas of saltmarsh would continue to accrete and/or be relatively stable.</p> <p>Infrastructure and agricultural assets will remain protected.</p>	<p>Infrastructure and agricultural assets will remain protected.</p>	
Scenario 4	No Active Intervention	No Active Intervention	No Active Intervention
	Stone revetted banks (>20 years) would remain.	Stone revetted banks are expected to fail during this period.	No defences.
	<p>Over this epoch, the intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to</p>	<p>Failure of defences will be haphazard during this epoch, resulting in uncontrolled periodic flooding of low lying areas,</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>respond as at present. Erosion at the seaward edge of marshes at Nor Marsh and Rainham Creek would continue, however the remaining areas of saltmarsh would continue to accrete and/or be relatively stable. Erosion of marshes along Rainham Creek would result in the undermining and erosion of landward defences in this area.</p> <p>Recreational and residential assets and agricultural land of the frontage and backing flood risk areas will remain protected from flooding and erosion during this epoch.</p>	<p>infrastructure and recreational, residential and agricultural assets.</p> <p>In low lying areas, sporadic defence failure would create new transitional and intertidal habitats within the realigned areas, which would develop over existing habitats. Any loss of designated habitat may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Tidal prism and tidal flows are expected to increase as the Medway widens and sea levels rise, resulting in the potential for downstream erosion, e.g. at the mouth of the Medway. Saltmarsh erosion trends as per the previous epoch, will be expected to continue.</p>	<p>The estuary would move further away from its ideal form as defences fail. This, along with sea level rise, will potentially increase the tidal prism and downstream erosion in the estuary. Saltmarsh erosion trends, e.g. at Nor Marsh and Rainham Creek, will be exacerbated.</p> <p>The estuary system would become a more natural system through this epoch. New habitats and creeks would become more established.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Long term uncontrolled loss of agricultural and recreational land.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p>
MOTNEY HILL TO KINGSFERRY BRIDGE			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	<p>Stone revetted banks (<20 years) at Barksore, Chetney and Ferry Marshes would require maintenance/upgrading within this period. Defences (>20 years) along the rest of the frontage would</p>	<p>All defences would require maintenance, improvement and or replacement at various times during this epoch.</p>	<p>Increased frequency of maintenance, improvement and replacement of defences would be necessary due to the combined effects of sea levels rise and climate change.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	remain.		
	<p>This section of the Medway estuary is very wide and has extensive intertidal and saltmarsh areas and marsh islands. The channel of the Swale, between Queenborough and the Kingsferry Bridge, is however narrower and more fluvial in form.</p> <p>Over this epoch, the intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present. It is predicted that Burntwick Island, Deadmans Island, Ham Green and Greenborough marshes would continue to experience marsh erosion. Saltmarsh at Millfordhope Marsh would continue to be relatively stable over this period. Saltmarsh accretion would continue in sheltered areas and along the west shoreline of Chetney Marshes and at Bedlams Bottom.</p> <p>North of Kingsferry Bridge the Swale channel is assumed to be stable over this period. The position of the channel would remain fixed due to the maintenance of the current defence line, which in turn would restrict natural channel processes.</p> <p>Maintaining the current defence line would fix the channel position of the Swale, restricting natural channel processes.</p> <p>Will protect the natural freshwater, agricultural and residential assets of the frontage and backing flood risk</p>	<p>During these epochs there is uncertainty regarding the evolution of mudflats and saltmarsh in this area. It is assumed however, that intertidal saltmarsh and mudflat evolution is assumed to continue in the same pattern as in the previous epoch.</p> <p>With sea level rise, tidal prism will increase which would exacerbate erosion in areas such as Burntwick Island, Deadmans Island, Ham Green and Greenborough marshes. However, it is assumed that accretion would continue to keep pace with sea level rise in other areas such as along the western shoreline of Chetney Marshes and at Bedlams Bottom.</p> <p>The loss designated habitats may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the channel positions in the Swale, restricting natural channel processes.</p> <p>Will protect the natural freshwater, agricultural and residential assets of the frontage and backing flood risk areas.</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. In the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in wider estuary locations, over this epoch.</p> <p>As sea levels rise, tidal prism and tidal flows are expected to increase. There will therefore be increased potential for coastal squeeze in areas where net erosion is prevalent e.g. Burntwick Island, Deadmans Island, Ham Green and Greenborough marshes.</p> <p>This may result in the loss of environmentally designated habitat, which may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the Swale channel position, restricting natural channel processes.</p> <p>Will protect the natural freshwater, agricultural and residential assets of the frontage and backing flood risk areas.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	areas.		
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing the defence line will narrow the channel in an area that is wider than the ideal form in the Medway. This is likely to reduce the tidal prism, potentially reduce downstream erosion and move the estuary toward a more ideal form.</p> <p>In the Swale however, advancing the defence line will narrow the channel further in an already constrained section of channel. This will potentially move the Swale channel away from its ideal form, increase flow speeds and the potential for erosion. Flood risk may be increased due to a reduced channel capacity.</p> <p>There is potential to create new habitat landward of the defences or use the reclaimed land for development. This however would be at the expense of existing environmentally designated habitats. Designated habitat loss may need to be compensated for elsewhere.</p> <p>The shoreline will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will maintain flood and erosion protection to freshwater marshes, agricultural land and</p>	<p>Any new habitat landward of defences will become more established.</p> <p>It is assumed that with sea level rise, tidal prism within the estuary is expected to increase, in turn increasing flow speeds in the main channel and therefore increasing the erosion potential in environmentally designated areas such as Stangate Creek, West Swale and Long Reach (Swale). Designated habitat loss may need to be compensated for elsewhere.</p> <p>It is assumed that accretion would continue to keep pace with sea level rise in sheltered areas.</p> <p>Flow speeds through the narrow channel of the Swale are likely to increase and erosion of intertidal areas and defences will be enhanced. Hence, safe navigation of maritime traffic may become compromised due to the increased flow speeds through this channel.</p> <p>The shoreline will be fixed in position at MHWS level, restricting natural estuary processes.</p> <p>Advancing defence lines will maintain flood and erosion protection to recreational, residential and agricultural assets.</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. In the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in wider estuary locations, over this epoch.</p> <p>It is assumed that with sea level rise, tidal prism within the estuary will increase, resulting in exacerbated erosion of intertidal areas as per the previous epoch.</p> <p>Fast tidal flows resulting from the additional narrowing of the channel (especially in the Swale) by advancing the defence line are assumed to be exacerbated further.</p> <p>Mudflat erosion would be amplified in these confined areas. Resulting in complete foreshore loss in places and potential deepening of the main channel.</p> <p>Consequently defences would become increasingly susceptible to erosion in these locations.</p> <p>Safe navigation of maritime traffic may be compromised further.</p> <p>Habitat will be established landward of the defences.</p> <p>The shoreline will be fixed in position at MHWS level,</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	villages.		restricting natural estuary processes. Will continue to provide flood and erosion protection to freshwater marshes, agricultural land and villages.
Scenario 3	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement (raising) and / or eventual replacement during this epoch.
	<p>Managed retreat along this section has the potential for inundation of significantly large areas of low lying land. This will, to a certain extent, also be dependent on the management policies adopted in the Swale (i.e. a management policy of retreat to the west of Sheppey would increase estuary width even further).</p> <p>Removal or relocation of residential and commercial assets may be required, dependant on the chosen line of retreat.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing freshwater habitats.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks over time.</p>	<p>Habitat in realigned areas will become more established throughout this epoch and new channels and creeks will become more defined.</p> <p>Downstream flow speeds are expected to increase as the tidal prism increases due to a wider estuary channel and as sea levels rise. Foreshore erosion is assumed therefore to be exacerbated towards the estuary mouth at Sheerness.</p> <p>Known areas of erosion in environmentally designated areas will also potentially be increased, such as Burntwick Island, Deadmans Island, Ham Green and Greenborough marshes. It is assumed that accretion would continue to keep pace with sea level rise in other areas.</p> <p>Will protect agricultural land and villages.</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. In the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in wider estuary locations, over this epoch.</p> <p>Sea level rise and a wider estuary are likely to exacerbate increases in tidal prism, flow speeds and erosion in confined areas downstream (at the estuary mouth at Sheerness) and in current erosion hot spots.</p> <p>New habitats will be established in realigned areas.</p> <p>Will protect agricultural land and villages.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Large scale retreat along the Medway frontage will increase estuary width considerably at an already wide section of estuary, moving it further away from its ideal form.</p> <p>Retreat along the Swale frontage will also increase estuary width in a narrow section of the estuary, moving it towards a more ideal form. However, large scale retreat will move the estuary away from the ideal form.</p> <p>Large scale retreat downstream, e.g. at Barksore and Chetney Marshes, has the potential to increase tidal levels upstream in the estuary.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Resulting increases in tidal prism, especially with large scale retreat, are likely to significantly increase tidal flows and the potential for erosion in confined areas immediately downstream (i.e. at the mouth of the Medway).</p> <p>Over this epoch, the intertidal mudflat and saltmarsh areas in front of defences are likely to continue to respond as at present. It is assumed that in the Medway, Burntwick Island, Deadmans Island, Ham Green and Greenborough marshes would continue to suffer marsh erosion. Saltmarsh at Millfordhope Marsh would continue to be relatively stable over this period. Saltmarsh</p>		

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	accretion would continue in sheltered areas and along the west shoreline of Chetney Marshes and at Bedlams Bottom. Will protect agricultural land and villages.		
Scenario 4	Hold the Line	Hold the Line	No Active Intervention
	Stone revetted banks (<20 years) at Barksore, Chetney and Ferry Marshes would require maintenance/upgrading within this period. Defences (>20 years) along the rest of the frontage would remain.	All defences would require maintenance, improvement and or replacement at various times during this epoch.	Defences would expect to fail within this period.
	<p>This section of the Medway estuary is very wide and has extensive intertidal and saltmarsh areas and marsh islands. The channel of the Swale, between Queenborough and the Kingsferry Bridge, is however narrower and more fluvial in form.</p> <p>Over this epoch, the intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present. It is predicted that Burntwick Island, Deadmans Island, Ham Green and Greenborough marshes would continue to experience marsh erosion. Saltmarsh at Millfordhope Marsh would continue to be relatively stable over this period. Saltmarsh accretion would continue in sheltered areas and along the west shoreline of Chetney Marshes and at Bedlams Bottom.</p> <p>North of Kingsferry Bridge the Swale channel is assumed</p>	<p>During these epochs there is uncertainty regarding the evolution of mudflats and saltmarsh in this area. It is assumed however, that intertidal saltmarsh and mudflat evolution is assumed to continue in the same pattern as in the previous epoch.</p> <p>With sea level rise, tidal prism will increase which would exacerbate erosion in areas such as Burntwick Island, Deadmans Island, Ham Green and Greenborough marshes. However, it is assumed that accretion would continue to keep pace with sea level rise in other areas such as along the western shoreline of Chetney Marshes and at Bedlams Bottom.</p> <p>The loss designated habitats may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the channel</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. In the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in wider estuary locations, over this epoch.</p> <p>Failure of defences will be haphazard during this epoch, resulting in uncontrolled periodic flooding of large expanses of low lying areas, freshwater marshes, infrastructure and residential and agricultural assets. Long term loss of agricultural land and freshwater habitats.</p> <p>Designated freshwater habitat loss may need to be compensated for elsewhere.</p> <p>In low lying areas, sporadic defence failure will create new transitional and intertidal habitats within the realigned</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>to be stable over this period. The position of the channel would remain fixed due to the maintenance of the current defence line, which in turn would restrict natural channel processes.</p> <p>Maintaining the current defence line would fix the channel position of the Swale, restricting natural channel processes.</p> <p>Will protect the natural freshwater, agricultural and residential assets of the frontage and backing flood risk areas.</p>	<p>positions in the Swale, restricting natural channel processes.</p> <p>Will protect the natural freshwater, agricultural and residential assets of the frontage and backing flood risk areas.</p>	<p>areas. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks.</p> <p>Release of sediment may potentially act to reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>In the long term, failure of defences would result in the Medway and Swale estuary significantly increasing in size as the shoreline realigns. This however would move the Medway estuary away from its ideal form. Unless significantly large areas are inundated, the Swale estuary would potentially move towards a more ideal form.</p> <p>It is assumed that tidal prism and tidal flows will increase as sea levels rise and the estuary increases in size, resulting in the potential for downstream erosion, e.g. at the mouth of the Medway.</p> <p>Large scale inundation downstream, e.g. at Barksore and Chetney Marshes, has the potential to increase tidal levels upstream in the estuary.</p> <p>In areas where meanders are naturally constrained by high land, e.g. Motney Hill and Chetney Hill, defence failure would result in erosion governed by the fluvial and tidal flows.</p> <p>Where defences constrain channel meandering in the Swale, defence failure would allow the reassertion of</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
			<p>natural meandering behaviour, with erosion being concentrated on the outside of meanders, such as along the Swale channel at Chetney Marshes.</p> <p>Intertidal mudflat and saltmarsh erosion/accretion trends, which are assumed to continue as per the previous epoch, would be exacerbated with rising sea levels and climate change, however behaviour of intertidal areas becomes subject to greater levels of uncertainty through this epoch.</p>
Scenario 5	Managed Retreat	Managed Retreat	No Active Intervention
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	All defences would eventually fail within this epoch.
	<p>Managed retreat along this section has the potential for inundation of significantly large areas of low lying land. This will, to a certain extent, also be dependent on the management policies adopted in the Swale (i.e. a management policy of retreat to the west of Sheppey would increase estuary width even further).</p> <p>Removal or relocation of residential and commercial assets may be required, dependant on the chosen line of retreat.</p>	<p>Habitat in realigned areas will become more established throughout this epoch and new channels and creeks will become more defined.</p> <p>Downstream flow speeds are expected to increase as the tidal prism increases due to a wider estuary channel and as sea levels rise. Foreshore erosion is assumed therefore to be exacerbated towards the estuary mouth at Sheerness.</p> <p>Known areas of erosion in environmentally designated areas will also potentially be increased, such as Burntwick</p>	<p>In the Medway, sediment supply is predicted to decrease over this epoch, limiting accretion in the estuary. In the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in wider estuary locations, over this epoch.</p> <p>Failure of retreated defences will be haphazard during this epoch, resulting in uncontrolled periodic flooding of remaining low lying areas, infrastructure and residential and agricultural assets.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing freshwater habitats.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks over time.</p> <p>Large scale retreat along the Medway frontage will increase estuary width considerably at an already wide section of estuary, moving it further away from its ideal form.</p> <p>Retreat along the Swale frontage will also increase estuary width in a narrow section of the estuary, moving it towards a more ideal form. However, large scale retreat will move the estuary away from the ideal form.</p> <p>Large scale retreat downstream, e.g. at Barksore and Chetney Marshes, has the potential to increase tidal levels upstream in the estuary.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Resulting increases in tidal prism, especially with large scale retreat, are likely to significantly increase tidal flows and the potential for erosion in confined areas</p>	<p>Island, Deadmans Island, Ham Green and Greenborough marshes. It is assumed that accretion would continue to keep pace with sea level rise in other areas.</p> <p>Will continue to protect agricultural land and villages.</p>	<p>Any designated freshwater habitat loss may need to be compensated for elsewhere.</p> <p>In low lying areas, sporadic defence failure may create new transitional and intertidal habitats within the inundated areas. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>In the long term, failure of defences would result in the Medway and Swale estuary increasing further in size as the shoreline realigns. This is assumed to move both estuaries away from their ideal forms.</p> <p>It is assumed that tidal prism and tidal flows will increase as sea levels rise and the estuary increases in size further, resulting in the potential for downstream erosion, e.g. at the mouth of the Medway.</p> <p>Intertidal mudflat and saltmarsh erosion trends, which are assumed to continue as per the previous epoch, would be exacerbated with rising sea levels and climate change, however behaviour of intertidal areas becomes subject to greater levels of uncertainty through this epoch.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>immediately downstream (i.e. at the mouth of the Medway).</p> <p>Over this epoch, the intertidal mudflat and saltmarsh areas in front of defences are likely to continue to respond as at present. It is assumed that in the Medway, Burntwick Island, Deadmans Island, Ham Green and Greenborough marshes would continue to suffer marsh erosion. Saltmarsh at Millfordhope Marsh would continue to be relatively stable over this period. Saltmarsh accretion would continue in sheltered areas and along the west shoreline of Chetney Marshes and at Bedlams Bottom.</p> <p>Continued protection to agricultural land and villages.</p>		
Swale (south bank)			
KINGSFERRY BRIDGE TO MILTON CREEK (SOUTH BANK)			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Earth embankment and rock revetment (>20 years) would remain.	Earth embankment and rock revetment would require maintenance, improvement and replacement during this epoch.	Defences would require increased levels of maintenance, improvement and replacement with sea levels rise and the effects of climate change.
	<p>The channel of the Swale, between Kingsferry Bridge and Milton Creek is fluvial in form.</p> <p>Narrow Intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present. 'The Lillies' islands at the mouth of Milton Creek will continue to accrete. Larger areas of saltmarsh and</p>	<p>With sea level rise, tidal prism and tidal flows are assumed to increase, resulting in the potential for coastal squeeze of designated intertidal areas along constrained channels as defences constrain landward migration of habitat.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p>	<p>Over this epoch, sediment supply in the Swale is predicted to be sufficient to continue accretion patterns in locations where the channel is wide.</p> <p>However, constrained channels are more likely to experience an increased potential for erosion of designated intertidal habitats, due to an increase in tidal</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>mudflat along this frontage should continue to be stable. Maintenance of the current defence line will fix the channel in position and restrict natural channel processes.</p> <p>Will continue to protect the industrial assets, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>In wider channel locations e.g. at the mouth of the Milton Creek, continued vertical saltmarsh growth is assumed as sediment supply is expected to meet demand within the estuary over this epoch.</p> <p>Channels will be fixed in position, restricting natural channel processes.</p> <p>Will continue to protect the industrial assets, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>prism and tidal flows as sea levels rise.</p> <p>Channels will be fixed in position, restricting natural channel processes.</p> <p>Will continue to protect the natural freshwater assets, economic, residential and agricultural assets and backing flood risk areas.</p>
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Infill and reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing the defence line will narrow the channel further in an already constrained section of the estuary. Consequently, narrowing the channel is expected to increase flow speeds and erosion within the constrained reaches and immediately downstream (e.g. towards the Medway mouth and where the Swale joins the Medway at Queenborough).</p> <p>Flood risk may be increased due to reduced channel capacity.</p> <p>There is potential to create new habitat landward of the defences or use land for development.</p> <p>Loss of intertidal habitat will result from seaward</p>	<p>Flow speeds through the narrow channel will increase and erosion of intertidal areas and advanced defences are likely to be enhanced as sea levels rise. Consequently, it is assumed that the foreshore will narrow considerably in constrained locations.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>The advanced defence line will continue to fix the channel position and restrict natural channel processes.</p> <p>Flood protection to freshwater marshes, economic assets and backing flood risk areas will continue.</p>	<p>With sea level rise, tidal prism and tidal flows within the estuary are assumed to increase further.</p> <p>Fast tidal flows resulting from the additional narrowing of the channel by advancing the defence line are likely to be exacerbated further. It is assumed therefore that intertidal erosion would amplify in confined areas (essentially along the whole frontage).</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>The advanced defence line will continue to fix the channel position and restrict natural channel processes. Defences would however become increasingly susceptible to</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>movement of defences. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Will maintain flood protection to freshwater marshes, economic assets and backing flood risk areas.</p> <p>Creating new defences seaward of the original defence line will fix the channel in position and restrict natural channel processes.</p>		<p>erosion throughout this epoch.</p> <p>Flood protection to freshwater marshes, economic assets and backing flood risk areas will continue.</p>
Scenario 3	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.
	<p>Removal or relocation of infrastructure and economic assets may be required dependant on the chosen line of retreat.</p> <p>Managed retreat could potentially increase the estuary width significantly This would occur in areas which are narrower than the ideal form, i.e. around Elmley Island and towards Kingsferry Bridge, moving it towards a more ideal form in these locations.</p> <p>A wider channel is assumed to increase tidal prism and tidal flows immediately downstream and in confined areas, resulting in the potential for increased erosion around the naturally constrained channels around Elmley Hills and the Isle of Harty.</p>	<p>Downstream flow speeds are expected to increase as the tidal prism increases due to an increased intertidal area and with sea level rise.</p> <p>Foreshore erosion is therefore likely to be exacerbated in confined channel locations and immediately downstream (e.g. the constrained channel around the Isle of Harty).</p> <p>New habitat in realigned areas will become more established and new channels will become more defined.</p> <p>Will continue to protect the backing flood risk areas and economic assets.</p>	<p>Over this epoch, in the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in locations where the channel is wide.</p> <p>Habitats in realigned areas and new channels will be more established.</p> <p>It is assumed that an increase in tidal prism and associated intertidal erosion downstream and in confined areas, will be exacerbated during this epoch with sea level rise and climate change.</p> <p>Will continue to protect the backing flood risk areas and economic assets.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Inundation of low lying land seaward of retreated defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing habitats.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network over time.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Will continue to protect the backing flood risk areas and economic assets.</p>		
Scenario 4	Hold the Line	Hold the Line	No Active Intervention
	Earth embankment and rock revetment (>20 years) would remain.	Earth embankment and rock revetment would require maintenance, improvement and replacement during this epoch.	Defences are expected to fail within this period.
	<p>The channel of the Swale, between Kingsferry Bridge and Milton Creek is channel in form.</p> <p>Narrow Intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present. 'The Lillies' islands at the mouth of Milton Creek will continue to accrete. Larger areas of saltmarsh and mudflat along this frontage should continue to be stable.</p> <p>Maintenance of the current defence line will fix the</p>	<p>With sea level rise, tidal prism and tidal flows are assumed to increase, resulting in the potential for coastal squeeze of designated intertidal areas along constrained channels as defences constrain landward migration of habitat.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>In wider channel locations e.g. at the mouth of the Milton Creek, continued vertical saltmarsh growth is assumed as</p>	<p>Over this epoch, in the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in locations where the channel is wide.</p> <p>Failure of defences will be haphazard, resulting in uncontrolled flooding of low lying areas, freshwater habitats, economic assets and residential areas at Sittingbourne.</p> <p>It is assumed that failure of defences would eventually</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>channel in position and restrict natural channel processes.</p> <p>Will continue to protect the industrial assets, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>sediment supply is expected to meet demand within the estuary over this epoch.</p> <p>Channels will be fixed in position, restricting natural channel processes.</p> <p>Will continue to protect the industrial assets, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>result in the estuary channel significantly increasing in size as the shoreline realigns, moving the estuary towards the ideal form in an originally constrained section of the estuary.</p> <p>Inundation of low lying land and a continual supply of sediment would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing habitats. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>In the long term NAI will allow for the reassertion of natural meandering. Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>As sea levels rise, and as the estuary increases in width, it is assumed that tidal prism, flow speeds and erosion downstream and on outside of meanders will increase.</p> <p>If NAI occurs along the whole of the Swale (east of Kingsferry Bridge) the estuary would find a new equilibrium form, and in terms of width, the estuary would conform to an ideal form.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
MILTON CREEK TO FAVERSHAM CREEK (SOUTH BANK)			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Earth embankment and rock revetment (>20 years) would remain.	Earth embankment and rock revetment would require maintenance, improvement and replacement during this epoch.	Defences would require increased levels of maintenance, improvement and replacement with sea levels rise and the effects of climate change.
	<p>From Milton Creek to Faversham Creek the channel widens and has large areas of intertidal mudflat, but relatively small areas of saltmarsh, e.g. Fowley Island. The channel width is constant from Milton Creek towards the Isle of Harty, and then gets wider towards the eastern estuary mouth at Shell Ness.</p> <p>Large areas of former saltmarsh have been enclosed and reclaimed from the sea for agricultural use along this frontage.</p> <p>Intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present.</p> <p>Faversham Creek and 'The Lillies' islands at the mouth of Milton Creek are likely to continue to accrete. In other areas the channel is assumed to be stable.</p> <p>It is assumed that constrained channel areas would continue to experience erosion, e.g. where the channel narrows east of the mouth of Milton Creek and south west of the Isle of Harty.</p> <p>Will continue to protect the natural freshwater assets, economic, residential and agricultural assets and backing</p>	<p>With sea level rise, tidal prism and tidal flows are assumed to increase, resulting in the potential for coastal squeeze of designated intertidal areas along constrained channel sections (around Elmley Island and the Isle of Harty) as defences constrain landward migration of habitat.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>In wider channel locations continued vertical saltmarsh growth is assumed as sediment supply is expected to meet demand within the estuary over this epoch.</p> <p>Channels will be fixed in position, restricting natural channel processes.</p> <p>Will continue to protect the industrial assets, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>Over this epoch, in the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in locations where the channel is wide.</p> <p>It is assumed however, that with sea level rise, tidal prism and tidal flows will increase further. Constrained channels will therefore potentially become increasingly subject to coastal squeeze resulting in the erosion of designated intertidal habitats as defences constrain natural landward migration.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>Channels will be fixed in position, restricting natural channel processes.</p> <p>Will continue to protect the industrial assets, infrastructure, freshwater marshes and backing flood risk areas.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>flood risk areas.</p> <p>Detrimental impacts to environmental designations may occur, due to the potential for coastal squeeze of intertidal habitats and foreshore in constrained areas. Any designated habitat loss may need to be compensated for elsewhere.</p> <p>Maintenance of the current defence line will fix the channel in position and restrict natural channel processes.</p>		
Scenario 2	<p>Advance the Line</p> <p>Construct new defences seaward of the present defence line. Infill and reclaim land between the new and former defences.</p>	<p>Advance the Line</p> <p>Maintain the new defences.</p>	<p>Advance the Line</p> <p>Maintain, improve and upgrade advanced defences to allow for sea level rise.</p>
	<p>Advancing defences will narrow the channel further in already constrained locations (e.g. at Uplees). Narrowing the channel is expected to increase flow speeds through the channel and immediately downstream and therefore increase erosion of intertidal mudflat and saltmarsh areas.</p> <p>Where the channel is too wide at present (in the middle estuary), advancing the line is assumed to move the estuary towards a more ideal form and reduce tidal prism.</p> <p>Flood risk may be increased due to reduced channel capacity.</p> <p>There is potential to create new habitat landward of the</p>	<p>Flow speeds through the narrow channel will increase and erosion of intertidal areas and advanced defences are likely to be enhanced as sea levels rise. Consequently, it is assumed that the foreshore will narrow considerably in constrained locations.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>The advanced defence line will continue to fix the channel position and restrict natural channel processes.</p> <p>Flood protection to freshwater marshes, economic assets and backing flood risk areas will continue.</p>	<p>With sea level rise, tidal prism and tidal flows within the estuary are assumed to increase further.</p> <p>Fast tidal flows resulting from the additional narrowing of the channel by advancing the defence line are likely to be exacerbated further. It is assumed therefore that intertidal erosion would amplify in confined areas (essentially along the whole frontage).</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>The advanced defence line will continue to fix the channel position and restrict natural channel processes. Defences would however become increasingly susceptible to</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>defences or use land for development.</p> <p>Loss of intertidal habitat will result from seaward movement of defences. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Channels will be fixed in position by advancing the defence line, restricting natural channel processes.</p> <p>Will maintain flood protection to freshwater marshes, economic, residential and agricultural assets and backing flood risk areas.</p>		<p>erosion throughout this epoch.</p> <p>Flood protection to freshwater marshes, economic assets and backing flood risk areas will continue.</p>
Scenario 3	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.
	<p>Managed retreat along this section has the potential for inundation of significantly large areas of low lying land, dependant on the chosen line of retreat. This will, to a certain extent, also be dependent on the management policies adopted on the north bank of the Swale (i.e. a management policy of retreat to the south of Sheppey would increase estuary width further).</p> <p>Where the estuary is already wider than the ideal form (in the middle estuary), realignment will move the estuary away from its ideal form (especially with large scale retreat). Large scale realignment is likely to result in significant increases in tidal prism, flow speeds and</p>	<p>Downstream flow speeds are expected to increase as the tidal prism increases due to a wider estuary channel and as sea levels rise.</p> <p>Foreshore erosion is therefore likely to be exacerbated in confined channel locations and immediately downstream of the realignment.</p> <p>New habitat in realigned areas will become more established and new channels will become more defined.</p> <p>Will continue to protect the backing flood risk areas, economic, residential and agricultural assets.</p>	<p>Over this epoch, in the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in locations where the channel is wide.</p> <p>Habitats in realigned areas and new channels will be more established.</p> <p>Increased tidal prism and associated intertidal erosion, downstream and in confined areas will be exacerbated during this epoch with sea level rise and climate change.</p> <p>Will continue to protect the backing flood risk areas, economic, residential and agricultural assets.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>erosion immediately downstream and in confined areas (towards Faversham Creek).</p> <p>In areas which are narrower than the ideal form at present (e.g. at Uplees and near Milton Creek), realignment is expected to increase the estuary width moving it towards a more ideal form in these locations.</p> <p>Large scale retreat downstream, e.g. south of the Swale has the potential to increase tidal levels upstream in the estuary.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing freshwater habitats.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks over time.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Will continue to protect the backing flood risk areas, economic, residential and agricultural assets.</p>		
Scenario 4	Hold the Line	Hold the Line	No Active Intervention
	Earth embankment and rock revetment (>20 years) would remain.	Earth embankment and rock revetment would require maintenance, improvement and replacement during this	Defences are expected to fail within this period.

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
		epoch.	
	<p>From Milton Creek to Faversham Creek the channel widens and has large areas of intertidal mudflat, but relatively small areas of saltmarsh, e.g. Fowley Island. The channel width is constant from Milton Creek towards the Isle of Harty, and then gets wider towards the eastern estuary mouth at Shell Ness.</p> <p>Large areas of former saltmarsh have been enclosed and reclaimed from the sea for agricultural use along this frontage.</p> <p>Intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present. Faversham Creek and ‘The Lillies’ islands at the mouth of Milton Creek are likely to continue to accrete. In other areas the channel is assumed to be stable.</p> <p>It is assumed that constrained channel areas would continue to experience erosion, e.g. where the channel narrows east of the mouth of Milton Creek and south west of the Isle of Harty.</p> <p>Detrimental impacts to environmental designations may occur, due to the potential for coastal squeeze of intertidal habitats and foreshore in constrained areas. Any designated habitat loss may need to be compensated for elsewhere.</p> <p>Maintenance of the current defence line will fix the</p>	<p>With sea level rise, tidal prism and tidal flows are assumed to increase, resulting in the potential for coastal squeeze of designated intertidal areas along constrained channel sections (around Elmley Island and the Isle of Harty) as defences constrain landward migration of habitat. Any designated habitat loss may need to be compensated for elsewhere.</p> <p>In wider channel locations continued vertical saltmarsh growth is assumed as sediment supply is expected to meet demand within the estuary over this epoch.</p> <p>Channels will be fixed in position, restricting natural channel processes.</p> <p>Will continue to protect the industrial assets, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>Over this epoch, in the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in locations where the channel is wide.</p> <p>Failure of defences will be haphazard, resulting in uncontrolled flooding of extensive low lying areas and agricultural, residential and economic assets. Flooding would occur on every high tide.</p> <p>Failure of defences would result in the estuary channel increasing significantly in size as the shoreline realigns, moving the estuary away from its ideal form, where the channel was already wide, and towards the ideal form in constrained areas.</p> <p>Large scale inundation downstream, e.g. south of the Swale, has the potential to increase tidal levels upstream in the estuary.</p> <p>Inundation of low lying land and a continual supply of sediment would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing habitats. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>In the long term NAI will allow for the reassertion of</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>channel in position and restrict natural channel processes.</p> <p>Will continue to protect the natural freshwater assets, economic, residential and agricultural assets and backing flood risk areas.</p>		<p>natural meandering. Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>As sea levels rise, and as the estuary increases in width, it is assumed that tidal prism, flow speeds and erosion downstream and on outside of meanders will increase.</p> <p>If NAI occurs along the whole of the Swale (east of Kingsferry Bridge) the estuary would find a new equilibrium form, and in terms of width, the estuary would conform to an ideal form.</p>
Scenario 5	Managed Retreat	Managed Retreat	No Active Intervention
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	Defences are expected to fail within this period.
	<p>Managed retreat along this section has the potential for inundation of significantly large areas of low lying land. This will, to a certain extent, also be dependent on the management policies adopted on the north bank of the Swale (i.e. a management policy of retreat to the south of Sheppey would increase estuary width even further).</p> <p>Where the estuary is already wider than the ideal form (in the middle estuary), realignment will move the estuary away from its ideal form (especially with large scale retreat). Large scale realignment is likely to result in significant increases in tidal prism, flow speeds and</p>	<p>Downstream flow speeds are expected to increase as the tidal prism increases due to a wider estuary channel and as sea levels rise.</p> <p>Foreshore erosion is therefore likely to be exacerbated in confined channel locations and immediately downstream of the realignment.</p> <p>New habitat in realigned areas will become more established and new channels will become more defined.</p> <p>Will continue to protect the backing flood risk areas, economic, residential and agricultural assets.</p>	<p>Over this epoch, in the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in locations where the channel is wide.</p> <p>Failure of realigned defences will be haphazard, resulting in uncontrolled flooding of extensive low lying areas and agricultural, residential and economic assets. Flooding would occur on every high tide.</p> <p>Failure of realigned defences would result in the estuary channel increasing further in size as the shoreline realigns, again moving the estuary away further from its ideal form.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>erosion immediately downstream and in confined areas (towards Faversham Creek).</p> <p>In areas which are narrower than the ideal form at present (e.g. at Uplees and near Milton Creek), realignment is expected to increase the estuary width moving it towards a more ideal form in these locations.</p> <p>Large scale retreat downstream, e.g. south of the Swale, has the potential to increase tidal levels upstream in the estuary.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing freshwater habitats.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks over time.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Will continue to protect the backing flood risk areas, economic, residential and agricultural assets.</p>		<p>Inundation of low lying land and a continual supply of sediment could encourage the creation of new intertidal habitat in the realigned areas, at the expense of existing habitats. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>In the long term NAI will allow for the reassertion of natural meandering. Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>As sea levels rise, and as the estuary increases in width, it is assumed that tidal prism, flow speeds and erosion downstream and on outside of meanders will increase.</p> <p>If NAI occurs along the whole of the Swale (east of Kingsferry Bridge) the estuary would find a new equilibrium form, and in terms of width, the estuary would conform to an ideal form.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
Swale (north bank)			
SHELL NESS TO KINGSFERRY BRIDGE			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Earth embankments and revetments (<20 years) would require significant levels of maintenance, improvement and replacement during this period.	Earth embankments and revetments would require increased levels of maintenance, improvement and replacement within this epoch.	The combined effects of sea level rise and climate change would result in the increased need for maintenance, improvement and replacement of defences.
	<p>The channel of the Swale, between Shell Ness and Elmley Island is of a relatively constant width, with extensive areas of saltmarsh and intertidal mudflats along the southern shoreline of the Isle of Sheppey. The channel changes to a more fluvial form between Elmley Island and Kingsferry Bridge.</p> <p>The shell beach and spit at Shell Ness is assumed to continue to accrete as at present (analysis of historic maps indicates an approximate accretion rate of 4.3m/yr at present) assuming that a continual supply of sediment from offshore sources is available.</p> <p>Intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present where mudflat and saltmarsh accretion would be expected to continue between Shell Ness and the Isle of Harty. Along constrained channel frontages (e.g. between Elmley Hills and Kingsferry Bridge, and to the south west of the Isle of Harty), intertidal habitats are likely to experience</p>	<p>With sea level rise, tidal prism and tidal flows are assumed to increase, resulting in the potential for coastal squeeze of designated intertidal areas along constrained channel sections (around Elmley Island and the Isle of Harty) as defences constrain landward migration of habitat.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>In wider channel locations continued vertical saltmarsh growth is assumed, as sediment supply is expected to meet demand within the estuary over this epoch.</p> <p>The shell spit and beach at Shell Ness is expected to continue to accrete as long as a sediment supply was available.</p> <p>Channels will be fixed in position, restricting natural channel processes.</p> <p>Will continue to protect the freshwater marshes and backing flood risk areas.</p>	<p>Over this epoch, in the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in locations where the channel is wide.</p> <p>However, it is assumed that the supply of shells from the offshore source would decline as the bank becomes drowned as sea levels rise. It is therefore assumed that this will result in the spit and beach at Shell Ness narrowing and the spit becoming increasingly susceptible to breach. This would place increasing pressure on landward defences in this area, reduce the natural protection to the habitats behind and widen the eastern estuary mouth.</p> <p>This may result in a greater length of the southern shoreline of the Swale being likely to become increasingly susceptible to open coast conditions (i.e. increased erosion potential with climate change).</p> <p>Behaviour of these intertidal areas however, become subject to greater levels of uncertainty throughout this</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>increased erosion.</p> <p>Detrimental impacts to environmental designations may occur, due to the potential for coastal squeeze of intertidal habitats and foreshore in constrained areas. Any designated habitat loss may need to be compensated for elsewhere.</p> <p>Maintenance of the current defence line will fix the channel in position and restrict natural channel processes.</p> <p>Will continue to protect the freshwater marshes and backing flood risk areas.</p>		<p>epoch.</p> <p>It is also assumed, that with sea level rise, tidal prism and tidal flows will increase further. Constrained channels will therefore potentially become increasingly subject to coastal squeeze resulting in the erosion of designated intertidal habitats as defences constrain natural landward migration.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>Channels will be fixed in position, restricting natural channel processes.</p> <p>Will continue to protect the freshwater marshes and backing flood risk areas.</p>
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Infill and reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing defences will narrow the channel further in already constrained locations (e.g. around the Isle of Harty). Narrowing the channel is expected to increase flow speeds through the channel and immediately downstream and therefore increase erosion of intertidal mudflat and saltmarsh areas.</p> <p>Where the channel is too wide at present (at the eastern mouth and in the middle estuary), advancing the line is</p>	<p>Flow speeds through the narrow channel will increase, and erosion of intertidal areas and advanced defences are likely to be enhanced as sea levels rise. Consequently, it is assumed that the foreshore will narrow considerably in constrained locations.</p> <p>Loss of designated habitat may need to be compensated for elsewhere.</p> <p>The advanced defence line will continue to fix the channel</p>	<p>With sea level rise, tidal prism and tidal flows within the estuary are assumed to increase further.</p> <p>Fast tidal flows resulting from the additional narrowing of the channel by advancing the defence line are likely to be exacerbated further. It is assumed therefore that intertidal erosion would amplify in confined areas (essentially along the whole frontage).</p> <p>Loss of designated habitat may need to be compensated</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>assumed to move the estuary towards a more ideal form and reduce tidal prism.</p> <p>Flood risk may be increased due to reduced channel capacity.</p> <p>There is potential to create new habitat landward of the defences or use land for development.</p> <p>Loss of intertidal habitat will result from seaward movement of defences. Loss of designated habitat may need to be compensated for elsewhere.</p> <p>Channels will be fixed in position by advancing the defence line, restricting natural channel processes.</p> <p>Will maintain flood protection to freshwater marshes and backing flood risk areas.</p>	<p>position and restrict natural channel processes.</p> <p>Flood protection to freshwater marshes and backing flood risk areas will continue.</p>	<p>for elsewhere.</p> <p>The advanced defence line will continue to fix the channel position and restrict natural channel processes. Defences would however become increasingly susceptible to erosion throughout this epoch.</p> <p>Flood protection to freshwater marshes, economic assets and backing flood risk areas will continue.</p>
Scenario 3	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.
	<p>Managed retreat along this section has the potential for inundation of significantly large areas of low lying land, dependant on the chosen line of retreat. This will, to a certain extent, also be dependent on the management policies adopted on the south bank of the Swale (i.e. a management policy of retreat to the south of the Swale would increase estuary width further).</p> <p>Secondary defences already exist in some places so</p>	<p>The shell spit and beach at Shell Ness would continue to accrete as long as a sediment supply was available.</p> <p>Downstream flow speeds are expected to increase as the tidal prism increases due to an increased intertidal area and as sea levels rise.</p> <p>Foreshore erosion is therefore likely to be exacerbated in confined channel locations and immediately downstream of the realignment (around Elmley Island and the Isle of Harty).</p>	<p>Over this epoch, in the Swale, sediment supply is predicted to be sufficient to continue accretion patterns in locations where the channel is wide.</p> <p>With sea level rise, however, it is assumed that sediment supply from the offshore shell source would decline as it becomes drowned, resulting in the spit and beach at Shell Ness narrowing.</p> <p>Realigned defences would potentially allow the spit to</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>costs of new defences may be minimised.</p> <p>The beach and shell spit at Shell Ness are assumed to continue to accrete.</p> <p>The line of realignment will determine whether the option will have a positive or negative effect on the estuary, for example where the estuary is already wider than the ideal form (in the middle estuary and at Shell Ness), realignment will move the estuary away from its ideal form (especially with large scale retreat). Large scale realignment is likely to result in significant increases in tidal prism, flow speeds and erosion immediately downstream and in confined areas (south west of the Isle of Harty and north of Elmley Island to Kingsferry Bridge). Large scale retreat downstream, e.g. north of the Swale, also has the potential to increase tidal levels upstream in the estuary.</p> <p>However, in areas which are narrower than the ideal form at present (e.g. around the Isle of Harty and Elmley Hills), realignment is expected to increase the estuary width moving it towards a more ideal form in these locations.</p> <p>Realignment may create a second mouth to the Swale around the Isle of Harty (dependant on the adopted policy on the open coast south of Leysdown-on-Sea) and a second channel around Elmley Island. These new channels would essentially widen the narrow sections of</p>	<p>New habitat in realigned areas will become more established and new channels will become more defined.</p> <p>Will maintain flood protection to some freshwater marshes and backing flood risk areas.</p>	<p>eventually breach and migrate landwards naturally. The decline of the spit is likely to reduce natural protection to the habitats behind and would widen the eastern Swale mouth.</p> <p>The widening of the mouth is likely to result in a greater length of the southern shoreline of the Swale becoming increasingly susceptible to open coast conditions (i.e. increased erosion potential with climate change).</p> <p>Habitats in realigned areas and new channels will be more established.</p> <p>Increased tidal prism and associated intertidal erosion, downstream and in confined areas will be exacerbated during this epoch with sea level rise and climate change.</p> <p>Will maintain flood protection to some freshwater marshes and backing flood risk areas.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>channel, moving the estuary towards a more ideal form.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing freshwater habitats.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks over time.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Will maintain flood protection to some freshwater marshes and backing flood risk areas.</p>		
Scenario 4	Hold the Line	Hold the Line	No Active Intervention
	Earth embankments and revetments (<20 years) would require significant levels of maintenance, improvement and replacement during this period.	Earth embankments and revetments would require increased levels of maintenance, improvement and replacement within this epoch.	No formal defences exist around the high land around the Isle of Harty. Earth embankments, revetments and groynes (<20 years) will fail during this period.
	<p>The channel of the Swale, between Shell Ness and Elmley Island is of a relatively constant width, with extensive areas of saltmarsh and intertidal mudflats along the southern shoreline of the Isle of Sheppey. The channel changes to a more fluvial form between Elmley Island and Kingsferry Bridge.</p>	<p>With sea level rise, tidal prism and tidal flows are assumed to increase, resulting in the potential for coastal squeeze of designated intertidal areas along constrained channel sections (around Elmley Island and the Isle of Harty) as defences constrain landward migration of habitat.</p> <p>Any designated habitat loss may need to be compensated</p>	<p>The eventual failure of groynes along this frontage may allow greater rates of long shore transport, As a result the beach may begin to narrow (assuming a reduced supply of sediment from the offshore bank as it drowns under sea level rise) and the tip of the spit would recurve landwards. Landward rollover of the beach is likely to</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>The shell beach and spit at Shell Ness is assumed to continue to accrete as at present (analysis of historic maps indicates an approximate accretion rate of 4.3m/yr at present) assuming that a continual supply of sediment from offshore sources is available.</p> <p>Intertidal mudflat and saltmarsh areas in front of defences are assumed to continue to respond as at present where mudflat and saltmarsh accretion would be expected to continue between Shell Ness and the Isle of Harty. Along constrained channel frontages (e.g. between Elmley Hills and Kingsferry Bridge, and to the south west of the Isle of Harty), intertidal habitats are likely to experience increased erosion.</p> <p>Detrimental impacts to environmental designations may occur, due to the potential for coastal squeeze of intertidal habitats and foreshore in constrained areas. Any designated habitat loss may need to be compensated for elsewhere.</p> <p>Maintenance of the current defence line will fix the channel in position and restrict natural channel processes.</p> <p>Will continue to protect the freshwater marshes and backing flood risk areas.</p>	<p>for elsewhere.</p> <p>In wider channel locations continued vertical saltmarsh growth is assumed, as sediment supply is expected to meet demand within the estuary over this epoch.</p> <p>The shell spit and beach at Shell Ness is expected to continue to accrete as long as a sediment supply was available.</p> <p>Channels will be fixed in position, restricting natural channel processes.</p> <p>Will continue to protect the freshwater marshes and backing flood risk areas.</p>	<p>occur in exposed locations, as backing defences fail and wave energy levels increase.</p> <p>Decline of the spit is assumed to reduce natural protection to the habitats behind and widen the eastern Swale mouth, rendering greater areas of the south shore of the Swale more exposed.</p> <p>Failure of other defences will be haphazard, resulting in uncontrolled flooding of freshwater marshes, and extensive low lying areas. A new channel may form around Elmley Island.</p> <p>The existence of secondary defences however, may restrict the area inundated, e.g. towards the south east of Sheppey, counterwalls and secondary defences are assumed to contain inundation.</p> <p>These secondary defences are likely to fail towards the end of this epoch. The flooding of low lying land behind these defences may potentially create a new channel of the Swale, separating the Isle of Harty from the Isle of Sheppey. This channel may connect with the open coast north of Shell Ness, creating a third mouth to the Swale (dependent on the adopted policy on the open coast for north Sheppey, this may cause significant impacts to assets at Leysdown-on Sea).</p> <p>Large scale inundation downstream, e.g. north of the Swale, has the potential to increase tidal levels upstream</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
			<p>in the estuary.</p> <p>In areas backed by high land, for example the London Clay Islands around Elmley Hills and the Isle of Harty, defence failure would result in low rates of erosion (approximately 0.5m/yr) governed by the channel and tidal flows.</p> <p>In the long term NAI will allow for the reassertion of natural meandering. Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Failure of defences would result in the estuary channel increasing in size as the shoreline realigns, moving the estuary away from its ideal form, where the channel was already wide, and towards the ideal form in constrained areas.</p> <p>Inundation of low lying land and a predicted continual supply of sediment to the Swale would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing habitats. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>As sea levels rise, and as the estuary increases in width,</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
			it is assumed that tidal prism, flow speeds and erosion downstream and on outside of meanders will increase. If NAI occurs along the whole of the Swale (east of Kingsferry Bridge) the estuary would find a new equilibrium form, and in terms of width, the estuary would conform to an ideal form.
Scenario 5	Managed Retreat	Managed Retreat	No Active Intervention
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	No formal defences exist around the high land around the Isle of Harty. Defences will fail during this period.
	<p>Managed retreat along this section has the potential for inundation of significantly large areas of low lying land, dependant on the chosen line of retreat. This will, to a certain extent, also be dependent on the management policies adopted on the south bank of the Swale (i.e. a management policy of retreat to the south of the Swale would increase estuary width even further).</p> <p>Secondary defences already exist in some places so costs of new defences may be minimised.</p> <p>The beach and shell spit at Shell Ness are assumed to continue to accrete.</p> <p>The line of realignment will determine whether the option will have a positive or negative effect on the estuary, for example where the estuary is already wider than the ideal form (in the middle estuary and at Shell Ness),</p>	<p>The shell spit and beach at Shell Ness would continue to accrete as long as a sediment supply was available.</p> <p>Downstream flow speeds are expected to increase as the tidal prism increases due to an increased intertidal area and as sea levels rise.</p> <p>Foreshore erosion is therefore likely to be exacerbated in confined channel locations and immediately downstream of the realignment (around Elmley Island and the Isle of Harty).</p> <p>New habitat in realigned areas will become more established and new channels will become more defined.</p> <p>Will maintain flood protection to some freshwater marshes and backing flood risk areas.</p>	<p>The eventual failure of groynes along this frontage may allow greater rates of long shore transport, As a result the beach may begin to narrow (assuming a reduced supply of sediment from the offshore bank as it drowns under sea level rise) and the tip of the spit would recurve landwards. Landward rollover of the beach is likely to occur in exposed locations, as backing defences fail and wave energy levels increase.</p> <p>Decline of the spit is assumed to reduce natural protection to the habitats behind and widen the eastern Swale mouth, rendering greater areas of the south shore of the Swale more exposed.</p> <p>Failure of realigned defences will be haphazard, resulting in uncontrolled flooding of backing low lying areas.</p> <p>In areas backed by high land, for example the London</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>realignment will move the estuary away from its ideal form (especially with large scale retreat). Large scale realignment is likely to result in significant increases in tidal prism, flow speeds and erosion immediately downstream and in confined areas (south west of the Isle of Harty and north of Elmley Island to Kingsferry Bridge). Large scale retreat downstream, e.g. north of the Swale, also has the potential to increase tidal levels upstream in the estuary.</p> <p>In areas which are narrower than the ideal form at present (e.g. around the Isle of Harty and Elmley Hills), realignment is expected to increase the estuary width moving it towards a more ideal form in these locations. Realignment may create a second mouth to the Swale around the Isle of Harty (dependant on the adopted policy on the open coast south of Leysdown-on-Sea) and a second channel around Elmley Island. These new channels would essentially widen the narrow sections of channel, moving the estuary towards a more ideal form.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing freshwater habitats.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p>		<p>Clay Islands around Elmley Hills and the Isle of Harty, defence failure would potentially result in low rates of erosion (approximately 0.5m/yr) governed by the channel and tidal flows.</p> <p>In the long term NAI will allow for the reassertion of natural meandering. Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Failure of defences would result in the estuary channel increasing in size further, moving the estuary further away from its ideal form.</p> <p>Inundation of low lying land and a predicted continual supply of sediment to the Swale could encourage the creation of new intertidal habitat in the realigned areas, at the expense of existing habitats. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>As sea levels rise, and as the estuary increases further in width, it is assumed that tidal prism, flow speeds and erosion downstream and on outside of meanders will increase.</p> <p>If NAI occurs along the whole of the Swale (east of</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks over time.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Will maintain flood protection to some freshwater marshes and backing flood risk areas.</p>		<p>Kingsferry Bridge) the estuary would find a new equilibrium form, and in terms of width, the estuary would conform to an ideal form.</p>
KINGSFERRY BRIDGE TO RUSHENDEN			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Earth embankments and seawall (<20 years) would require maintenance, improvement and capital works within this period.	Defences would need to be maintained, improved and replaced within this epoch.	Increasing levels of maintenance, improvement and replacement will be required due to sea level rise and the effects of climate change.
	<p>The channel of the Swale, between the Kingsferry Bridge and Rushenden, is fluvial in form.</p> <p>Over this epoch, erosion of intertidal areas is expected to continue along the confined channel which in turn would put pressure on and increase undermining of defences in this area.</p> <p>The maintenance of the current defence line will fix the channel in position and restrict natural channel processes.</p> <p>Will continue to protect the economic assets at Rushenden, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>It is assumed that the combined effects of sea level rise and climate change would potentially increase tidal prism, tidal flows and intertidal mudflat and marsh erosion in confined areas of channel.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>The maintenance of the current defence line will fix the channel in position and restrict natural channel processes.</p> <p>Will continue to protect the economic assets at Rushenden, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>With sea level rise, tidal prism is expected to increase, along with tidal flows and the potential for further erosion of intertidal habitats and defences, resulting in a detrimental impact on environmentally designated habitats.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>The maintenance of the current defence line will fix the channel in position and restrict natural channel processes.</p> <p>Will continue to protect the economic assets at Rushenden, infrastructure, freshwater marshes and backing flood risk areas.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Infill and reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing the defence line will narrow the channel further in an already constrained section of channel. This will potentially move the Swale channel away from its ideal form, increase flow speeds and the potential for erosion downstream. Flood risk may be increased due to a reduced channel capacity.</p> <p>There is potential to create new habitat landward of the defences or use the reclaimed land for development. This however would develop over existing environmentally designated habitats. Designated habitat loss may need to be compensated for elsewhere.</p> <p>The shoreline will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will maintain flood and erosion protection to Rushenden, infrastructure, freshwater marshes and low lying flood risk areas.</p>	<p>Any new habitat landward of defences will become more established.</p> <p>It is assumed that with sea level rise, tidal prism within the estuary will increase, in turn increasing flow speeds in the main channel and therefore increasing the erosion potential in environmentally designated intertidal areas.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Flow speeds through the narrow channel of the Swale are likely to increase and erosion of intertidal areas and defences will be enhanced. Hence, safe navigation of maritime traffic may become compromised due to the increased flow speeds through this channel.</p> <p>The shoreline will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will maintain flood and erosion protection to Rushenden, infrastructure, freshwater marshes and low lying flood risk areas.</p>	<p>It is assumed that with sea level rise, tidal prism within the estuary will increase, resulting in exacerbated erosion of constrained intertidal areas.</p> <p>Fast tidal flows resulting from the additional narrowing of the channel are assumed to be exacerbated further.</p> <p>Mudflat erosion would be amplified in these confined areas. Resulting in complete foreshore loss in places and potential deepening of the main channel.</p> <p>Consequently defences would become increasingly susceptible to undermining in these locations.</p> <p>Safe navigation of maritime traffic may be compromised further.</p> <p>Habitat will be established landward of the defences.</p> <p>The shoreline will be fixed in position, restricting natural estuary processes.</p> <p>Advancing defence lines will maintain flood and erosion protection to Rushenden, infrastructure, freshwater marshes and low lying flood risk areas.</p>
Scenario 3	Managed Retreat	Managed Retreat	Managed Retreat
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this	New landward defences would require maintenance, improvement and / or eventual replacement during

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
		epoch.	this epoch.
	<p>Removal or relocation of infrastructure and economic assets may be required, dependant on the chosen line of retreat.</p> <p>Managed retreat along this section has the potential for inundation of a large area of low lying land adjacent to the Kingsferry Bridge.</p> <p>Retreat along the Swale frontage will increase estuary width in a narrow section of the estuary, moving it towards a more ideal form. This will, to a certain extent, also be dependent on the management policies adopted in the Medway, at Chetney Marshes (i.e. a management policy of retreat on Chetney Marshes would increase estuary width even further and therefore move the estuary away from the ideal form).</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Resulting increases in tidal prism are likely to increase tidal flows and the potential for increased erosion in confined areas immediately downstream (i.e. towards Queenborough).</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing freshwater habitats.</p>	<p>Habitat in realigned areas will become more established throughout this epoch and new channels and creeks will become more defined.</p> <p>Downstream flow speeds are expected to increase as the tidal prism increases due to a wider estuary channel and as sea levels rise. Foreshore erosion is assumed therefore to be exacerbated towards the estuary mouth at Sheerness.</p> <p>Will continue to protect the economic assets at Rushenden, infrastructure and backing flood risk areas.</p>	<p>Sea level rise and a wider estuary are likely to exacerbate increases in tidal prism, flow speeds and erosion in confined areas downstream (at the estuary mouth at Sheerness).</p> <p>New habitats will be established in realigned areas.</p> <p>Economic and residential assets at Rushenden, infrastructure and low lying flood risk areas will remain protected.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks over time.</p> <p>Will continue to protect the economic assets at Rushenden, infrastructure and backing flood risk areas.</p>		
Scenario 4	Hold the Line	Hold the Line	No Active Intervention
	Earth embankments and seawall (<20 years) would require maintenance, improvement and capital works within this period.	Defences would need to be maintained, improved and replaced within this epoch.	Earth embankments, seawalls and quay walls (<20 years) are expected to fail during this period.
	<p>The channel of the Swale, between the Kingsferry Bridge and Rushenden, is fluvial in form.</p> <p>Over this epoch, erosion of intertidal areas is expected to continue along the confined channel which in turn would put pressure on and increase undermining of defences in this area.</p> <p>The maintenance of the current defence line will fix the channel in position and restrict natural channel processes.</p> <p>Will continue to protect the economic assets at Rushenden, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>It is assumed that the combined effects of sea level rise and climate change would potentially increase tidal prism, tidal flows and intertidal mudflat and marsh erosion in confined areas of channel.</p> <p>Any designated habitat loss may need to be compensated for elsewhere.</p> <p>The maintenance of the current defence line will fix the channel in position and restrict natural channel processes.</p> <p>Will continue to protect the economic assets at Rushenden, infrastructure, freshwater marshes and backing flood risk areas.</p>	<p>Failure of defences will be haphazard during this epoch resulting in uncontrolled flooding of low lying areas and to infrastructure and residential assets at Rushenden.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>High land at the Rushenden Disposal Tip is likely to begin to suffer low rates of erosion (approximately <0.5m/yr), releasing potentially contaminated sediment into the estuary.</p> <p>In low lying areas, sporadic defence failure will create new transitional and intertidal habitats within the realigned areas. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
			<p>Release of sediment may potentially act to reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>It is assumed that eventual complete failure of defences will result in the estuary channel increasing in size as the shoreline realigns, moving the estuary towards a more ideal form at this location.</p> <p>Tidal prism and tidal flows are expected to increase as the Swale channel widens and sea levels rise. This will allow the reassertion of natural meandering.</p> <p>Potential for increased downstream erosion (at the mouth of the Medway), and erosion on the outside of meanders, is likely to occur as tidal flow speeds increase.</p>
Scenario 5	Managed Retreat	Managed Retreat	No Active Intervention
	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.	Defences are expected to fail during this period.
	<p>Removal or relocation of infrastructure and economic assets may be required, dependant on the chosen line of retreat.</p> <p>Managed retreat along this section has the potential for inundation of a large area of low lying land adjacent to the Kingsferry Bridge.</p> <p>Retreat along the Swale frontage will increase estuary width in a narrow section of the estuary, moving it</p>	<p>Habitat in realigned areas will become more established throughout this epoch and new channels and creeks will become more defined.</p> <p>Downstream flow speeds are expected to increase as the tidal prism increases due to a wider estuary channel and as sea levels rise. Foreshore erosion is assumed therefore to be exacerbated towards the estuary mouth at Sheerness.</p> <p>Will continue to protect the economic assets at Rushenden,</p>	<p>Failure of realigned defences will be haphazard during this epoch resulting in uncontrolled flooding of low lying areas and to infrastructure and residential assets at Rushenden.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>High land at the Rushenden Disposal Tip is likely to begin to suffer low rates of erosion (approximately <0.5m/yr),</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	<p>towards a more ideal form. This will, to a certain extent, also be dependent on the management policies adopted in the Medway, at Chetney Marshes (i.e. a management policy of retreat on Chetney Marshes would increase estuary width even further and therefore move the estuary away from the ideal form).</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary. Resulting increases in tidal prism are likely to increase tidal flows and the potential for increased erosion in confined areas immediately downstream (i.e. towards Queenborough).</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing freshwater habitats.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks over time.</p> <p>Will continue to protect the economic assets at Rushenden, infrastructure and backing flood risk areas.</p>	<p>infrastructure and backing flood risk areas.</p>	<p>releasing potentially contaminated sediment into the estuary.</p> <p>In low lying areas, sporadic defence failure may create new transitional and intertidal habitats within the realigned areas. Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of existing creek networks.</p> <p>Release of sediment may potentially act to reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>It is assumed that eventual complete failure of defences will result in the estuary channel increasing further in size as the shoreline realigns, moving the estuary away from the ideal form at this location.</p> <p>Tidal prism and tidal flows are expected to increase as the Swale channel widens further and sea levels rise. This will allow the reassertion of natural meandering. Potential for increased downstream erosion (at the mouth of the Medway), and erosion on the outside of meanders, is likely to occur as tidal flow speeds increase.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
RUSHENDEN TO SHEERNESS			
Scenario 1	Hold the Line	Hold the Line	Hold the Line
	Earth embankments and seawall (<20 years) would require maintenance, improvement and capital works within this period.	Defences would need to be maintained, improved and replaced within this epoch.	Increasing levels of maintenance, improvement and replacement will be required due to sea level rise and the effects of climate change.
	<p>The channel of the Swale, between Rushenden and the second mouth of the Swale north of Queenborough, is fluvial in form.</p> <p>The mouth of the Medway estuary at Sheerness is constrained in width compared to the middle estuary. Intertidal areas in the more confined channel areas around the Medway estuary mouth are assumed to continue to erode, as at present. Consequently defences are likely to become increasingly susceptible to erosion in this location.</p> <p>The channel of the Swale near to its second mouth at Queenborough, is assumed to continue to be stable over this period.</p> <p>Maintaining the current defence line would fix the channel positions, restricting natural channel processes.</p> <p>Economic, residential and heritage assets along the frontage and backing flood risk areas will continue to be protected.</p>	<p>There is assumed to be an increased potential for mudflat erosion in confined areas of the estuary channel, i.e. at the Medway estuary mouth at Sheerness and the Swale’s second mouth at Queenborough, resulting from faster flows through these restricted channels, due to the combined effects of sea level rise and climate change.</p> <p>Potential for coastal squeeze and detrimental impacts on environmentally designated habitats around Queenborough and Rushenden may result.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the channel positions, restricting natural channel processes.</p> <p>Economic, residential and heritage assets along the frontage and backing flood risk areas will continue to be protected.</p>	<p>With sea level rise, tidal prisms are expected to increase, resulting in faster flows through the confined channels and increased potential of erosion of intertidal areas and defences.</p> <p>Increased potential for coastal squeeze and detrimental impacts on environmentally designated habitats around Queenborough and Rushenden may result.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Maintaining the current defence line would fix the channel positions, restricting natural channel processes.</p> <p>Economic, residential and heritage assets along the frontage and backing flood risk areas will continue to be protected.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
Scenario 2	Advance the Line	Advance the Line	Advance the Line
	Construct new defences seaward of the present defence line. Infill and reclaim land between the new and former defences.	Maintain the new defences.	Maintain, improve and upgrade advanced defences to allow for sea level rise.
	<p>Advancing the defence line will narrow the channel further in an already constrained location, moving the estuary away from its ideal form. Consequently flow speeds through the constriction are likely to increase and erosion of present intertidal areas enhanced. Flood risk may be increased due to a reduced channel capacity.</p> <p>There is potential to create new habitat landward of the defences or use land for development. Detrimental environmental impacts will occur with the loss of designated habitat north of Queenborough. Any loss of designated habitat may need to be compensated for elsewhere.</p> <p>The channel will be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to Sheerness's economic, residential and heritage assets and infrastructure will be maintained.</p>	<p>Any new habitat landward of defences will become more established.</p> <p>It is assumed that with sea level rise, tidal prism within the estuary will increase, in turn increasing flow speeds in the main channel and therefore increasing the erosion potential of intertidal habitats and undermining of defences. Flood risk may be increased due to a reduced channel capacity.</p> <p>Designated habitat loss may need to be compensated for elsewhere.</p> <p>Safe navigation of maritime traffic may become compromised due to the increased flow speeds through the channels.</p> <p>The shoreline will be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to Sheerness's economic, residential and heritage assets and infrastructure will be maintained.</p>	<p>It is assumed that with sea level rise, tidal prism within the estuary is expected to increase, resulting in exacerbated erosion of constrained intertidal areas. Flood risk may be increased due to a reduced channel capacity.</p> <p>Fast tidal flows resulting from the additional narrowing of the channel are assumed to be exacerbated further.</p> <p>Mudflat erosion would be amplified in these confined areas. Resulting in complete foreshore loss in places and potential deepening of the main channel.</p> <p>Consequently defences would become increasingly susceptible to undermining in these locations.</p> <p>Safe navigation of maritime traffic may be compromised further.</p> <p>Habitat will be established landward of the defences.</p> <p>The shoreline will be fixed in position, restricting natural estuary processes.</p> <p>Flood and erosion protection to Sheerness's economic, residential and heritage assets and infrastructure will be maintained.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
Scenario 3 (Immediately north of Queenborough ONLY)	Hold the Line (Immediately north of Queenborough ONLY)	Managed Retreat (Immediately north of Queenborough ONLY)	Managed Retreat (Immediately north of Queenborough ONLY)
	Earth embankments and seawall (<20 years) would require maintenance, improvement and capital works within this period.	New defences will need to be constructed landwards of the present defences.	New landward defences would require maintenance, improvement and / or eventual replacement during this epoch.
	<p>The channel of the Swale, between Rushenden and the second mouth of the Swale north of Queenborough, is fluvial in form.</p> <p>The mouth of the Medway estuary at Sheerness is constrained in width compared to the middle estuary. Intertidal areas in the more confined channel areas around the Medway estuary mouth are assumed to continue to erode, as at present. Consequently defences are likely to become increasingly susceptible to erosion in this location.</p> <p>The channel of the Swale near to its second mouth at Queenborough, is assumed to continue to be stable over this period.</p> <p>Maintaining the current defence line would fix the channel positions, restricting natural channel processes.</p> <p>Economic, residential and heritage assets along the frontage and backing flood risk areas will continue to be protected.</p> <p>Removal or relocation of infrastructure and economic assets will be required to prepare for managed retreat in</p>	<p>Retreat of defences in this section would require the removal or result in the loss of commercial assets.</p> <p>Inundation of low lying land seaward of the new defences would encourage the creation of new intertidal habitat in the realigned areas, which would develop over existing habitat.</p> <p>Any loss of designated habitat may need to be compensated for elsewhere.</p> <p>Flows into and out of these new intertidal areas are likely to create new channels or result in the expansion of the existing creek network over time.</p> <p>Realignment of the estuary will potentially increase the estuary width which is narrower than the ideal form at present in this location.</p> <p>A second channel of the Medway could be created, extending between north of Queenborough and east of Sheerness, connecting the Medway with the open coast.</p> <p>This will effectively increase the width of the estuary mouth, moving it towards a more ideal form. This however would be dependant on a managed retreat policy being adopted on the open coast between Sheerness and Scrapesgate, on</p>	<p>Downstream flow speeds are assumed to increase as the tidal prism increases due an extra estuary mouth and as sea levels rise.</p> <p>During this epoch, foreshore erosion is likely to be exacerbated towards the estuary mouth at Sheerness and the new channel mouth, east of Sheerness.</p> <p>Habitat in realigned areas will become more established throughout this epoch and new channels will become more defined.</p> <p>Economic, residential and heritage assets at Sheerness and Queenborough would continue to be protected.</p>

	Predicted Change For		
	Years 0 – 20 (up to 2025)	Years 20 – 50 (up to 2055)	Years 50 – 100 (up to 2105)
	the next epoch.	<p>the north of Sheppey.</p> <p>Release of sediment may potentially reduce erosion rates or increase rates of accretion elsewhere in the estuary.</p> <p>Resulting increases in tidal prism are assumed to increase tidal flows and the potential for increased erosion in confined areas immediately downstream (i.e. the Medway mouth between Sheerness and the Isle of Grain). However a new mouth east of Sheerness could potentially help accommodate these flows.</p> <p>Economic, residential and heritage assets at Sheerness and Queenborough would continue to be protected.</p>	