Suffolk SMP2 Sub-cell 3c

Policy Development Zone 5 – Thorpeness to Orford Ness

Suffolk Coastal District Council/Waveney District Council/Environment Agency

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Version 9

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Baseline Location Map

Policy Development Zone 5 - Thorpeness to Orford Ness

Key:

- Anticipated 100 Year Shoreline with Present Management
- Policy Development Zones
- Management Areas
- Policy Units
- NNR
- SSSI
- Existing Indicative EA Flood Risk Zone
- SPA
- RAMSAR
- SAC
- Scheduled Monuments

ROYAL HASKONING

I:\9S4195\Technical_Data\GIS\Projects\Figures\Policy Development Zones\With Present Management

4.5.1 OVERVIEW

PRINCIPAL FEATURES

Built Environment:

The zone includes the important regional centre of Aldeburgh, the village of Thorpeness to the north and the significant areas of farmland within the estuary valley, with the agricultural industry being a major component of the economy. The River Alde becomes the River Ore just upstream of Orford and is thereafter commonly known as the Alde/Ore Estuary. The main coastal road between Aldeburgh and Thorpeness runs just to the back of the coast. To the south at Orford Ness is an operational Lighthouse. Snape Maltings is at the head of the Alde/Ore estuary and the village of Orford is eight kilometres upstream of the mouth.

Heritage and Amenity:

Aldeburgh and Orford are the most substantial historic settlements in this area, with significant scheduled monuments and listed buildings. There are extensive areas of historic reclaimed marshland. Slaughden Martello Tower is a scheduled monument of unique design and Orfordness has significant 20th century military establishments. The whole area is culturally important to the region, with Orford Castle and Snape Maltings Concert Hall, and the importance of beach use and water sports within the estuary. The yachting centre at Slaughden is one of the most important in the area. The beach is used by fishermen for boat launching and this activity is an important feature of the character of the town.

Nature Conservation:

The Alde/Ore Estuary together with the shingle ness is designated as a Ramsar site. This area is also part of the Orfordness-Shingle Street SAC and is covered by SPA designation (the SPA extending beyond the former designations) as the Sandlings SPA at the head of the estuary and inland of the low lying land behind Thorpeness around the valley of the Hundred River. Most of the area north of Aldeburgh is an SSSI, part of the Leiston-Aldeburgh designations. The whole coast lies within the Suffolk Coast and Heaths AONB.

STAKEHOLDER OBJECTIVES

- To maintain in a sustainable manner Aldeburgh as a viable commercial and tourism centre, recognising its cultural and heritage value;
- To maintain in a sustainable manner Thorpeness as a viable coastal settlement and tourist destination, recognising its cultural and heritage significance;
- To maintain a range of recreational activities along the foreshore and within the estuary, including sailing and navigational access;
- To maintain Orfordness as a designated site of international and European importance;
- To support the adaptation of local coastal communities;
- To support the adaptation of the local coastal farming communities;
- To maintain biological and geological features in a favourable condition, subject to natural change, and in the context of a dynamic coastal environment;
- To support appropriate ecological adaptation of habitats;
- To promote ways to maintain access to and along the coastal path; and
- To maintain or enhance the high quality landscape.

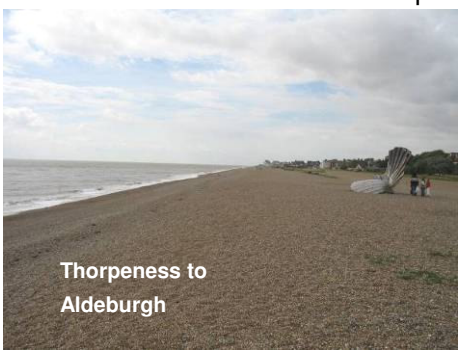
DESCRIPTION


General topography and bathymetry of the zone

The zone includes the main section of Thorpeness village and extends to the main ness feature of Orfordness to the south of the Lighthouse.

The zone covers two distinct areas. To the north is the section including the headland of Thorpeness and the high ground at Aldeburgh, with the valley of the Hundred River and low lying area situated behind the shingle bank at the back of the foreshore. The nearshore area of this section is relatively shallow, sloping out to the 10m Chart Datum contour some 1km offshore. The shingle backed bay forms a shallow curve from Thorpeness to Aldeburgh where it is aligned north-south.

This bank is quite substantial with an extensive back face and shallow front slope. During the 1953 storm it was not fully breached, although overtopped with local fans of sediment distributed behind. To the north end of the ridge and situated to the back of a slightly steeper front face profile is a row of properties extending some 800m along the shoreline. These form the extension of Thorpeness village along Thorpeness Haven. There is an access to the beach to the north of these properties and just inland is the Meare, an area of open fresh water.


Thorpeness to Aldeburgh

It was just to the south of the properties that the most northern of the 1953 shingle fans developed. Evidence of the fans can be seen along the frontage cutting across the road that runs behind the shingle ridge. The road is at a level of approximately 4m AOD with the general scrub grazing land beyond lying lower at some 2m AOD. The drainage of the land is by gravity through the outfall which cuts beneath the shingle bank. The outfall slightly influences the shape of the coast into two sub-bays at low water within the larger sweep of the main bay.


Aldeburgh Frontage

The shingle ridge runs south into the progressively more forward line of properties making up the sea front of Aldeburgh. At the southern end of Aldeburgh this line of properties and the seawall fronting them is actually exposed to the active front beach face. Further north the line runs some considerable distance behind the beach face with a wide expanse of flat shingle berm between. This berm is used by fishermen to store boats and fishing gear. The whole

frontage has in the past been groyned, demonstrating that in the last century there were occasions when this shingle was not present., In the past, Aldeburgh apparently lost some five rows of properties forward of the current line. The current width of shingle is around 60m. Buildings such as the War Memorial and the RNLI station protrude slightly over the back beach area.

The second section of the zone comprises Orfordness, extending some 7.5km south of Aldeburgh. The point of the ness is marked by the Lighthouse. At the north of this section at Slaughden is a narrow neck of land only 50m to 75m wide, separating the coast from the estuary. On the estuary side are houses and the slipways and quays of the sailing club. The estuary at the Slaughden bend in the river has extensive mooring areas. To the north of the sailing club, following the bend of the river and directly behind the town, are the Aldeburgh Marshes. Across from the sailing club is the northern end of the Sudbourne Marshes, extending some 6.5km to Orford village. These two marshes are defended by embankments. Further upstream, behind the Sudbourne ridge of high ground, are the extensive Iken Marshes with the smaller Hazelwood Marsh to the northern side.


Martello Tower at Slaughden

The Slaughden Martello Tower sits on the narrow neck of land between sea and estuary. The seaward face of this neck is heavily defended by rock and timber groynes, and by a concrete seawall. The only land access to the tower and on to the ness itself is along the track from Aldeburgh, initially along the ridge and then to the estuary side of the ridge.

Further south the shingle ridge becomes slightly wider as the estuary turns slightly inland and then considerably more so as the ness curves slightly seaward in front of the Lantern and King's Marshes.


Orford Ness

Offshore of this ridge of beach shingle lies the Aldeburgh Ridge. This ridge runs in a similar manner to the Sizewell bank to the north along a north northeast axis. The ridge or bank is 500m from the shore at the southern end and some 1.5km offshore at Aldeburgh. The position of the bank reflects the changing orientation of the shoreline along Orfordness.

At the southern nib of the Ness is the Lighthouse, some 18m from the active shingle face.

PHYSICAL PROCESSES

TIDE AND WATER LEVELS (mODN)

Location	LAT	MLWS	MLWN	MHWN	MHWS	HAT	Neap range	Spring range	Correction CD/ODN
Sizewell		-1.45	-0.50	0.70	1.10		1.20	2.55	-1.3
Aldeburgh		-1.55	-0.60	0.7	1.20		1.30	2.75	-1.6
Orford Ness		-1.60	-0.75	1.05	1.15		1.80	2.75	-1.65

Extremes(mODN)

Location:	1:1	1:10	1:25	1:50	1:100	1:250	1:500	1:1000
Sizewell	2.05	2.57	2.78	2.93	3.09	3.29	3.45	3.61
Aldeburgh	2.05	2.57	2.77	2.93	3.08	3.29	3.45	3.6
Orford Ness	2.06	2.58	2.78	2.94	3.09	3.3	3.46	3.61

WAVE CLIMATE

Dominant offshore wave directions are from the north northeast and south southwest. There is a suggestion of better correlation between modelled offshore wave climates further to the south of the area than that modelled directly offshore to the east. As such there is potentially greater convergence of offshore wave climate towards the east (northeast sector waves tend to have more east in them, southerly sector waves tend to approach more south southeast). There can be significant wave action directly from the east and although less frequent, there can be periods of high south easterly wave energy. The nearshore bank modifies wave energy such that net energy approaches the coast from the east.

TIDAL FLOW

Peak flow on the flood is of the order of 1.3m/s tending to set in towards the coast and therefore tending to be captured by the channel between the shore and the offshore bank. On the ebb, the flow in the offshore area is of the order of 1.5m/s, tending to flow slightly to the north northeast.

PROCESSES

Control Features:

The main natural features controlling the frontage are the headland and Ness at Thorpeness and the offshore bank in front of Orfordness. The defence at the southern end of Aldeburgh also forms a significant control point in terms of shoreline behaviour.

Existing Defences:

To the north, there are no major defences and overall the main defence here and through to Aldeburgh is the natural shingle ridge. At Aldeburgh there is evidence of a small concrete back wall at the northern end, but this protrudes above the beach only a matter of half a metre. Further south, the defence is a more substantial concrete wall with a wave return crest. This is to the back of and largely buried by the shingle beach. It emerges and is quite frequently exposed at the southern limit of property.

Along the Slaughden frontage is a large concrete wall fronted by groynes to the southern end. Until recently this area has also received recharge with material taken from further south. The potential for continued recharge is being reviewed. The wall is more exposed in front of the Martello tower and is protected by rock at its southern end. The coast then reverts back to a natural defence of the shingle ridge.

Within the estuary the seaward edge of the Slaughden Bend is protected by the various quays and slipways, and the nearshore slope is quite shallow. There are major flood embankments to the main flood compartments.

The defence just south of Slaughden on the northern end of the Lantern Marshes has been breached.

Processes:

The shoreline processes are seen as relatively straightforward, although there remains uncertainty with respect to future rates of erosion.

Over the northerly section of the zone the frontage is quite stable. There is a weak supply of sediment past Thorpeness which is likely to continue. South of Thorpeness, drift is still relatively low with a suggested net drift to the north over the northern section and a weak net southerly drift across the Aldeburgh frontage. As over much of the SMP coast, these net drift rates are developed from the balance between higher drift rates under different conditions from north to south and from south to north. The rates determined, given the inherent inaccuracy of sediment modelling, suggest low throughput over the bay. There seems little to suggest that there is a drift divide and the significant degree to which the outfall in the centre of the bay tends to draw out the low water contour indicates a high degree of stability. The shingle ridge will still tend to roll back and the ridge is vulnerable over the centre and south to overtopping on a major storm. Retention of sediment is controlled at the southern end by the end section of defence at Aldeburgh.

At the southern end of the Aldeburgh town frontage there is some drift to the south, but the rate has been estimated as being quite low. This is consistent with the degree to which the beach at the corner can build out and erode back. It should be noted that some of the recent improvement in this area may be as a result of recharge to the south. This operation of recharge of material has continued and the need for further recharge has been recently agreed. The Environment Agency and Natural England are working together to ensure that any shingle recharge takes account of the internationally important shingle habitats on Orfordness and an emergency protocol has also been established should the amount of shingle at Slaughden fall to low levels. There is concern that this action cannot be continued indefinitely. There is scope for relatively large volumes of material to be moved naturally over a single storm. Such conditions can expose the point at Fort Green and draw shingle from the large reservoir to the north in front of the town. As sea levels rise, this point will increasingly become more exposed and will act more as a valve for sediment flow to the south.

There has been persistent erosion of much of the northern section of Orfordness over the last 100 years. Net drift rates are still relatively low but significant quantities can be moved under individual events. The southern section just to the north of the Ness has had far less of a history of erosion and this appears to be in relation to the higher offshore bank. In some periods this area has accreted. It may well be that material moved south on specific events is then constrained from moving back north. This means that, although net drift rates further north are low, there is still a persistent net deficit of material in these northern sections.

The overall result of this is that the neck at Slaughden has narrowing. The accumulation of material just north of the actual Ness is also likely to be responsible for the increased rates of erosion at the Ness. The Ness then feeds off its own reservoir of shingle to supply the higher drift rates to the south.

It would be expected that over the near future there would be periods of increased supply south of the material retained to the north of the Ness and the Ness itself may temporarily recover, if only for a

short period of time. The Ness is very exposed to waves from a south easterly direction. Under such conditions there will be erosion and drift of material to the north and to the south. In effect, the Ness will go through a period when its convex curve is flattened.

Within the estuary, despite the uncomfortable shape of the Slaughden bend, there is little record of significant erosion from the estuary side of the neck of land at Slaughden. Anecdotal evidence in the original Suffolk Estuarine Strategy suggested that the main flow pressure appeared to be to the south of the Martello Tower. The subsequent Alde/Ore Estuary Strategy modelling indicates that there may be high pressure to the north of the Martello Tower. In neither report is it suggested that there is a significant possibility of a breach from the estuary through to the sea. The main pressure for a breach is in terms of coastal erosion on the open shoreline. The Thorpeness to Hollesley Coastal Study identifies long term erosion north of the Martello Tower as being of the order of 35m over the period between 1886 and 2000, compared to erosion of some 65m over the same period to the south of the tower. This long term rate increases slightly further south over the undefended section of Orford Ness. As sea level rises there would be increased pressure from the seaward side and flows within the estuary would also increase significantly. If, as is being considered as an option by the estuary strategy, large areas of the estuary were returned to the tidal prism, there would be further increase in pressure from within the estuary for the neck of the shoreline at Slaughden to breach.

The breach scenario has been modelled within the estuary and shows that Slaughden would act as the main inlet mouth. There would, in the long term, tend to be a separation in the estuary pattern such that Slaughden would take all the flow to the north and would take much of the flow between Slaughden and Orford. The flow to the south of Orford would be substantially reduced and the existing mouth at North Weir point would tend to become less dominant on coastal processes.

At the coast at Aldeburgh, because of the low drift rates across the frontage and the limited amount of sediment at this point within the system, there would be very little inclination for the estuary to develop an ebb tide delta close to the shore. The new estuary mouth would, depending on its location, tend to be quite wide and would impose pressure on the defence to the north, whether at the Martello Tower or at the southern end of the town defence. To the south, if uncontrolled, the flow through the mouth would tend to move material from the north offshore and would starve the southern side of the entrance. With a continuing net southerly drift to the south of the breach, this would tend to be compensated for by the beach feeding off its own bulk with a continued reduction of shoreline sediment.

Unconstrained Scenario:

The unconstrained scenarios assumed that all defences are removed. Although unrealistic, in terms of the residual impact of existing defences the scenario does highlight the pressure on the coast.

There would be little change to the north. There would, however, be a breach at Slaughden which is likely to be self sustaining and this would become the dominant inlet to the estuary as described above. The defence to the south of Aldeburgh would no longer provide control of the northern frontage and the shingle bank over the whole northern section would be considerably weaker as shingle is transported south. The bank, although generally still stable in shape, would tend to breach and the area behind would become regularly inundated.

At the new mouth of the Alde/Ore there would, at least initially, be a significant volume of shingle feeding from the north due to the failure at Fort Green. This may then tend to form an ebb delta or possibly a spit in a southerly direction. This would support the coast to the south to a degree. However, this supply would diminish and more erosion would occur to Orfordness to the south.

POTENTIAL BASELINE EROSION RATES

Base rates have been assessed from monitoring and historical data. The range of potential erosion is assessed in terms of variation from the base rate and sensitivity in potential sea level rise. Further detail on erosion rates is provided in Appendix C.

(Sea Level Rise assumed rates: 0.06m to year 2025; 0.34m to year 2055; 1m to year 2105)

Location	Base Rate (m/yr)	Notes	100yr. Erosion range (m)
Thorpe Ness	0.1	Influenced by nearshore feature.	10 to 30
Thorpeness	0.1	Influenced by exposure of the headland to the north.	10 to 30
Thorpeness Haven	0	Still affected by sea level rise.	10 to 20
Aldeburgh	0.2	Area generally protected by beach and control to the south.	10 to 20
Slaughden	0.5	Held by defences or erosion through to estuary.	0
Orford North	0.7	Protected by Benacre Ness and progression of Ness.	30 to 120
North of Ness	0.3	Held by bank.	10 to 25
Orford Ness	1	Dependent of occasional feed from the north.	33 to 186

4.5.2 PRESENT MANAGEMENT

Present Management is taken as that policy defined by SMP1, modified by subsequent strategies or studies. It should be noted that both in the case of SMP1 and that of many of the strategies undertaken before 2005, the period over which the assessment was carried out tended to be 50 years.

SMP1			REVIEWED POLICY		
MU	**LOCATION**	**POLICY**	**REF**	**LOCATION**	**POLICY**
MIN 6	Thorpeness Common to The Haven	HTL	S5	Thorpeness Village	HTL
ORF 1	The Haven	HTL	S5	The Haven	HTL
ORF 2	Aldeburgh to Fort Green	HTL			
ORF 3	Fort Green To Lantern Marshes	HTL			
ORF 4	Lantern Marshes to Orford Beach	Do Nothing			

References:

S5 *Lowestoft to Thorpeness Coastal Study*

The policy determined from the Catchment Flood Management Plan (2008) for the Suffolk Coasts and Heaths Area is set out below.

Policy two – reduce existing flood risk management actions (accepting that flood risk will increase with time). In the Suffolk Coast and Heaths the Environment Agency will accept that flood risk will increase in the future. The most vulnerable receptors to flooding are the environmental sites at risk. The risk to these sites now and in the future for a policy two response is not unacceptable. Under a policy two response 50 more people will be at risk (these are mainly in isolated properties) and economic agricultural damages will increase by £101,800. By adopting policy two the investment in flood risk management activities can reduce by £97,500.

Adopting policy two means that flood risk will remain acceptable in the future, despite the impact of climate change and urban growth. The existing level of flood risk is not considered to be unacceptable, so we do not have to invest in an extensive effort in reducing flood risk from its current level either now or in the future. The Environment Agency can accept that risks will increase in the future and they will not reach an unacceptable level. This policy is appropriate for this policy unit because:

- the current and future levels of risk are not deemed to be unacceptable;
- the small and acceptable level of risk under this option means that any additional measures we undertake would be disproportionate to the level of risk;
- investment into flood risk management will be reduced in the future. The scale of flood risk in the Suffolk Coast and Heaths is such that under this policy option the estimated properties damages are £2.4 million for a one per cent AEP event (an increase of £550,000) and agricultural damages are £484,300 (an increase of £113,600). The one per cent AEP event would affect approximately 12 more properties in the future and up to 50 more people will be at risk. Most of this increase in risk will be spread among

Shottisham, Leiston, Therberton and Wrentham, but also among the more isolated areas and hamlets located in policy unit one. By scaling down our existing actions across this policy unit, the risks to society and the economy remain at an acceptable level over the next 100 years. There are 34 internationally and nationally designated environmental sites at risk in this policy unit. The greatest risk will be to the Stour-Orwell estuary Ramsar and SPA.

When this policy two is applied to a large area there could be some individual areas where a reduction in measures could not be adopted because of unacceptable risks.

Baseline scenarios for the zone

No Active Intervention (Scenario 1):

Under this scenario there would be no further work to maintain or replace defences. At the end of their residual life structures would fail. Defences would not be raised to improve standards of protection.

Over the period of the SMP, possibly within the second epoch as defences fail on the seaward side, there would be a breach at Slaughden. It seems most likely to the south of the Martello Tower but it might be between Fort Green and the Martello Tower. In either event, this would put more pressure on the defence to the north and this would also fail shortly after.

Even with a breach at the Martello Tower, the subsequent loss of the beach would cause an unravelling of the defence back to Fort Green and this defence would fail within the second epoch. Failure here would then result in a substantial loss of the beach in front of Aldeburgh and a decrease in the standard of defence. With the weakening of this defence the southern advanced position of the town would be lost probably by the end of 50 years. There would be continued loss of shingle and gradually the front defence of the whole town would be under threat over the 100 years of the SMP. It would be in subsequent years that erosion would work back along the front row of houses, eventually forming a balance between the influence of the estuary mouth and the higher ground upon which Aldeburgh sits.

The coast to the north would lose sediment, although remain reasonably stable in alignment. However, with a narrower ridge there would be more frequent overtopping and a tendency for regular breaches through to the land behind. Flooding would occur to the northern side of Aldeburgh and within the area of the Meare at Thorpeness. It is possible that the properties of Thorpeness Haven would survive but be under threat over the 100 years.

Within the estuary the defence to Aldeburgh Marsh would be lost at Fort Green and this would result in increased flood risk to properties to the south of Aldeburgh. It is assumed that defences within the estuary would fail. This would be hastened by exposure to wave action, significantly increasing tidal prism and widening the mouth of the Alde. There would be widespread loss of agricultural land and potential contamination of the aquifer beneath the Sudbourne ridge. There would be loss of the sailing club and probably the mooring facilities, and existing water sport use of this part of the estuary would be lost. The wide open mouth would provide limited opportunity here for re-establishing this use. There would be substantial gain in terms of intertidal mud flats and saltmarsh.

With Present Management (Scenario 2):

The With Present Management scenario assumes that the policies of either SMP1 or subsequent strategies apply. This does not necessarily imply a Hold the Line approach throughout the area.

No policy decisions have been made with respect to a potential breach in the area of Slaughden. It is assumed, therefore, that under this scenario the defences would be held at this point, in line with SMP1 policy. This will, probably over the second epoch, require significant further investment in defence (in the order of £15.5m Present Value). This might involve heavy revetment over a length of possibly 4km, or more probably construction of nearshore structures and revetments. In effect, defence would follow a progressive erosion of the coast to the south. Initial works would protect Fort Green through to the Martello Tower. Without increasingly substantial recharge and with rising water levels, and still with the intent of preventing a breach into the estuary further south, the defence would have to be continued first beyond the Martello Tower, adding further protection as the natural shingle bank to the south thins. Eventually defence would reach a point, estimated as being some 4km south of Aldeburgh, where the width between the seaward face of the shingle and the actual estuary channel becomes sufficiently wide that no further threat of breach exists. Initial defence construction over the next 40 years would be sustainable over the period of the SMP. However, in order to stop breaches occurring further to the south, further modification and management of the frontage is likely to be required beyond the 100 years. Over the period of the SMP and beyond there would be increasing incursion of defence within the area of the designated habitat of Orford Ness.

Works would be undertaken initially at Fort Green and the main Aldeburgh town frontage would be maintained.

Over the northern frontage the substantial shingle ridge would be retained and there would be slow roll back with the occasional overtopping. On more severe storms such as experienced in 1953, this would result in overwash of water and development of shingle fans into the hinterland. This would potentially become more frequent with sea level rise and it may be necessary to construct local defences to the north of Aldeburgh and to the area of the Meare. Generally, the approach would not result in significant management of the natural shingle ridge. The road is sufficiently set back behind the shingle bank that it would not suffer direct erosion. However, it would be more frequently overtopped and there would be a need to clear the road of overwash shingle. The properties at Thorpeness Haven would not come under threat from direct erosion, although these may be subject to wave overtopping damage on very severe events. It is assumed under this scenario that local works to enhance the natural defence would not be precluded subject to avoiding any detriment to the environmental features.

To the south of the zone, the Ness would be expected to flatten, continuing to feed material to the south but also eroding north while also tending to provide some sediment north. This process would happen in stages where there were periods of erosion and periods of accretion. The trend would be for erosion in front of the Lighthouse, with the loss of the Lighthouse almost certainly within the next 30 years but probably sooner. No detailed surveys have been obtained at the Lighthouse as part of the SMP and erosion lines and rates are based solely on the most up to date OS mapping. It would not, under this scenario, be the intention to protect the Lighthouse.

Economic Assessment

The following table provides a brief summary of damages determined by the SMP2 MDSF analysis for the whole PDZ. Further details are provided in Appendix H. Where further, more detailed information is provided by studies, this is highlighted. The table aims to provide an initial high level assessment of potential damages occurring under the two baseline scenarios.

MDSF ASSESSMENT OF EROSION DAMAGES

NAI		**Present Value Damages (£x1000)**
Location	*Assets at risk*	
Aldeburgh and Thorpeness	75 properties.	£1,724
WPM		**Present Value Damages (£x1000)**
Location	*Assets at risk*	
Aldeburgh and Thorpeness	No loss is assumed from the MDSF analysis for erosion.	

MDSF ASSESSMENT OF POTENTIAL FLOOD RISK

Aldeburgh North	Property and agricultural land.	£8,606
Aldeburgh Marshes	Property and agricultural land.	£3,543
Area south of Martello Tower	Agricultural land.	£800

OTHER INFORMATION:
Damages within the estuary are being determined by the current strategy. Damages determined during the initial SES amounted to £23.3m under the Do Nothing option based on prices in 1999. Typically these might increase to £35m in 2008. MDSF gives damages due to flood risk to property and land under NAI of £68 million (excluding Aldeburgh Marsh which is taken for above).

General Assessment of Objectives

The following table provides an overall assessment of how the two baseline scenarios impact upon the overall objectives agreed by stakeholders. These objectives are set out in more detail within Appendix E. The table aims to provide an initial high level assessment of the two baseline scenarios, highlighting potential issues of conflict. These issues are discussed in the following section, examining alternative management scenarios from which SMP2 policy is then derived.

STAKEHOLDER OBJECTIVE	**NAI**			**WPM**		
	Fails	Neutral	Acceptable	Fails	Neutral	Acceptable
To maintain in a sustainable manner Aldeburgh as a viable commercial and tourism centre, recognising its cultural and heritage value						
To maintain in a sustainable manner Thorpeness as a viable coastal settlement and tourist destination recognising its cultural and heritage significance						
To maintain a range of recreational activities along the foreshore and within the estuary, including sailing and navigational access						
To maintain Orfordness as a designated site of international and European importance						
To support the adaptation of local coastal communities						
To support the adaptation of the local coastal farming communities						
To maintain biological and geological features in a favourable condition, subject to natural change, and in the context of a dynamic coastal environment						
To support appropriate ecological adaptation of habitats						
To promote ways to maintain access to and along the coastal path						
To maintain or enhance the high quality landscape						

4.5.3 DISCUSSION AND DETAILED POLICY DEVELOPMENT

The No Active Intervention scenario results in unacceptable losses at Aldeburgh and makes sustaining the natural defence to the north of Aldeburgh difficult in terms of management of flood risk. There is, however, some concern that even if this bank were maintained there may still be increasing flood risk due to increased overtopping in the future. WPM, principally with respect to the management of the Slaughden frontage, is technically achievable and sustainable over the 100 year period. However, this potentially drives management beyond that time down a course that could involve significant investment over a much longer timescale. This approach could also have consequence, on the management of the conservation interest for Orfordness. The Environment Agency and Natural England are working together to ensure that any shingle recycling at Slaughden takes account of the internationally important shingle habitats on Orfordness. An emergency protocol has also been established should the amount of shingle at Slaughden start to fall towards critically low levels. Recycled recharge has been agreed for 2008/2009. However, it is Natural England's advice that that the current shingle recycling operation is not sustainable or viable in the future because of the damage that removing shingle from the Ness causes to the habitat supporting annual vegetation. Their advice, therefore, is that it is highly unlikely to be possible to continue with the current management in the short term (20 years) without damaging the designated site. It is also recognised that there are similar concerns if a breach at Slaughden was either created or allowed to happen in terms of habitat within the estuary. Determining the potential long term environmental impacts of specific schemes goes beyond the remit of the SMP.

The SMP is still able to assess policy over the frontage in general, taking account of the potential defence of Slaughden or a breach in this area through to the estuary. Initially, the scope of the impact of either holding the line or experiencing a breach at Slaughden may be considered. These are two basic scenarios for future management and decisions here provide a framework for examining other sections of the coast.

Slaughden and Management of Aldeburgh
In the first scenario of preventing a breach in the area of Slaughden, the key defence in relation to management of Aldeburgh and the coast to the north is still primarily that at Fort Green. If the coastal defence to the south is maintained, this key control point will still come under pressure with sea level rise. In the absence of the defence at Fort Green, the town frontage at Aldeburgh comes under increasing pressure to the point where it may be considered unsustainable and further retreat of the shoreline would occur. The consequence of this is the loss of much of the sea front property and the beach. This would be unacceptable if there is a sustainable alternative. Despite the increasing pressure, therefore, it is considered both appropriate and economically justified to continue to hold Fort Green. This is a manageable location. Typically, the defence would need to be increased and this location would become an established hard point on the coast. Costs might be of the order of £1.5m over the next 50 years (PV cost of the order of £600k). These works would not significantly increase the point as a total barrier to sediment and there would still be a weak supply to the south as at present.

Under the second scenario of a breach, either between the Martello Tower and Fort Green or south of the Martello Tower, there would need to be works undertaken on the

northern side of the new mouth to sustain Aldeburgh. Given that the estuary would not tend to form any significant ebb delta and that sediment from the north would, therefore, either recurve into the estuary or would be taken offshore, there would be little benefit in allowing loss to the frontage to the north. In effect a harbour arm could be constructed.

If this were sited at or just south of the Martello Tower this would accumulate sediment along the Slaughden frontage, thus protecting the point at Fort Green. Potentially the cost of this would be some £3m to £4m – possibly less if the defence were moved back to Fort Green. Assuming works would be undertaken in year 20, this would give an estimated PV cost between £1.5m and £2m. The cost of works would be realistic against the value of potential damages, given also the intent of maintaining Aldeburgh as a viable community and commercial centre.

Purely from the coastal management perspective, maintaining the barrier between the sea and the estuary would be counter to the basic principle of minimising reliance on man made defences. It is likely that this would also result in unacceptable damage to the coastal habitat.

If a breach were to be allowed, it would be possible to manage the impact of this in terms of the effect on Aldeburgh, as discussed above. As such, from the perspective of the SMP, allowing a breach would be the preferred approach.

However, this does not take account of the impact within the estuary. It is recognised that such impacts could significantly affect many values within the estuary, affecting agricultural values, the important navigational and water use, landscape and nature conservation.

Particular concerns have been raised.
The two biggest industries that support over 90% of the economic activity of the Alde estuary hinterland are tourism and agriculture.

There is a concern therefore that a breach in the area of Slaughden may destroy the unique safe sailing for which Aldeburgh is renowned, and the huge junior sailing activities that can safely occur.

Furthermore, unlike further up the coast where underground water near the coast is brackish due to hydraulic connection with sea bed, from Aldeburgh South to South Essex a 300/400 metre wide 100 metre deep London clay strip creates a perfectly impermeable barrier to saline incursion from the seabed, and the aquifers within 500 metres of the coast produce large amounts of fresh irrigation water. The hill of crag overlying the clay where this farm sits contains a reservoir in the crag of above 150m gallons. The three farms use it. Marshland estate and Stannay farm have licenses to withdraw 75million gallons annually and even in dry years the water table hardly drops at all in spite of pumping full allocation. If the sea water gets across the marshes into these sand aquifers it will go brackish for miles inland, wrecking all the underground irrigation of the hinterland and destroying the huge agricultural output.

There is a current concern over the level of flood defence to the back of Aldeburgh and properties in the Slaughden area. Under a breach at Slaughden scenario there is concern that there would be an increase in water levels generally within the estuary.

These are issues relating to the estuary would have to be considered in more detail before a policy at the coast could be confirmed. In taking these into consideration, the significant potential negative impacts on the coast identified above would need to be considered as consequences of management of the estuary. At present, while the recommended approach would be to manage breaching of the coastal barrier, this could not be confirmed until the full impacts of this on the socio/environmental aspects of the estuary have been examined in detail.

Preliminary modelling has been undertaken within the Alde/Ore (Black and Veatch January 2006), considering among other options, the potential breach at Slaughden. The study showed that a breach would have a significant impact on the estuary and that the new entrance would tend to be the dominant entrance. It was considered unlikely, however, that this would result in closure of the existing mouth.

There would be a substantial increase in velocity at the new mouth but that this would decrease further within the estuary. Within the main channel and along the Aldeburgh Marsh frontage maximum flows might increase by 5% and 29% respectively. Flows further upstream and further down towards Orford would reduce. In terms of water levels, the model indicted that both for normal tides and surge conditions the water levels in the upper estuary would tend to be less, potentially by up to 0.3m. In the lower estuary around Orford and Havergate levels could increase by 0.04m. There was also significant change in the potential sediment behaviour of the estuary, influencing patterns of erosion and accretion.

Several different options for management of defence within the estuary were modelled along side the breach scenario. These modified the changes identified above. In particular, creating a by-pass channel through the neck of the Slaughden Bend tended to significantly reduce maximum velocity increases but also reduced the beneficial impact on water levels within the upper estuary.

Given these important interactions, but also recognising the detailed and wide ranging examination of the whole area that is required, the SMP has to adopt a pragmatic approach to taking matters forward. As discussed above, and solely from the perspective of management of the coast, the SMP identifies key considerations with respect to shoreline management. This informs the necessary further study of the area as a whole.

The aim of what is intended, therefore, is to maintain the important natural character of Orfordness and to maintain the town of Aldeburgh. There remains uncertainty with respect to management to the area south of the Martello Tower through to the Lantern Marshes. This needs to be resolved through an estuary management plan.

There is a commitment by the Suffolk Coast ICZM Initiative[1] to develop with local communities and interested groups a Management and Investment Plan for the Alde and Ore. This area will include the Alde and Ore estuary and its adjoining coastline. This plan will take account of the conclusions of the SMP, will review the recommended SMP policy and if necessary amend this accordingly. In the meantime it is important to have an interim policy for the coastline. From the perspective of purely managing the shoreline, a policy of No Active Intervention would be concluded in relation to the coast south of the Martello Tower. Present management relies on recycling shingle from further south on Orford Ness. There is currently an agreed emergency plan to recharge the shingle bank, if required, that is under constant review.

Subject to continued monitoring this practice would continue in the short term. This may not continue over the whole period of the 1st epoch. South of Lantern Marshes the intent would be for No Active Intervention. This would result in the potential loss of or need to move the Lighthouse, but with the intention that the important natural feature of Orfordness is allowed to develop naturally.

Providing significant caveats in relation to the policy south of Slaughden, it is still possible to recommend policy elsewhere within this section of the coast. From the above argument it may be concluded that, regardless of a breach south of Slaughden, it would be both technically and economically appropriate to continue to defend Aldeburgh. Purely from the perspective of coastal management it is preferable that, if a breach were to be allowed, this should be to the south of the Martello Tower, maintaining the Scheduled Monument. It is also felt that this would provide for better management of the use within the estuary, providing the opportunity to maintain important uses within the shelter of the promontory which would be created.

It is then concluded that defence at Aldeburgh is to be maintained, with the intention that the most sustainable approach to this is maintaining a beach in front of Aldeburgh. From this it is then possible to consider how the coast to the north can be best managed.

Aldeburgh and the coast to the north

In considering the coast to the north, the policy for the Aldeburgh town frontage would be to Hold the Line. North of here, the shingle bank would maintain its bulk and, therefore, would act as a defence to the land behind. The residual flood risk to this area needs to be examined in more detail. However, in the longer term overtopping flood risk could be more significant. If this were the case then it would be necessary to improve flood defence to the rear of the low lying land, including to the north around the Meare and to the rear of Aldeburgh. Given the intent to manage the coast as naturally as possible, and not to increase reliance on defences which could then significantly affect the natural movement or roll back of the shingle, the aim of management would be to provide key flood defence set back from the active shingle ridge. The essential decision as to where such a defence would be provided would depend largely on the value of the

[1] The Suffolk Coast Integrated Coastal Zone Management (ICZM) initiative is a partnership of organisations committed to developing an integrated approach to the management of the Suffolk coast. It includes East of England Development Agency, the Environment Agency, GO-East, Natural England, Suffolk County Council, Suffolk Coastal District Council and Waveney District Council.

lower lying land. Flood defence could be provided at the road, but with increasing sea level this is likely to require pumped drainage of the area behind. It seems unlikely that there would be justification for this.

It is anticipated, therefore, that flood defence would be retreated to the rear of the low lying area, protecting the properties to the rear of Aldeburgh and to the area of the Meare. There is potential for creating different transitional habitat in the area immediately behind the shingle ridge.

This would have no significant additional impact on the road or on the property along Thorpeness Haven. At Thorpeness Haven it is anticipated that these properties would not be significantly affected. As such the policy here would be for No Active Intervention. The intent here, as along the whole of the shingle ridge, would be to allow natural development of the frontage. Within this intent, if locally threatened, the SMP would not preclude minor works to reinforce directly in front of properties, assuming this was acceptable in terms of impact on the conservation designations and within the intent not to disrupt the movement of shingle over the frontage.

The Coast to the South of Aldeburgh

The impact of either breaching the bank south of Slaughden or maintaining a defence along the frontage would have significant consequences in terms of potential sediment supply to the south. Over the period of the SMP this might initially impact on areas down to the slight embayment seaward of Lantern Marshes. Beyond here the consequences are likely to be less significant, with continued patterns of erosion and accretion along the more substantial width of the southern area of Orfordness and the Ness itself. Any attempt to significantly modify the behaviour of the Ness in front of the Lighthouse is likely to be abortive in the long term. The policy over this frontage, therefore, remains as No Active Intervention.

Interaction with the Estuary

Although primarily driven by the erosion at the coast at Slaughden, and notwithstanding significant issues in terms of impacts to the open coast discussed above, the principal impact of a breach would be in relation to use and defence within the estuary. The SMP has defined the limits in terms of coastal impacts and has at a high level demonstrated that in principle a breach scenario can be managed while still maintaining Aldeburgh. The decision how best to manage the estuary needs to be taken based on the range of issues affecting the use of the estuary.

In undertaking such an examination, in addition to these aspects relating to the actual estuary, an estuary management strategy should take account of the following coastal issues:

- the significant cost and potential impacts of defending the coast for up to a 4km length; or
- the need for increased expenditure of managing a breach south of the Martello Tower whilst defending Aldeburgh and minimising the consequential impact to the south.

Following on from the work being undertaken by the Alde/Ore Futures project and subject to the results emerging from the Aldeburgh Coast and Estuaries Strategy (ACES) there is a commitment to undertake a review of the SMP2 policy. This review would be in relation to this Policy Development Zone and would be undertaken prior to any larger scale review provided by SMP3. Based on the anticipated programme for the two studies above, this local review would be undertaken within the next two years.

Management Areas

In summary, therefore, the zone is sub-divided into two management areas, these being:

- Thorpeness Haven to Aldeburgh (including the Martello Tower subject to an estuary decision to breach at Slaughden) (four policy units).
- Lantern Marshes to Orford Ness (two policy units).

The policy and intent of management is set out by management area in the following sheets.

PDZ5

ALB 14 - THORPENESS HAVEN TO ALDEBURGH (CH. 41 TO 46)
ORF 15 - MARTELLO TOWER TO ORFORD NESS (CH. 46.5 TO 53)

4.5.4 ALB 14 - THORPENESS HAVEN TO ALDEBURGH

Location reference:	**THORPENESS HAVEN TO ALDEBURGH (CH. 41 TO 46)**
Management Area reference:	**ALB 14**
Policy Development Zone:	PDZ 5

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data.

The following descriptions are provided to assist interpretation of the map shown overleaf.

100 year shoreline position:
The following maps aim to summarise the anticipated position of the shoreline in 100 years under the two scenarios of "With Present Management" and under the "Draft Preferred Policy" being put forward through the Shoreline Management Plan.

- In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Draft Preferred Policy this distinction is made in showing two different lines:

  With Present Management.
  Draft Preferred Policy.

- In some areas, the Draft Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

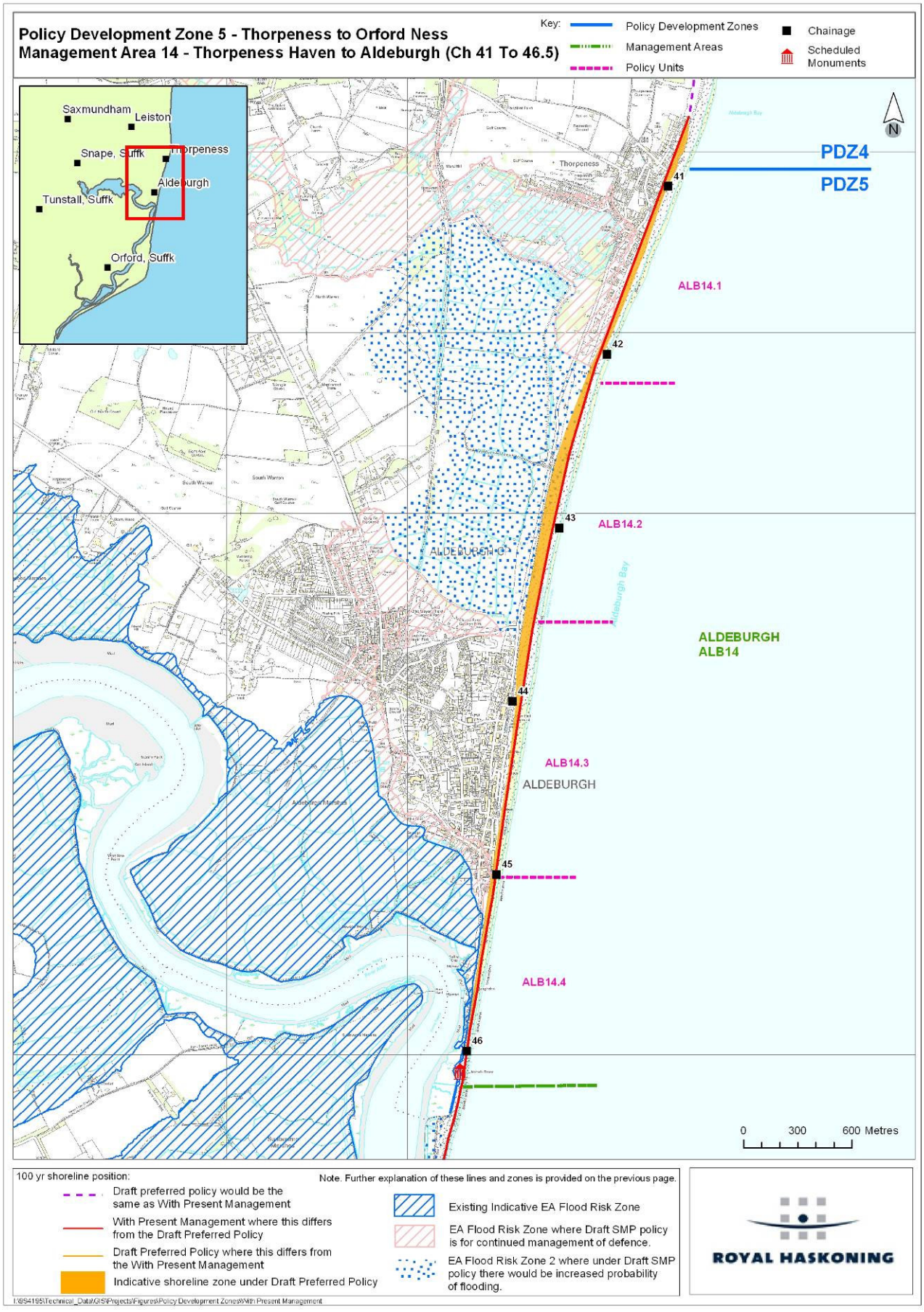
Flood Risk Zones

General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this Draft SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP draft policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

The maps should be read in conjunction with the text within the Draft SMP document.


Policy Development Zone 5 - Thorpeness to Orford Ness
Management Area 14 - Thorpeness Haven to Aldeburgh (Ch 41 To 46.5)
Key:
Policy Development Zones
Management Areas
Policy Units
Chainage
Scheduled Monuments
Saxmundham
Leiston
Snape, Suffk
Aldeburgh
Tunstall, Suffk
Orford, Suffk
PDZ4
PDZ5
ALB14.1
ALB14.2
ALB14.3
ALB14.4
ALDEBURGH
ALB14
41
42
43
44
45
46
N
0
300
600 Metres
100 yr shoreline position:
Draft preferred policy would be the same as With Present Management
With Present Management where this differs from the Draft Preferred Policy
Draft Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under Draft Preferred Policy
Note. Further explanation of these lines and zones is provided on the previous page.
Existing Indicative EA Flood Risk Zone
EA Flood Risk Zone where Draft SMP policy is for continued management of defence.
EA Flood Risk Zone 2 where under Draft SMP policy there would be increased probability of flooding.
ROYAL HASKONING

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The aim of the plan is to maintain the natural shingle defence to the frontage, thereby providing sustainable defence to Aldeburgh. This would require maintaining control at either Fort Green or south of the Martello Tower, depending on the policy for a breach based on full examination of issues within the estuary.

There is a continuing flood risk over the frontage and this would increase with sea level rise. There needs to be a review of flood warning and emergency planning to address this.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	The short term policy would be for the maintenance of existing defence at Aldeburgh and through to the Martello Tower.
Medium term	In the medium term the position for control of defence at Aldeburgh would depend on policy based on an estuary management plan. If defences were to be managed at Fort Green, these works would be undertaken progressively forming a bastion at this location. If defences were to be managed at the Martello Tower, assuming a breach, these works would be in the form of a harbour pier.
Long term	Maintain defences and consider flooding of the area behind the Haven with local flood defence.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		**Policy Plan**			
		2025	**2055**	**2105**	**Comment**
ALB 14.1	Thorpeness Haven property	NAI	NAI	NAI	This would not preclude minor works to sustain property, subject to impact assessment.
ALB 14.2	Thorpeness Haven Beach	MR	MR	MR	Consider allowing flooding with secondary defence but maintain the road.
ALB 14.3	Aldeburgh	HTL	HTL	HTL	Control at Fort Green.
ALB 14.4	Slaughden	HTL	HTL	HTL	Detailed management subject to an estuary management plan.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention * HR – Hold the Line on a retreated alignment, MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No substantial change from existing policy over the northern section of the area. The potential for a breach at Slaughden.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		**by 2025**	**by 2055**	**by 2105**	**Total £k PV**
Property	Potential NAI Damages/ Cost £k PV	5,114	4,798	3,962	13,875
	Preferred Plan Damages £k PV	131	107	73	311
	Benefits £k PV	4,983	4,691	3,889	13,563
	Costs of Implementing plan £k PV	2,000	500	550	3,050

Strategic Environmental Assessment summary table for preferred policy MA ALB 14

This is an excerpt from the **Strategic Environmental Assessment** undertaken for the Suffolk SMP – for the full assessment, please refer to **Appendix F** (**Strategic Environmental Assessment: Environmental Report**).

ISSUE	DETERMINATION
ISSUE - Maintenance and Enhancement of Biodiversity on a Dynamic Coastline	
The interaction between the maintenance of designated freshwater or terrestrial habitat protected by defences and designated coastal habitat seaward of defences – will SMP policy provide a sustainable approach to habitat management?	Designated sites in this management area are Leiston/Aldeburgh, Alde-Ore Estuary SSSI, Alde-Ore Estuary Ramsar/SPA, Sandlings SPA and Alde-Ore & Butley Estuaries SAC. Policy seeks to allow a natural evolution of the coastline to the north whilst protecting Aldeburgh. The policy also offers a HTL policy at Slaughden which is intended to protect the integrity of the estuary to the rear. The long term defence at Slaughden may prove unsustainable in regard to SLR therefore, overall the policy is considered to be minor negative.
Coastal squeeze and changes to coastal processes has the potential to adversely affect the integrity of international sites (Ramsar sites and areas designated under the Habitats and Birds Directives) – will SMP policy have an adverse effect on the integrity of any international sites?	The overall suite of policies provides for the natural evolution of the coast to the north, whilst holding the line at Slaughden in order to maintain the integrity (within a planning timescale) of the estuary to the rear. Holding the line is considered necessary to provide the time for management of the estuary to respond to the eventual breach at Slaughden. The overall effect is therefore considered minor positive.
Coastal squeeze has the potential to lead to the loss of UK BAP (priority & broad) coastal habitat. Alternative sites for habitat creation are required to help offset the possible future natural losses – will there be no net loss of UK BAP habitat within the SMP timeline up to 2100?	The BAP habitat in this area includes: Reedbeds Coastal Floodplain and Grazing Marsh and Coastal Vegetated Shingle. The management area promotes a natural development of the coast. With the exception of the defence of Aldeburgh and at Slaughden. The MR would lead to a roll back of habitat and the overall effect is therefore considered to be neutral
Coastal squeeze has the potential to lead to coastal SSSIs falling into unfavourable condition. For example, approximately 50 of 100 SSSI units assessed at the Minsmere-Walberswick Heaths and Marshes SSSI are in unfavourable condition, although the majority of these (36) are in an unfavourable recovering condition. Factors attributable to the unfavourable declining condition relating to the SMP, are cited as coastal squeeze – will SMP policy contribute to further SSSIs	The SSSIs in this management area is designated for mudflat, saltmarsh, vegetated shingle, acid grassland and coastal lagoons. The management area provides for a more natural management of the coast to the North and the protection of the estuary via the defence at Slaughden. It is not considered that this suite of management would not have a negative effect on SSSIs and the overall effect is therefore neutral.

ISSUE	DETERMINATION
falling into unfavourable condition and address the causal factors of existing units which are in unfavourable declining condition (due to coastal management) wherever possible?	
ISSUE - Maintenance of environmental conditions to support biodiversity and the quality of life	
ISSUE - Maintenance of balance of coastal processes on a dynamic linear coastline with settlements at estuary mouths	
The Suffolk coast is a complex system of dynamic and static shingle, beach frontages, urban areas and estuary mouths. The system has been maintained in recent years to provide relative stability to the system in order to protect coastal assets. The effects of sea level rise require a more strategic approach to shoreline management, but the relative stability of the plan area needs to be maintained albeit within a dynamic context.	
Will SMP policy maintain an overall level of balance across the Suffolk coast in regard to coastal processes, which accepts dynamic change as a key facet of overall coastal management?	The Policy seeks to provide a dynamic coastal system which is underpinned by dynamism and natural coastal evolution whilst maintaining the frontage around Aldeburgh and Slaughden. Overall this policy is therefore allowing natural change in part, whilst constraining the coast in the south. The overall effect is considered minor negative.
Will SMP policy increase actual or potential coastal erosion or flood risk to communities in the future?	The policy will not increase flood risk. The overall effect therefore is neutral.
Will SMP policy commit future generations to spend more on defences to maintain the same level of protection?	The management area will require additional defence works adjacent to the MR and also commit to the long term maintenance of Slaughden. Therefore the cost of this defence is minor negative.
Does the policy work with or against natural processes?	The overall intent of the management area is to promote a natural evolution of the coast in the north whilst taking an interventionist approach in the south. The overall effect is therefore minor negative.

ISSUE	DETERMINATION
ISSUE - Maintenance of water supply in the coastal zone	
Agriculture on the Suffolk coast is dependent on the maintenance of a freshwater supply from groundwater aquifers. The delivery of this supply is threatened by intrusion of salt water into freshwater aquifers and from the loss of boreholes at risk from erosion – will SMP policy maintain structures to defend water abstraction infrastructure and to avoid any exacerbation of levels of saline intrusion into freshwater aquifers.	The management area will lead to some incursion around the MR, but will protect the integrity of an extensive estuary. The overall effect is therefore minor positive.
ISSUE - Maintenance of the values of the coastal landscape & Area of Outstanding Natural Beauty (AONB)	
The maintenance of the coastal landscape in the face of coastal change on a dynamic coast and estuary system. A key factor being the potential change in the landscape in response to shifts in coastal habitat composition and form. Will SMP policy maintain a range of key natural, cultural and social features critical to the integrity of the Suffolk coastal landscape? Will SMP policy lead to the introduction of features which are unsympathetic towards the character of the landscape?	The management area will provide for the natural development of the coast in the north and maintain major features in the south. Overall the benefits of this are minor positive. The management area will introduce new defences to the rear of the power station, but these are not considered to be detrimental to the landscape in their context adjacent to a nuclear power station. Overall the effect is considered to be neutral.
ISSUE - Protection of historic and archaeological features on a dynamic coastline	
The Suffolk coast contains a range of historic settlements and harbours typically located on the open coast and mouths of estuaries (for example, Southwold - Walberswick, Aldeburgh, Shingle Street etc). These settlements may be at higher levels of risk from coastal flooding as a result of climate change or levels of erosions along the coast – will SMP policy maintain the fabric and setting of key historic listed buildings and conservation areas?	The policy HTL at Aldeburgh and NAI on the static shoreline at Thorpeness will protect the conservation areas and listed buildings of both areas. The effect is therefore minor positive.
The coastal zone in Suffolk contains a range of archaeological and palaeo-environmental features which may be at risk from loss from erosion within the timeline of the SMP – will SMP policy provide sustainable protection of archaeological and palaeo-environmental features (where appropriate) and ensure the provision of adequate time for the survey of archaeological sites where loss is expected.	The MR policy area has no features of interest listed. The effect is therefore considered to be neutral.

ISSUE	DETERMINATION
ISSUE - Protection of coastal communities and culture	
Protection of coastal towns and settlements	
The Core Strategies of Waveney Council and Suffolk Coastal District Council identify key coastal settlements which are important to the quality of life locally and the integrity of the economy of the area. These settlements are likely to face a higher level of risk from coastal flooding and loss due to erosion in response to sea level rise. There is a need therefore to ensure that the settlements below are protected for the duration of the SMP. Will SMP policy maintain key coastal settlements in a sustainable manner, where the impact of coastal flooding and erosion is minimised and time given for adaptation? Will SMP policy protect the coastal character of communities which have historically been undefended?	The Policy provides for the protection of Aldeburgh and Thorpness and the size and value of both settlements warrants ongoing protection. The overall effect is therefore minor positive. NA.
Protection of key coastal infrastructure	
The Suffolk coast is served by a network of roads along the coast (primarily the A12) and a network of smaller roads to coastal settlements. The maintenance of these roads is important in regard to the utility it provides for the coastal economy and quality of life etc. The roads themselves are of secondary importance (they could be replaced), the important feature is the actual access provided as a social and economic function. The potential exists for this network to be affected by coastal processes – will SMP policy maintain road based transport connectivity between settlements on the Suffolk coast?	No transport routes would be interrupted as a result of this policy. The overall effect is therefore neutral.
The Suffolk coast is served by rail network primarily links Lowestoft and Felixstowe with the national rail network. The network is critical to the functionality of the ports at these centres, supports commuting to London and tourism and runs through the 1 in 1000 year floodplain. The potential exists for areas of the network to be impacted by coastal processes at Felixstowe (adjacent to the port) and Lowestoft (at Oulton Broad) - Will SMP policy maintain rail based transport connectivity between the Suffolk coast and the national rail network?	No transport routes would be interrupted as a result of this policy. The overall effect is therefore neutral.

ISSUE	DETERMINATION
The Suffolk coast is visited by a large number of tourists and residents every year. Access to and along the coast is provided by a range of coastal footpaths (the primary footpath being the Suffolk Coasts and Heaths Footpath). The provision of this access, rather than the actual footpaths themselves supports a range of values which contribute to the quality of life and local economy of the Suffolk coastal area. Paths are often located close to the foreshore in areas at risk from coastal erosion (or within potential areas for managed realignment) – will SMP policy maintain or enhance levels of access along or to the Suffolk coast.	The policy would not lead to any loss of continued access along the coast and the effect is therefore neutral.

APPROPRIATE ASSESSMENT - PREFERRED PLAN **MA 14**

This is an excerpt from **Appendix I** of the **Appropriate Assessment** undertaken for the Suffolk SMP – for a full description of the potential effects and any avoidance measures, mitigation or compensation required as a result of the policies, please refer to **Appendix J** (**Appropriate Assessment Report**).

Alde-Ore Estuary SPA & Ramsar site features	**Article 4.1 Qualification** During the breeding season the area regularly supports: Marsh harrier Avocet Little tern Sandwich tern Over winter the area regularly supports: Ruff Avocet **Article 4.2 Qualification** During the breeding season the area regularly supports: Lesser black-backed gull Over winter the area regularly supports: Common redshank **Ramsar criterion 2** The site supports a number of nationally-scarce plant species and British Red Data Book invertebrates. **Ramsar criterion 3** The site supports a notable assemblage of breeding and wintering wetland birds. **Ramsar criterion 6 – species/populations occurring at levels of international importance** Qualifying species/populations (as identified at designation): Species regularly supported during the breeding season: Lesser black-backed gull Species with peak counts in winter:

	Pied avocet Common redshank	
Sub Feature(s) Intertidal mudflats, salt marshes. Considered to be one of the best estuary habitats in the UK. A range of nationally scare plant species inhabit the area, as do noteworthy bird and invertebrate species.	**Sensitivity** Area is subject to coastal squeeze and sea-level rise. Saltmarsh loss has occurred.	**Conservation Objective** The conservation objectives for this site are, subject to natural change, to maintain*, in favourable condition, the habitats for the populations of the regularly occurring Annex 1 bird species and migratory bird species +, of European importance, with particular reference to grazing marsh, saltmarsh, intertidal mudflat and shallow coastal waters. +avocet, Sandwich tern, little tern, ruff, redshank, lesser black-backed gull * maintenance implies restoration if the feature is not currently in favourable condition.

Alde-Ore Estuary SAC site features	**Annex I habitats (that are a primary reason for selection):** Estuaries **Annex I habitats (present as a qualifying feature but not primary reason for selection of this site):** Mudflats and sandflats not covered by seawater at low tide, Atlantic salt meadows	
Sub Feature(s) Intertidal mudflats, salt marshes, lagoons	**Sensitivity** Erosion combined with sea level rise has resulted in the loss of much of the saltmarsh.	**Conservation Objective** The conservation objectives for this site are, subject to natural change, to maintain*, in favourable condition, the Atlantic salt meadows, estuaries, mudflats and sandflats not covered by the seawater at low tide, saline lagoons, annual vegetation of drift lines and perennial vegetation of stony banks.

ALB 14.1 to 14.4

Potential effect of policy: This area seek to provide for the natural evolution of the coastline between two holding points at Thorpeness and Aldeburgh and to maintain the integrity of the Home Reach so that management of the River Ore can be developed to anticipate and respond to natural change. Preferred policy in between Thorpeness and Aldeburgh includes an extensive area of managed realignment which fronts Thorpeness Reserve and North Warren. It is anticipated that within the planning timeline, no actual SPA habitat would be lost under this policy (ALB14.2). Policy ALB 14.4 seeks to maintain the integrity of the narrow spit at Slaughden by Holding The Line. This policy is intended to ensure that the estuary behind will not destabilise due to a breach

at this point. This policy effectively provides the time to align estuary management (in regard to habitat) with longer term shifts in its evolution. However, due to the fact that the estuary strategy has not yet been completed, the potential effect of the HTL policy in the context of the International site cannot be effectively quantified or assessed.

Implications for the integrity of the site: No adverse effect on the integrity of the site, providing that the estuary strategy establishes the wider framework for management of this area.

Avoidance measure: The completion of the Estuary Strategy, coupled with ensuring that the technique used to HTL at Slaughden does not impact upon the adjacent International site.

4.5.5 ORF 15 - MARTELLO TOWER TO ORFORD NESS

Location reference:	**MARTELLO TOWER TO ORFORD NESS (CH. 46.5 TO 53)**
Management Area reference:	**ORF 15**
Policy Development Zone:	PDZ 5

* Note: Predicted shoreline mapping is based on a combination of monitoring data, analysis of historical maps and geomorphological assessment with allowance for sea level rise. Due to inherent uncertainties in predicting future change, these predictions are necessarily indicative. For use beyond the purpose of the shoreline management plan, reference should be made to the baseline data.

The following descriptions are provided to assist interpretation of the map shown overleaf.

100 year shoreline position:
The following maps aim to summarise the anticipated position of the shoreline in 100 years under the two scenarios of "With Present Management" and under the "Draft Preferred Policy" being put forward through the Shoreline Management Plan.

- In some areas the preferred policy does not change from that under the existing management approach. In some areas where there are hard defences this can be accurately identified. In other areas there is greater uncertainty. Even so, where the shoreline is likely to be quite clearly defined by a change such as the crest of a cliff the estimated position is shown as a single line.

- Where there is a difference between With Present Management and the Draft Preferred Policy this distinction is made in showing two different lines:

  With Present Management.
  Draft Preferred Policy.

- In some areas, the Draft Preferred Policy either promotes a more adaptive approach to management or recognises that the shoreline is better considered as a width rather than a narrow line. This is represented on the map by a broader zone of management:

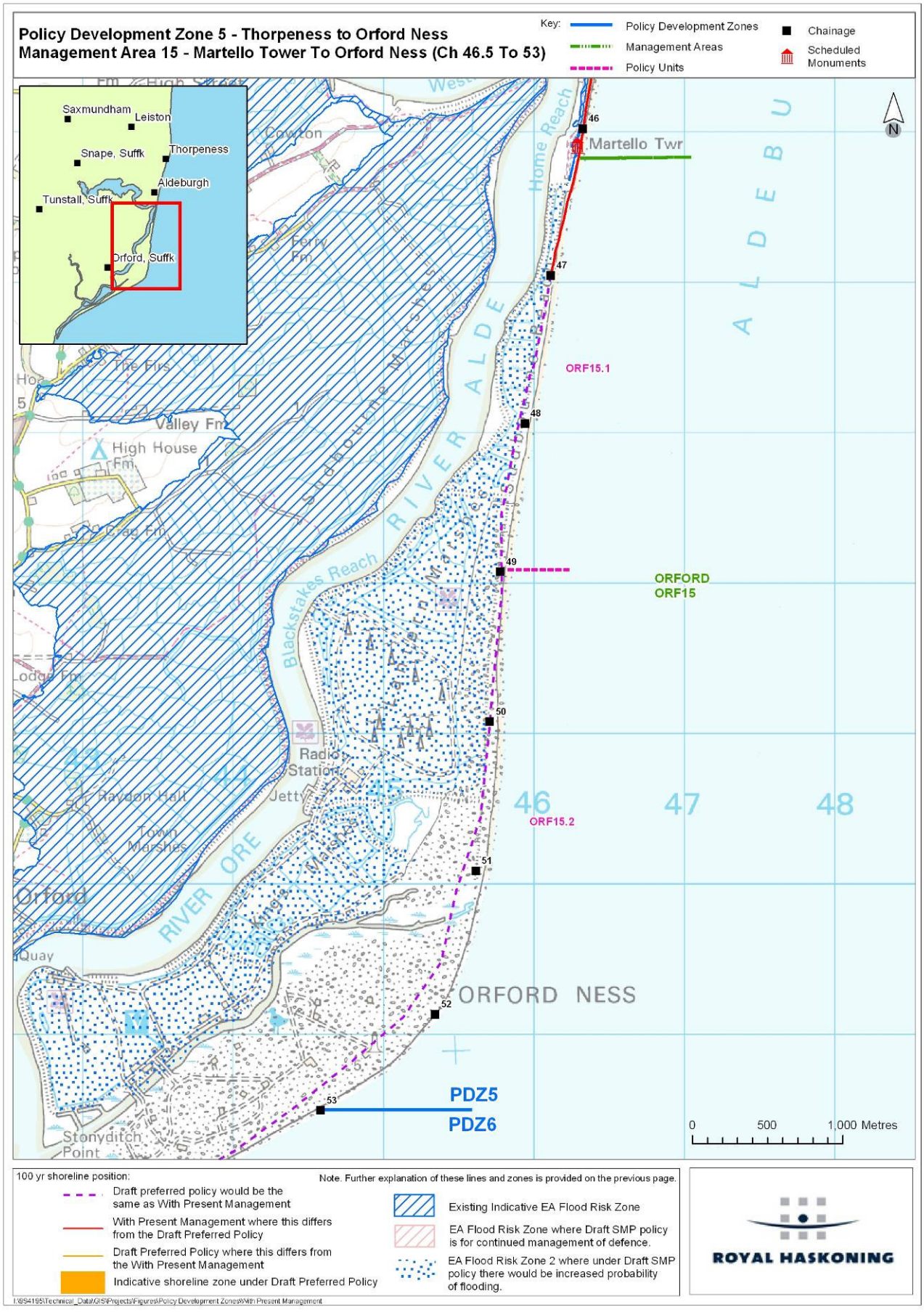
Flood Risk Zones

General Flood Risk Zones. The explanation of these zones is provided on the Environment Agency's web site www.environment-agency.gov.uk. The maps within this Draft SMP document show where SMP policy might influence the management of flood risk.

Indicate areas where the intent of the SMP draft policy is to continue to manage this risk.

Indicate where over the 100 years the policy would allow increased risk of flooding.

The maps should be read in conjunction with the text within the Draft SMP document.


Policy Development Zone 5 - Thorpeness to Orford Ness
Management Area 15 - Martello Tower To Orford Ness (Ch 46.5 To 53)
Key:
Policy Development Zones
Management Areas
Policy Units
Chainage
Scheduled Monuments
Saxmundham
Leiston
Snape, Suffk
Thorpeness
Aldeburgh
Tunstall, Suffk
Orford, Suffk
Martello Twr
ORF15.1
ORFORD
ORF15
ORF15.2
ORFORD NESS
PDZ5
PDZ6
RIVER ALDE
RIVER ORE
Blackstakes Reach
Home Reach
Radio Station
Jetty
Raydon Hall
Town Marshes
Orford Quay
Stonyditch Point
The Firs
Valley Fm
High House Fm
Crag Fm
Lodge Fm
Ferry Fm
Cowton
0
500
1,000 Metres
N
100 yr shoreline position:
Draft preferred policy would be the same as With Present Management
With Present Management where this differs from the Draft Preferred Policy
Draft Preferred Policy where this differs from the With Present Management
Indicative shoreline zone under Draft Preferred Policy
Note. Further explanation of these lines and zones is provided on the previous page.
Existing Indicative EA Flood Risk Zone
EA Flood Risk Zone where Draft SMP policy is for continued management of defence.
EA Flood Risk Zone 2 where under Draft SMP policy there would be increased probability of flooding.
ROYAL HASKONING
I:\9S4195\Technical_Data\GIS\Projects\Figures\Policy Development Zones\With Present Management

SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The aim of the plan is to maintain the important natural character of Orfordness. There remains uncertainty with respect to management to the area south of the Martello Tower through to the Lantern Marshes. This needs to be resolved through an estuary management plan. There is a commitment by the Suffolk Coast ICZM Initiative[2] to develop with local communities and interested groups a Management and Investment Plan for the Alde and Ore. This area will include the Alde and Ore estuary and its adjoining coastline. This plan will take account of the conclusions of the SMP, will review the recommended SMP policy and, if necessary, amend this accordingly. In the meantime it is important to have an interim policy for the coastline. From the perspective of purely managing the shoreline, a policy of No Active Intervention would be concluded. Present management relies on recycling shingle from further south on Orford Ness. There is currently an agreed emergency plan to recharge the shingle bank, if required, that is under constant review. Subject to continued monitoring this practice would continue in the short term. An alternative method may need to be developed later in the first epoch to avoid damaging the Orfordness shingle ridges. South of Lantern Marshes the intent would be for No Active Intervention. The Orfordness lighthouse is located on a highly dynamic feature and is now vulnerable to coastal process. Options for its future are currently being considered and these need to take into account the dynamic nature of the shingle feature, as well as environmental importance.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	No active intervention. Define actions with respect to Lighthouse.
Medium term	No active intervention.
Long term	No active intervention.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		**Policy Plan**			
		2025	**2055**	**2105**	**Comment**
ORF 15.1	Sudbourne Beach (south of the Martello Tower)	HTL	NAI	NAI	An interim policy pending an agreed Management and Investment Plan for the Alde and Ore area.
ORF 15.2	Orford Ness	NAI	NAI	NAI	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

The intent is to maintain the defence at Slaughden while practical. The policy would then change to NAI. This changes from the policy in SMP1 but is in line with the more recent approach being adopted.

[2] The Suffolk Coast Integrated Coastal Zone Management (ICZM) initiative is a partnership of organisations committed to developing an integrated approach to the management of the Suffolk coast. It includes East of England Development Agency, the Environment Agency, GO-East, Natural England, Suffolk County Council, Suffolk Coastal District Council and Waveney District Council.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	336	275	187	800
	Preferred Plan Damages £k PV	336	275	187	800
	Benefits £k PV	-	-	-	-
	Costs of Implementing plan £k PV	-	-	-	-

Strategic Environmental Assessment summary table for preferred policy MA ORF 15

This is an excerpt from the **Strategic Environmental Assessment** undertaken for the Suffolk SMP – for the full assessment, please refer to **Appendix F** (**Strategic Environmental Assessment: Environmental Report**).

ISSUE	DETERMINATION
ISSUE - Maintenance and Enhancement of Biodiversity on a Dynamic Coastline	
The interaction between the maintenance of designated freshwater or terrestrial habitat protected by defences and designated coastal habitat seaward of defences – will SMP policy provide a sustainable approach to habitat management?	Designated sites in this management area are Alde-Ore Estuary SSSI, Alde-Ore Estuary Ramsar/SPA, Orford Ness and Shingle Street SAC and Alde-Ore & Butley Estuaries SAC. Policy seeks to allow a natural evolution of the coastline with the northern section being held in Epoch 1 and then allowed to evolve naturally. The overall intent is to provide a sustainable natural frontage and overall the policy is considered to be minor positive.
Coastal squeeze and changes to coastal processes has the potential to adversely affect the integrity of international sites (Ramsar sites and areas designated under the Habitats and Birds Directives) – will SMP policy have an adverse effect on the integrity of any international sites?	The policy of NAI is considered contributory to the natural evolution of the site, which accepts natural changes as a key facet of this dynamic habitat. Therefore the effect is neutral.
Coastal squeeze has the potential to lead to the loss of UK BAP (priority & broad) coastal habitat. Alternative sites for habitat creation are required to help offset the possible future natural losses – will there be no net loss of UK BAP habitat within the SMP timeline up to 2100?	The BAP habitat in this area includes: Shingle, Mudflat and Saline Lagoons and on the landward side of the estuary some fringing areas of Coastal Floodplain and Grazing Marsh. The management area promotes a natural development of the coast. The shingle ridge will roll back landward at a slow rate, which may lead to the loss of saline lagoons (an ephemeral habitat which are also likely to form again in this area further landward). The overall effect is therefore minor positive.
Coastal squeeze has the potential to lead to coastal SSSIs falling into unfavourable condition. For example, approximately 50 of 100 SSSI units assessed at the Minsmere-Walberswick Heaths and Marshes SSSI are in unfavourable condition, although the majority of these (36) are in an unfavourable recovering condition. Factors attributable to the unfavourable declining condition relating to the SMP, are cited as coastal squeeze – will SMP policy contribute to further SSSIs falling into unfavourable condition and address the causal factors of existing units which are in unfavourable declining condition (due to coastal management) wherever possible?	The SSSIs in this management area are designated for mudflat, saltmarsh, vegetated shingle and coastal lagoons. The management area provides for a more natural management of the coast and the effect on SSSIs therefore minor positive.

ISSUE	DETERMINATION
ISSUE - Maintenance of environmental conditions to support biodiversity and the quality of life	
ISSUE - Maintenance of balance of coastal processes on a dynamic linear coastline with settlements at estuary mouths	
The Suffolk coast is a complex system of dynamic and static shingle, beach frontages, urban areas and estuary mouths. The system has been maintained in recent years to provide relative stability to the system in order to protect coastal assets. The effects of sea level rise require a more strategic approach to shoreline management, but the relative stability of the plan area needs to be maintained albeit within a dynamic context.	
Will SMP policy maintain an overall level of balance across the Suffolk coast in regard to coastal processes, which accepts dynamic change as a key facet of overall coastal management?	The Policy seeks to provide a dynamic coastal system which supports the integrity of the estuary and the dynamism of the ness. The overall effect is considered minor positive.
Will SMP policy increase actual or potential coastal erosion or flood risk to communities in the future?	The policy will not increase flood risk. The overall effect therefore is neutral
Will SMP policy commit future generations to spend more on defences to maintain the same level of protection?	The management area will not require management past the first epoch and therefore the cost of this defence is minor positive.
Does the policy work with or against natural processes?	The overall intent of the management area is to promote a natural evolution of the coast. The overall effect is therefore minor positive.
ISSUE - Maintenance of water supply in the coastal zone	
Agriculture on the Suffolk coast is dependent on the maintenance of a freshwater supply from groundwater aquifers. The delivery of this supply is threatened by intrusion of salt water into freshwater aquifers and from the loss of boreholes at risk from erosion – will SMP policy maintain structures to defend water abstraction infrastructure and to avoid any exacerbation of levels of saline intrusion into freshwater aquifers.	The management area will lead to the ongoing stability of the estuarine system and will allow the ness to move naturally. The overall effect is therefore minor positive.

ISSUE	DETERMINATION
ISSUE - Maintenance of the values of the coastal landscape & Area of Outstanding Natural Beauty (AONB)	
The maintenance of the coastal landscape in the face of coastal change on a dynamic coast and estuary system. A key factor being the potential change in the landscape in response to shifts in coastal habitat composition and form. Will SMP policy maintain a range of key natural, cultural and social features critical to the integrity of the Suffolk coastal landscape? Will SMP policy lead to the introduction of features which are unsympathetic towards the character of the landscape?	 The management area will provide for the natural development of the ness and will not lead to the human features on the ness being at any significant in the timeline of the plan. Overall the benefits of this are neutral. The management area will not lead to any new features. Overall the effect is considered to be neutral.
ISSUE - Protection of historic and archaeological features on a dynamic coastline	
The coastal zone in Suffolk contains a range of archaeological and palaeo-environmental features which may be at risk from loss from erosion within the timeline of the SMP – will SMP policy provide sustainable protection of archaeological and palaeo-environmental features (where appropriate) and ensure the provision of adequate time for the survey of archaeological sites where loss is expected.	SMP policy in this area is for NAI across all areas and epochs, except for Sudbourne Beach, which is NAI for epoch one. Sudbourne marshes contain prehistoric, Roman and medieval coastal related sites, while Orford Ness possesses a major group of 20th century military structures. However, due to the stability in the system, these are not considered to be affected during the lifetime of the plan and the effect is therefore neutral.
ISSUE - Protection of coastal communities and culture	
Protection of key coastal infrastructure	
The Suffolk coast is visited by a large number of tourists and residents every year. Access to and along the coast is provided by a range of coastal footpaths (the primary footpath being the Suffolk Coasts and Heaths Footpath). The provision of this access, rather than the actual footpaths themselves supports a range of values which contribute to the quality of life and local economy of the Suffolk coastal area. Paths are often located close to the foreshore in areas at risk from coastal erosion (or within potential areas for managed realignment) – will SMP policy maintain or enhance levels of access along or to the Suffolk coast.	The policy would not lead to any loss of continued access along the coast and the effect is therefore neutral.

APPROPRIATE ASSESSMENT - PREFERRED PLAN **MA 15**

This is an excerpt from **Appendix I** of the **Appropriate Assessment** undertaken for the Suffolk SMP – for a full description of the potential effects and any avoidance measures, mitigation or compensation required as a result of the policies, please refer to **Appendix J** (**Appropriate Assessment Report**).

Alde-Ore Estuary SPA & Ramsar site features	**Article 4.1 Qualification** During the breeding season the area regularly supports: Marsh harrier Avocet Little tern Sandwich tern Over winter the area regularly supports: Ruff Avocet **Article 4.2 Qualification** During the breeding season the area regularly supports: Lesser black-backed gull Over winter the area regularly supports: Common redshank **Ramsar criterion 2** The site supports a number of nationally-scarce plant species and British Red Data Book invertebrates. **Ramsar criterion 3** The site supports a notable assemblage of breeding and wintering wetland birds. **Ramsar criterion 6 – species/populations occurring at levels of international importance** Qualifying species/populations (as identified at designation): Species regularly supported during the breeding season: Lesser black-backed gull Species with peak counts in winter:

	Pied avocet Common redshank	
Sub Feature(s) Vegetated shingle	**Sensitivity** The shingle supports a number of rare and scarce invertebrates and is an important breeding place for many bird species including terns and avocet. Large areas of well developed sea pea. Trampling and damage from vehicles is an issue. Risk of loss due to coastal erosion and sea level rise.	**Conservation Objective** The conservation objectives for this site are, subject to natural change, to maintain*, in favourable condition, the habitats for the populations of the regularly occurring Annex 1 bird species and migratory bird species +, of European importance, with particular reference to grazing marsh, saltmarsh, intertidal mudflat and shallow coastal waters. +avocet, Sandwich tern, little tern, ruff, redshank, lesser black-backed gull * maintenance implies restoration if the feature is not currently in favourable condition.
Shingle ridge	Acts as a shingle barrier. Damage from vehicles driving over it. Previous coastal management has damaged the ridge.	
Saltmarsh - some extensive areas of well developed salt marsh, accreting on fringes of Alde	Risk of loss of important saltmarsh species through sea level rise and coastal erosion.	
Intertidal mudflat - fringing and on both sides of the channel	Risk of loss from coastal squeeze and sea level rise.	
Marshes and reed bed	Home to gull colonies which are at risk from fox predation. Reeds spreading as site gets wetter but water levels limited as BBC transmitter station cannot be isolated from rest of unit. Some areas to the north are more brackish. Grazed areas are good for lapwing and redshank.	
Saline lagoons - formed when shingle was used to build roads.	Becoming more species rich as lagoons become more established. At risk of loss through sea level rise.	

Alde Ore and Butley Estuary SAC site features	**Annex I habitats (that are a primary reason for selection):** Estuaries **Annex I habitats (present as a qualifying feature but not primary reason for selection of this site):** Mudflats and sandflats not covered by seawater at low tide, Atlantic salt meadows	
Sub Feature(s) Shingle bar - only bar built estuary in UK with a shingle bar. Vegetated and dynamic shingle habitat.	**Sensitivity** Coastal accretion - bar has been extending rapidly along the coast since 1530 through longshore drift from the north, pushing the mouth of the estuary progressively south-westwards.	**Conservation Objective** The conservation objectives for this site are, subject to natural change, to maintain*, in favourable condition, the Atlantic salt meadows, estuaries, mudflats and sandflats not covered by the seawater at low tide, saline lagoons, annual vegetation of drift lines and perennial vegetation of stony banks. * maintenance implies restoration if the feature is not currently in favourable condition.
Mudflats and sandflats - not covered by seawater at low tide	Risk of loss from coastal squeeze and sea level rise.	
Atlantic saltmeadows	Past canalisation and erosion together with sea level rise has resulted in the loss of much of the saltmarsh.	
Vegetated shingle	Many plant species that are nationally rare are found here in abundance.	
Lagoons	At risk from sea level rise and coastal squeeze.	

ORF 15.1 to 15.2

Potential effect of policy: It is considered that this Management Areas would not on consideration, have an adverse effect on the integrity of the International sites. There will undoubtedly be an effect in certain areas; however, no examples have been identified where this effect would be contributory towards an adverse effect on site integrity.

Implications for the integrity of the site: None