



Suffolk SMP2 Sub-cell 3c
Policy Development Zone 4 – Dunwich Cliffs to Thorpeness

Suffolk Coastal District Council/ Waveney District
Council/ Environment Agency

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Version 9

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4.4 POLICY DEVELOPMENT ZONE 4

Dunwich Cliffs to Thorpeness
Chainage: 30 to 41.



Shoreline Management Plan Sub Cell 3C - Lowestoft Ness To Felixstowe Landguard Point
Baseline Location Map
Policy Development Zone 4 - Dunwich Cliffs to Thorpeness



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



4.4.1 OVERVIEW

PRINCIPAL FEATURES (further details are provided in Appendix D)

Built Environment:

The main feature of the zone is Sizewell Power Station. There are also the National Trust properties above the Minsmere Cliffs, the village of Sizewell to the south of the Power Station and various properties along the crest of the Sizewell Cliffs. To the south of the zone is the village of Thorpeness with properties immediately behind the southern beach of Thorpe Ness. Further inland are the villages of Eastbridge and Thebeton.

Heritage and Amenity:

The area is important historically, with evidence of early settlement in the Sizewell area. Several areas are identified as being of potential high archaeological value dating back to prehistoric times and Saxon times. The first Leiston Abbey, located just inland of the Minsmere Sluice, is a scheduled monument. The marshland to the south of this site is also of historic importance. The RSPB Minsmere Bird reserve is of high value as a tourism centre and the National Trust land and centre at Dunwich Heath is also a significant tourism centre. The area is contained within the Suffolk Coast and Heath AONB and the coastal path runs from Dunwich Heath along the full length of the zone. Facilities at Sizewell village are identified as being an important way point on the path and for use of the beach itself. There is also boat launching from Sizewell Beach.

Nature Conservation:

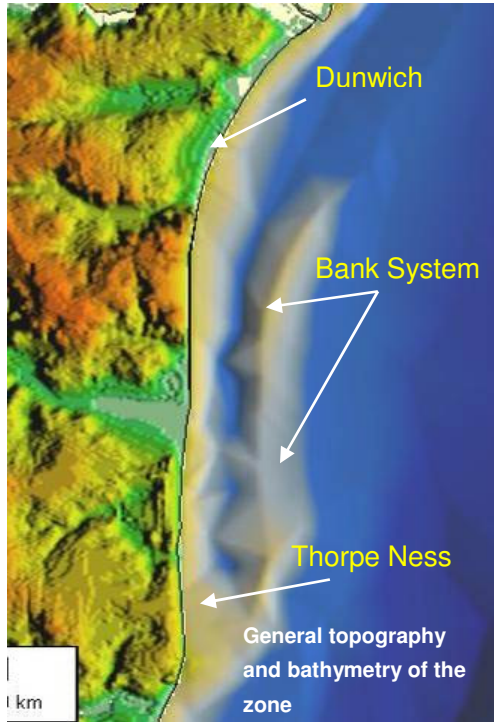
The northern half of Minsmere together with Dunwich Heath is included in and forms an essential aspect of the Minsmere-Walberswick Ramsar designation. This area is also designated as a SAC and SPA. The southern half of the Minsmere valley, together with the Sizewell Marshes behind Sizewell Power Station and a length of the coast running north from Thorpe Ness, are covered by SSSI designations – respectively, the Minsmere-Walberswick Heaths & Marshes, Sizewell Marshes and Leiston-Aldeburgh SSSIs.

STAKEHOLDER OBJECTIVES (the development of objectives is set out in Appendix B based on objectives listed in appendix E)

- To maintain the location and safe operation of Sizewell Power Station and any future development of the site;
- To maintain the tourism interest of this area;
- 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 this habitat and in particular the Minsmere RSPB reserve;
- To maintain a range of recreational activities along the foreshore;
- To support adaptation of the Sizewell community and individual interests along the frontage to any change;
- To maintain or enhance the high quality landscape;
- To maintain in a sustainable manner Thorpeness as a viable coastal settlement and tourist destination, recognising its cultural and heritage significance; and
- To promote ways to maintain access to and along the coastal path.

DESCRIPTION

The zone extends from just south of Dunwich Village to the access at the centre of



Thorpeness village. The whole frontage is dominated by the two areas of high ground, the Dunwich and Minsmere Cliffs to the north and the Sizewell Cliffs and Thorpeness headland to the south. The coast between is cut by the extensive valley of the Minsmere River, which includes a smaller side valley behind Sizewell. In the nearshore area there are two banks running parallel to the shore, the Dunwich and Sizewell banks to the north and south respectively, with a deeper channel (10m CD.) running between the shore and the banks. At the southern end of the banks this channel virtually disappears with a connection between the nearshore area of Thorpe Ness and the southern end of the Sizewell bank. The two banks (both rising to about 3m CD.) are separated in front of Minsmere by a deeper area, typically down to 5m CD. This deeper area changes in level such that the banks are at times nearly continuous and at other times relatively separate. There has

been a trend for the banks to amalgamate since the mid-1800s and to grow northward while also moving inshore.

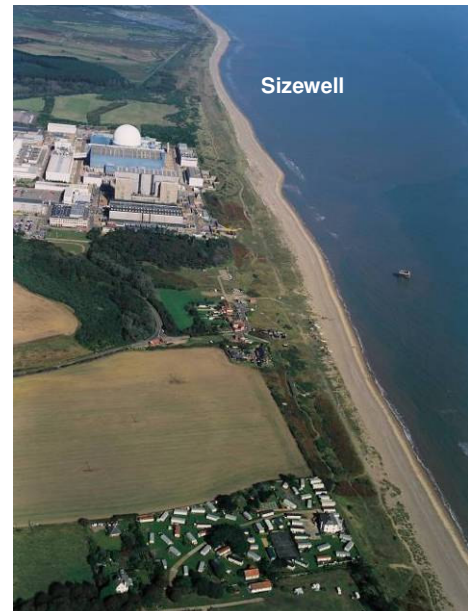
The shore over the whole area is typically that of a relatively sandy lower beach with coarser shingle above, although this varies to a degree along the shoreline. In general the coast appears quite straight. However, on the ground there is significant, though quite slight, variation in the alignment. Most noticeable is the tendency for the coast at Minsmere to be held forward of the general alignment, with the apex of this tending to be at the position of the sluice. This also coincides with the lower section in the offshore banks and is potentially associated with the centre of the Minsmere River valley.



The backshore also varies in position and character. To the northern end are the steep Dunwich Cliffs, with little upper beach berm which is presently relatively well vegetated. Further south there are areas of the more gently sloped cliff with a reasonable width of beach berm between the toe of the slope and the crest of the beach.

Set back some 60m from the crest of the Minsmere Cliffs are the National Trust properties and visitor centre.

At the southern end of the Minsmere Cliffs, the cliffs, decreasing in height to the Minsmere valley, are again relatively steep and tend to curve in line with the alignment of the shore through to the sluice. The backshore across Minsmere comprises a system of natural and remodelled systems of sand and shingle. To the north of the sluice is a man made channel and earth bank acting as a secondary line of defence. To the south of the sluice the shingle ridge and dune is the main defence to the low lying land behind. This continues through to the slightly higher ridge of land to the north of the Sizewell Power Station.



The Power Station is set back some 100m behind the beach with a width of dune and shingle fronting a higher earth embankment. The embankment comprises two banks, one at 5m OD and the other at 10m OD. The Sizewell village frontage is similarly set back with a lower lying area of dune and shingle between it and the beach. Behind the village is the main access road to the Power Station, with a road and car park to the front of the village. Along this frontage the beach is pulled forward, apparently associated with the position of the water outlets of the Power Station.

South from Sizewell, the coastline again rises and there tends to be an increasing width of back beach berm of accumulated material between the cliff face and the active beach slope. This berm continues all the way through to the nominal shoreline position of the Ness (although the actual ness feature extends within the nearshore area over a significantly greater extent). Beyond the shoreline position of the Ness, the backshore berm decreases rapidly in width and the cliff is steep and slowly eroding.



There is a slight increase in beach width as the cliff line decreases to the centre of Thorpeness village and the shingle beach tends to widen slightly as the cliff curves towards the southwest. To the back of the beach at Thorpeness is a low shallow slope earth bank with property set back only 20m to 30m behind this bank. These properties are typically some 70m behind the active face of the beach. These properties are in two sections. A single line of properties runs to the seaward side of North End Avenue. A larger cluster of properties is located behind Old Homes Road and the B1353. There are rock gabions in front of North End Avenue.

PHYSICAL PROCESSES

TIDE AND WATER LEVELS (mODN)

Location	LAT	MLWS	MLWN	MHWN	MHWS	HAT	Neaps nge	Spring range	Correction CD/ODN
Southwold		-1.15	-0.50	0.80	1.10		1.10	1.25	-1.3
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

Extremes(mODN)

Location:	1:1	1:10	1:25	1:50	1:100	1:250	1:500	1:1000
Southwold	2.05	2.58	2.79	2.94	3.1	3.31	3.47	3.63
Dunwich	2.05	2.57	2.78	2.93	3.09	3.3	3.45	3.61
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

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. Wave modelling inshore shows dominant wave directions from northeast and east northeast through to east southeast, with the latter direction being the south southwest offshore waves refracted around Thorpe Ness.

TIDAL FLOW

Tidal flow is south on the flood and north on the ebb, with speeds of the order of 0.7m/s on spring tides. The banks influence flows and it is projected that if the banks do move further inshore there may be a flood dominance in the regime.

PROCESSES

Control Features:

The main physical control features are the cliff line to north and south, with the harder Coralline Crag of Thorpeness acting as the principal anchor to the south. The nearshore banks clearly influence shoreline behaviour. These features are considered to be banner banks associated with Thorpeness. However, the indication of north northeast/south southwest orientated features offshore, such as the Aldeburgh Napes, suggest a possible geological base to some of these banks, in particular possibly to the Sizewell bank leading from Thorpeness. There is no geological evidence of this.

Existing Defences:

There are limited sections of man-made defences along the frontage, with defences tending to be set back behind the active shingle beach. The Minsmere Sluice does cut through the shore as a hard structure. Behind the natural shoreline there is the embankment to the northern end of the Minsmere valley and a more substantial bank and a maintained dune system set back in front of Sizewell Power Station.

There are also various low banks within the Minsmere valley acting to channel the river and contain the various areas of open water.

Processes:

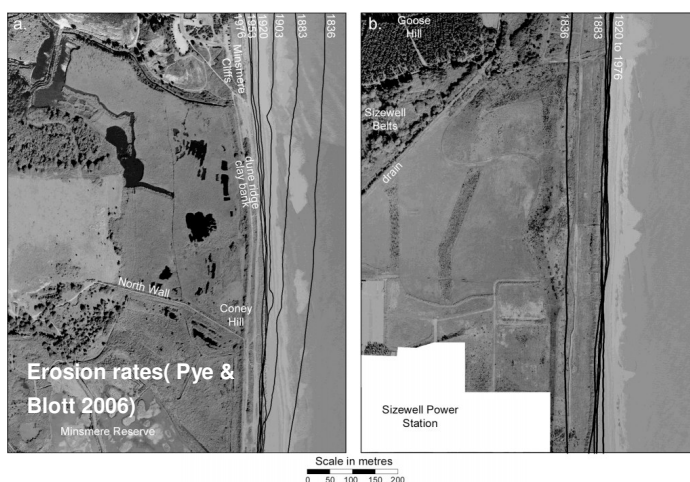
The whole frontage is considered in all studies to be strongly in line with net wave energy such that

there is limited net drift of sediment. However, within this system there is recorded significant movement both to north and south along the shoreline, tending to balance overall. There is a slight net southerly movement modelled and a very weak net drift to the south past Thorpe Ness. To the south of Thorpe Ness the indication is for a slight net northerly drift tending to hold material under the cliffs at Thorpeness Village. With the larger variation in drift rates, however, there can be significant local change in the condition of the beaches and this can, in more extreme events, result in exposure and erosion of the cliffs. The erosion of the cliffs is seen as providing important sediment supply to the system, maintaining a net balance along the coast.

In the past there have been occasions when the shingle ridge over the Minsmere valley has breached. Although after many events this required intervention to maintain the defence, following the breach of 1857 the natural defence healed itself without assistance. This does reinforce the concept that this frontage is mobile but quite stable. It has to be noted that there may have been greater input of sediment to the frontage at this time with erosion of the cliffs to the north and possibly great input from the shoreline further north. It also highlights, therefore, the importance of maintaining sediment drift to the area to maintain a competent natural defence line.

There is considerable discussion over the impact of the sluice at Minsmere. This structure quite evidently does influence movement along the shore, although not consistently acting as a full barrier. The structure is believed to act to strengthen the coast at this location, tending to limit more excessive movement away from the area and tending to encourage the overall retention of material towards the centre of the valley. There is an issue, however, of whether this accumulative behaviour of the shore at this point is totally as a result of the sluice. Potentially, it is the location of the sluice at the centre of the valley which provides the underlying geomorphological control. This may also be associated with the lower division between the banks offshore. The presence of the sluice reinforces this behaviour. Regardless of these uncertainties in the underlying structure of the coast, the sluice is considered to be an important structure.

Various studies have examined the past and present erosion rates of the area. These all conclude that to the south of Minsmere, there tends to be far less variation than further north under the cliffs at Minsmere and Dunwich. Certainly in the southern section of the coast south of Sizewell Power Station there is greater protection offered by the shingle beach to the backshore ridge and cliffs. This additional width of beach, coupled to the stronger nature of Thorpeness and the nearshore influence of the Ness itself, provides the shore with a greater ability to respond to specific storm events without resulting in a net landward retreat of the overall shoreline.



A recent report (*Kenneth Pye and Simon J. Blott 2006*) highlights the variation in longer term erosion of the frontage. This demonstrates the development of the cliffs to the north of Minsmere and the accretion occurring south of the valley. It is noted that this accretion occurs before the construction and outfalls at the Power Station.

To the northern end of the system at the Dunwich and Minsmere Cliffs, periods of erosion of the beaches have exposed the cliff line more regularly, causing a net retreat of the shore. With the distribution of sediment along the shore, the input locally of sediment is never able to build sufficiently to resist further erosion of the cliffs. The process is seen as being similar to the manner in which Dunwich Cliffs control the shingle bay over the Walberswick marshes. It is probably part of a larger system of behaviour.

The shore sediments are relatively mobile and are supported cross-shore by the cliffs backing the shore, or in the case of the Minsmere valley section, by the limiting effect of the cliff line to the north. During more severe conditions the cliff is exposed and erodes so material is able to infill behind, creating the variation in width of beach berm. Such areas locally have a greater resilience to erosion of the back cliff and, therefore, there is preferential erosion elsewhere. The net effect is that the shoreline acts as a unit, slowly eroding inland. Underlying this is the variation in wave climate and the behaviour of the nearshore banks such that there is also the creation of very shallow bays. Each separate section still, however, acts within the overall behaviour as a continuous unit. Long term average erosion trends suggest that the coast is still attempting to adjust in shape such that the frontage to the north is eroding at a slightly faster rate than to the south, in effect hinging on Thorpe Ness.

Locally, particularly at the interface between the cliffs and the low lying area of Minsmere, there can be discontinuity along the coast. This is seen most significantly to the northern end of Minsmere where there has been an area particularly vulnerable to setting back. Overall, this is seen as a local problem rather than a breakdown of the larger system, although attempting hold the line forward artificially in this area would detract from the overall resilience of the area.

Unconstrained Scenario:

The unconstrained scenario assumed that all defences are removed. In the case of this zone, defences tend to be set back from the active shoreline area. Therefore, apart from the influence the sluice imposes on sediment behaviour, the shoreline is still responding relatively naturally with little significant interaction at present between this and the man made flood defences to the rear.

Overall, the system would be expected to adjust very slowly to erosion and sea level rise in much the same way as it does now. There would be increased flood risk to the hinterland in the absence of any defences, but until there was an actual breach this would not significantly impact on the processes at the shoreline. There will be a tendency for the coast to the north to erode slightly faster and cause reorientation to the frontage very slightly to the north. This will tend to increase stability. At Minsmere, in the absence of the sluice, the frontage would tend to flatten slightly, potentially increasing the pressure on the secondary defence behind. This could result in a breach to the low lying area and the development of a tidal inlet. The net effect of this may well be to compensate for the loss of the sluice through the creation of an ebb tide delta, having a very similar impact on the coast as the current sluice. More locally at the northern end of the Minsmere frontage, the recent erosion and overtopping demonstrates the vulnerability of this section of the coast. There is evidence to indicate that there may be long term movement inshore of the offshore banks. It has been suggested that these banks may eventually close the channel between the banks and the shore. Such behaviour, although by no means certain, would significantly change the behaviour of the frontage.

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)
Dunwich Cliffs	0.6	Erodes intermittently.	25 to 103
Minsmere Cliffs	0.4	Erodes intermittently.	25 to 103
Minsmere	0.1	Influenced by the offshore banks and higher adjacent coastline.	20 to 75
Sizewell	0.1	An area generally protected by beach.	10 to 70
Sizewell Cliffs	0.0	Protected by back beach berm but still potentially influenced by sea level rise and roll back.	10 to 30
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

4.4.2 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 2	Dunwich Village to Dunwich Heath	retreat	S5	Dunwich	Limited intervention
			S5	Minsmere Cliffs	NAI
MIN 3	Dunwich Heath to North Sizewell	retreat	S5	Minsmere north	MR
			S5	Minsmere Sluice	HTL
			S5	Minsmere south	NAI
MIN 4	North Sizewell to Sizewell Gap	HLT	S5	Sizewell	HTL
MIN5	Sizewell Gap to Thorpeness Common	Do Nothing and HTL	S5	Sizewell Cliffs and Thorpe Ness	NAI
MIN 6	Thorpeness Common to The Haven	HTL	S5	Thorpeness Village	HTL

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. Structures would fail at the end of their residual life. There would be no raising of defences to improve standards of protection.

In terms of coastal processes, under this scenario the coast may be expected to act in a manner similar to the way it behaves at present. The coast will erode slowly, although there will be increasing vulnerability at the northern end of the Minsmere frontage.

In the short to medium term (possibly within Epoch 1) the Minsmere Sluice will fail and with that there will be an initial flattening of the coast, pressure and failure of the defences behind. Since no action would be taken, a tidal inlet is likely to develop. Whether this inlet is then sufficient to create a regular entrance channel forming a fully functioning estuary is uncertain. Alternatively, the valley may function more as the Broads north of Southwold. In the case of an estuary developing, there is likely to be fully developed ebb tide delta. In the latter case there would tend to be a seepage fan of shingle. In either case the presence of the valley would tend to restore a degree of control on the coast.

There is also the possibility of a breach in the defences to the north of the main reserve and this initially may form a separate inlet allowing potentially better adjustment in the transition between the cliffs and the valley. There is a small, slightly separate valley in this area, defined by the ridge coming down to Coney Hill. At present the area drains through the main sluice. The response of the coast would be determined by the degree to which this valley is able to flood and form a separate inlet and a separate ebb delta or seepage fan, rather than merely contributing to the main valley inlet.

In terms of impacts, the erosion of the northern cliffs may in the long term affect property along the frontage but probably not until the final epoch of the SMP (50 to 100 years). Erosion is most unlikely to affect the main National Trust Properties but would affect the car park and visitor centre over the same sort of period. The erosion line projected by the SMP for the area is based on the crest of the cliff rather than the back of the shoreline.

The failure of the defences at Minsmere would have a major impact on the bird reserve and there would be a significant change in the nature of the habitat. The erosion line projected by the SMP for the area is based on the back of the beach crest as this determines the impact on assets behind and

the potential interaction with defences. This is also true for the Sizewell frontage. Flooding of the valley would put properties at risk further inland at Eastbridge, including properties in the village and the pub, and potentially to the back of Sizewell village

At Sizewell Power Station the high defence behind the existing dune would still provide a high standard of protection to the central section of the site. Flooding would occur to the land to the rear of the Power Station, although this is not shown as affecting the Power Station site itself. Over the period of the SMP the roll back of the beach face may encroach upon the toe of the rear defence, although there would still be a beach in front. Beyond the SMP period this erosion would continue, gradually eroding the back defence. It is unlikely the natural defence to the village would be affected but there may be loss of the Coastguard Lookout.

Further south, the erosion line projected by the SMP for the area is based on the crest of the cliff rather than the back of the shoreline. This suggests that some properties might be affected towards the end of the SMP period. In particular there may be risk to Sizewell Hall and to Thorpeness House.

At Thorpe Ness there would be slow erosion and this has the potential to allow further erosion to the south in front of the village. Initial losses might be anticipated on the seaward side of North End Avenue during the next 50 years. This erosion would continue beyond the period of the SMP, placing other properties in this area at risk. There is probably less risk of erosion to the south with properties seaward of the B1353 only coming under threat towards the end of the SMP period.

With Present Management (Scenario 2):

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

Over much of the area the response would be similar to that of NAI. The specific differences are discussed below.

At the northern end of the Minsmere valley the current policy is for managed realignment. The specific nature of this is uncertain at this time and this is currently under review.

The policy at Minsmere Sluice is for holding the sluice. This will become more difficult as the coast to either side rolls back. However, if this was attempted by purely reinforcing the sluice this would reinforce its behaviour as a sediment barrier. The consequence of this would be to tend to divide the coast into two distinct bays. The net effect could be to increase erosion immediately to the south, while potentially slowing erosion to the north. The impact is unlikely to extend as far south as Sizewell but could encourage a breach into the low lying land behind. If the approach to maintaining the sluice was to allow its impact to reduce in line with the slow roll back, then it would continue to hold the coast forward without significantly changing the overall alignment. The intent of the policy would be to maintain the Minsmere reserve in a similar condition to present. There would be the potential for increased flooding within the Minsmere valley due to the increased periods when flow from within the valley is unable to be released due to level of the tide. The potential impact of this on the ecological value of the area would need to be examined in detail, as would the increased flood risk to properties further within the valley.

At Sizewell there may be a need to reinforce the toe to the back defence. In a similar manner to the sluice, if this is achieved while still allowing general sediment drift, this is unlikely to cause significant disruption to the coastal system.

Holding the line south of Thorpe Ness would have little impact on the system as it is to the south of the continuing main control point. There are no significant sustainability issues but this would have a potential impact on the reasons for designation of the area.

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 other 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
<i>Location</i>	<i>Assets at risk</i>	(£x1000)
Dunwich cliff	1 no. property.	£49
Thorpeness village	8 no. properties.	£302
WPM		Present Value Damages
<i>Location</i>	<i>Assets at risk</i>	(£x1000)
Dunwich cliff	1 no. property.	£49
Thorpeness village	8 no. properties.	£302

MDSF ASSESSMENT OF POTENTIAL FLOOD RISK

Within Minsmere Valley	Properties to back of flood area. Agricultural land.	£5,602 £255
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OTHER INFORMATION:

No further information is available from more detailed studies at this time.

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 the location and safe operation of Sizewell Power Station and any future development of the site						
To maintain the tourism interest of this area						
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 this habitat and in particular the Minsmere RSPB reserve						
To maintain a range of recreational activities along the foreshore						
To support adaptation of the Sizewell community and individual interests along the frontage to any change						
To maintain in a sustainable manner Thorpeness as viable coastal settlement and tourist destination recognising its cultural and heritage significance						
To maintain or enhance the high quality landscape						
To promote ways to maintain access to and along the coastal path						

4.4.3 DISCUSSION AND DETAILED POLICY DEVELOPMENT

Thorpe Ness as a headland and nearshore feature controls the long term behaviour of the zone and this is unlikely to change significantly over the period of the SMP. The eroding cliffs to the northern section of the frontage generally control the retreat of the zone. Although Sizewell Power Station imposes a need to hold the line of defence, over the period of the SMP this imposes no significant impact on the coast as a whole. It is only at Minsmere that there are potentially wider implications of management, in particular with respect to the sluice. To the south of Thorpe Ness there are primarily local issues of management.

SUB-DIVISION AND DETAILED ASSESSMENT

From the above general assessment, in considering the review of policy, the coast may be divided up into four sections for discussion despite the zone working very much as a continuous unit.

Dunwich and Minsmere Cliffs

Within the previous policy development zone it was concluded that at Dunwich Village the policy could allow minor intervention, with the constraint that the village does not warrant becoming a significant hard point, that sediment is still allowed to move across the frontage and the general erosion of the cliff to the south is unimpeded. This is important in relation to this current zone in that the cliffs supply material which then becomes distributed over the whole frontage. The policy previously defined under WPM is confirmed: there should be no active intervention.

Minsmere

The assessment of this section of the coast shows that there is no great pressure for erosion. Average erosion rates in the area of the sluice are of the order of 0.1m/yr and there have been periods of accretion and erosion. This erosion occurs more as roll back of the shingle face than specific loss of material from the frontage. As roll back of the shingle bank does occur, there is the likelihood that in the long term this shingle ridge would roll back such that it impinges more on the man made defence behind. At this point the interaction of the shingle ridge and the bank would tend to stop the natural behaviour of the system and would start to affect the behaviour of the coast as a whole.

Maintaining this situation would start to require increasing effort in terms of management and in the longer term would start developing towards an unsustainable situation. This clearly would be in conflict with the general principle or intent to reduce reliance on artificial defences and as such could not be recommended without good reason. Given the shape of the valley, as the shingle ridge rolls back it is unlikely to remain a fully competent defence against flooding and would tend to behave in a similar manner to the shingle banks further north, backing Dunwich Bay. As such there would be increasingly regular overtopping, with the ridge likely to flatten and widen.

Within the Minsmere valley there would be the risk of flooding to the villages of Eastbridge, Therberton and potentially the rear of Sizewell Village. Addressing this flood risk locally away from the active coastal zone would be the more sustainable approach.

Any decision to maintain or recreate defences to the rear of the existing line is really one of expectation as to maintaining different extents of habitat. This cannot be determined

by the SMP and is a decision in relation to habitat management, taking account also of the tourism value of the reserve to the region and nation. In terms of the SMP, the abandonment of defences would increase the balance of habitat in favour of saltmarsh and mudflat creation, but at the significant loss of freshwater habitat. In making this decision, as previously discussed in other PDZs, there is concern over loss of freshwater habitat within the coastal zone. In terms of nature conservation interests, the problem is that holding or defending the shingle ridge here would be detrimental to the internationally important shingle/beach habitats. However, allowing the hinterland to flood would be detrimental to the freshwater interests.

It is not anticipated that this real conflict between maintaining the defence system of the shingle ridge and rear bank, and avoiding significant impact on the coastal processes, would occur within the first two epochs of the plan. However, the intent would be to allow the natural development of the shoreline in the long term with the consequence of increasing flooding to the hinterland. Nominally the policy over this main section of Minsmere would be to Hold the Line initially, but with an underlying intent that management of these front defences would cease if actions resulted in significant disruption to the natural ridge. Therefore the overall intent is for managed realignment, with retreat of the frontage over the three epochs. This would not preclude future pumped drainage if this was necessary to allow adaptation of the habitat behind the sea defence. The sluice is seen as an important feature in controlling this managed realignment, at least until there is conflict between the natural shingle ridge and the rear defence. It would be the intent of the plan, therefore to maintain the sluice in such a manner as to maintain its function as a drainage structure to the land behind. This is discussed further below.

The concept of managed realignment at the northern limit of the valley more immediately is, however, supported, in particular if this area is separated from the main valley through construction of a cut off bank. Subject to detailed study, it is considered that this would create a better natural transition between the cliff line to the north and the shingle ridge to the south. This benefit would be potentially lost if the area were found or encouraged to link with the main area of the reserve.

At the sluice, with management again not overly reinforcing the control imposed by the sluice on sediment movement, maintaining the position of the sluice is considered appropriate management of the shoreline. Eventually, towards the end of the SMP period, some significant adjustment would be necessary given the roll back of the coast to north and south. This needs to be reviewed in subsequent SMPs, considering the developing pressure at this point in relation to holding the secondary line of defence. As commented above, the value of providing pumped drainage of the valley would need to be considered in relation to management of the nature conservation features. Defence locally in the area of the villages to the rear of the valley is seen as being more sustainable.

Given the above, in particular maintaining the variability of sediment supply, the shingle banks to the south of the sluice would continue to roll back. There would be no need for significant management assuming that occasional flooding of the hinterland is acceptable as at present. Until the actual sluice and rear bank to the north start influencing the coastal behaviour directly, there could be minor works required over the short to medium term epochs to improve the condition locally to this length to the south.

This would not be incompatible with the policy set for Catchment Flood Management.

The overall plan for the area is to allow natural function of the shoreline. While the standard of protection within the valley would decrease over time, it is not anticipated that there would be substantial inundation of the area potentially over the period of the SMP. There is risk within the valley to properties due to increased flood risk and this is discussed above. There is also potential impact on Leiston Abbey and associated with this the historic landscape of freshwater marshes. This risk is unlikely to become substantial until such a time that regular overtopping of the shoreline ridge occurs, potentially not till epoch 3. Even so, this risk is identified now so that the need for mitigation of possible impact may be in the future is highlighted.

There has been concern raised that in allowing natural response of the shore and increased potential flood risk, that the power station would be located on a island. This would not be the case. Flood management to the rear of the power station would need to be reviewed and it is important that development of the power station site is fully integrated with management of this northern area.

Sizewell and Sizewell Cliffs

The position of Sizewell Power Station and Village is within a zone where there is lower overall erosion. There is still a need to allow the variation of sediment drift across the frontage. This was seen to be critical during recent construction when a barrier to this movement resulted in sudden local erosion. In the long term, as the existing defences become locally exposed, there would be a need for low level management to strengthen the toe of the rear defence banks. As suggested in the strategy, this would not significantly impact on the wider area. The potential construction of shore based works, associated with offshore wind energy in the vicinity of Sizewell Village, has been identified. As above it is not anticipated that these works would require any substantial intervention at the shore, assuming that they are adequately set back.

It is not envisaged that intervention to the cliffs will be needed during the period of the SMP. If there were a risk to property, the SMP would not preclude the type of management considered at Dunwich. This low level of defence would not impact significantly on coastal processes. However, this is unlikely to be justified economically and would have to be assessed in terms of impact on the designations for the area.

Thorpeness

There is a more substantial risk to property in the area. Even so, this risk is not considered significant in terms of the overall objective to maintain Thorpeness as a community. Based on existing erosion rates risk to these properties may not materialise until epoch 3. As such, and given the relatively low overall economic loss, it is not anticipated that major coastal works could be justified. As with areas to the north, in terms of coastal processes, minor management of erosion could not be precluded. However, this would need to be considered specifically with respect to the important objectives for management of the nature conservation value for the area and to the area of coast to the north. During the development of SMP1 (which looked over a period of 50 years) the policy considered potential works to protect the property at Thorpeness. In considering this over a longer time period and with a view to future sustainable management, it is not considered appropriate to commit to increasing protection of

Thorpeness cliff. This would have the potential to disrupt the natural supply and behaviour of the coast immediately to the south, potentially jeopardising sustainable management of the risk to other properties. This would need to be considered in more detail and hence the attitude that local private works might be feasible subject to specific assessment of impacts.

Management Areas

Initially the frontage was divided into two management areas. Following discussion with key stakeholder and subsequent discussion with the CSG it was felt to be more appropriate to treat the whole frontage as whole area in terms of management. This reflects the on-going need to maintain defence to the Power Station, both in terms of protection along the coast and in terms of flood risk to the rear of Sizewell. In addition, it was recognised that management of the Power Station frontage may provide potential benefit to management of the area to the north. In summary, therefore, and although discussed in four areas above, in terms of management the zone is sub-divided into only one management areas:

- Dunwich Cliffs to Thorpeness (seven policy units).

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

PDZ4

MIN 12 & 13 - DUNWICH TO THORPENESS (CH. 30 TO 41)

4.4.4 MIN 12 & 13 - DUNWICH TO THORPENESS


Location reference:	DUNWICH TO THORPENESS (CH. 30 TO 41)
Management Area reference:	MIN 12 & 13
Policy Development Zone:	PDZ 4

* 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:

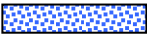
-  With Present Management.
-  Draft Preferred Policy.

-  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.



SUMMARY OF PREFERRED PLAN RECOMMENDATIONS AND JUSTIFICATION

PLAN: The intent of the SMP is to maintain a natural coastline where possible, maintaining defence to the Power Station and Sizewell village but the long term intent to allow natural overtopping and flooding of the Minsmere valley. There is no significant interaction between this and asset management within this area at present. The secondary line of defence at Minsmere, which protects properties in the hinterland, is unlikely to affect coastal processes until towards the end of the SMP period. The standard of protection both in terms of coastal overtopping and in terms of water level management within the valley is primarily in terms of the balance of habitat. This needs to be considered in more detail. The standard of defence does affect the possible approach to management of flood risk to villages within the hinterland. It is considered more sustainable to provide local flood defence in these areas rather than rely on the front line defence at the coast. When the defence line is eventually exposed, the SMP would not recommend maintaining it. In the interim, the sluice is recognised to have an important function in management of flood risk within the area. It also maintains a degree of control on sediment movement. The intent is that the structure is maintained but in such a manner that it does not become a barrier to sediment movement. This agrees with the general principles for managing this frontage. Also, given this, this may influence any decision with respect to possible pumping of drainage from within the Minsmere valley. The aim of the plan is to maintain the defence of Sizewell but to generally allow the natural development of the coast. These two aims are not seen as being in conflict. Within this, the plan would not preclude local management to reduce the rate of erosion but this would have to be assessed in detail, taking into account the potential impacts on nature conservation interests.

PREFERRED POLICY TO IMPLEMENT PLAN:	
From present day	Maintain the Minsmere Sluice and develop managed realignment to the north end of Minsmere.
Medium term	Adapt but maintain the Minsmere Sluice and manage realignment to the north end of Minsmere. Consider improving flood defence to areas within the Minsmere valley.
Long term	Adapt but maintain the Minsmere Sluice (subject to this not impinging on sediment movement) and manage realignment to the north end of Minsmere. Potential need to reinforce defence at Sizewell Power Station.

SUMMARY OF SPECIFIC POLICIES

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
MIN 12.1	Dunwich and Minsmere Cliffs	NAI	NAI	NAI	
MIN 12.2	Minsmere North	MR	MR	NAI	Encouraging development of a more natural transition between the shingle bank and the cliffs.
MIN 12.3	Minsmere Central	MR	MR	MR	Through management of the sluice. In effect this would require holding the position of the sluice but in the context of managed realignment of the overall unit.
MIN 12.4	Minsmere South	MR	MR	MR	Possible minor works to address local weak spots.
MIN 13.1	Power Station and village	HTL	HTL	HTL	Works in the long term may be required.
MIN 13.2	Sizewell Cliffs	NAI	NAI	NAI	
MIN 13.3	Thorpeness	NAI	NAI	MR	Potential need for minor works subject to local impacts.
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

CHANGES FROM PRESENT MANAGEMENT

No substantial change from existing policy over the northern half of the frontage. Change in policy at the northern section of Thorpeness from Hold the Line to long term managed realignment. Policy changed as protection in the long term is unlikely to be justified and in terms of potential impact on designated areas.

IMPLICATION WITH RESPECT TO BUILT ENVIRONMENT

Economics		by 2025	by 2055	by 2105	Total £k PV
Property	Potential NAI Damages/ Cost £k PV	2,514	2,103	1,580	6,159
	Preferred Plan Damages £k PV	227	283	332	842
	Benefits £k PV	2,287	1,830	1,248	5,317
	Costs of Implementing plan £k PV	35	344	370	749

Costs estimated at Sizewell not included. Potential need to reinforce bank to maintain defence to Power Station.

Strategic Environmental Assessment summary table for preferred policy MA MIN 12

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	
<p>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?</p>	<p>Designated sites in this management area are Minsmere Walberswick Heaths & Marshes SSSI, Minsmere Walberswick Ramsar/SPA and Minsmere Walberswick Heaths and Marshes SAC. Policy seeks allow a natural evolution of the coastline, with minimal management input to this frontage. Therefore deemed a minor positive benefit.</p>
<p>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?</p>	<p>The policy promotes the natural development of the coastline, where a dynamic range of habitat can function according to natural change. Part of this process may be the loss or migration of freshwater or saline habitat; this is addressed via mitigation (the habitat replacement policy). The overall effect is therefore minor positive.</p>
<p>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?</p>	<p>The BAP habitat in this area includes: Coastal Floodplain and Grazing Marsh, Lowland Dry Acid Grassland, Coastal Vegetated Shingle, Saline Lagoons, Coastal Cliffs and Slopes and Reed bed. The management area promotes a natural development of the coast. There would be a gradual shift from Coastal Floodplain/Grazing Marsh to Saltmarsh (via control of the sluice). The shingle and saline lagoon habitat will gradually migrate landward. It is considered, however, that the overall provision of BAP habitat will remain constant.</p> <p>Therefore, the management area is considered to have a minor positive effect on this area. Some BAP habitat may be lost, but an equivalent amount of alternate habitat will be gained.</p>
<p>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</p>	<p>The SSSI in this management area is designated for reed bed, shingle and grazing marsh. . The management area provides for a more natural management of this coast.</p>

ISSUE	DETERMINATION
<p>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?</p>	<p>Therefore, the management area is considered to have a minor positive effect on this issue.</p>
<p>ISSUE - Maintenance of environmental conditions to support biodiversity and the quality of life</p>	
<p>ISSUE - Maintenance of balance of coastal processes on a dynamic linear coastline with settlements at estuary mouths</p>	
<p>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.</p> <p>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?</p> <p>Will SMP policy increase actual or potential coastal erosion or flood risk to communities in the future?</p> <p>Will SMP policy commit future generations to spend more on defences to maintain the same level of protection?</p> <p>Does the policy work with or against natural processes?</p>	<p>The Policy seeks to provide a dynamic coastal system which is underpinned by dynamism and natural coastal evolution. The previous policy was one of constraint at the sluice; this policy seeks to promote natural change and therefore has significant positive effect.</p> <p>The management area will not lead to increased levels of erosion or flood risk. Coastal properties may be nearer to the foreshore as a result of MR, but will be protected by fronting saltmarsh as opposed to a shingle ridge. The overall effect therefore is neutral</p> <p>The management area will require additional defence works at Eastbridge and Coney Hill. However these are limited in their extent compared to the works required to maintain the shingle ridge. The overall effect is therefore neutral or minor positive.</p> <p>The overall intent of the management area is to promote a natural evolution of the coast and removes the need to defend the sluice as part of this (previous policy was to</p>

ISSUE	DETERMINATION
	HTL). The overall effect is therefore significant positive.
ISSUE - Maintenance of water supply in the coastal zone	
<p>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.</p>	<p>The management area will lead to the natural development of this area, and will lead to increased threats to aquifers, however the defence provided by the existing shingle ridge is not considered to be sustainable therefore the effects of realignment and NAI are desirable and to not actively lead to any significant threat to aquifers. The effect of this management area is therefore neutral (given the effects of SLR).</p>
ISSUE - Maintenance of the values of the coastal landscape & Area of Outstanding Natural Beauty (AONB)	
<p>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.</p> <p>Will SMP policy maintain a range of key natural, cultural and social features critical to the integrity of the Suffolk coastal landscape?</p> <p>Will SMP policy lead to the introduction of features which are unsympathetic towards the character of the landscape?</p>	<p>The management area will provide for the natural development of the coast. As part of the realignment of the coast, there will be a loss of a SAM (chapel which is the first site of Leiston Abbey). The effect is therefore expected to be minor negative due to the effects of the loss of the SAM, but countered by the provision of a more active, natural coastal landscape.</p> <p>The management area will not introduce new features into the landscape, although there may be some shift in habitat composition.</p>
ISSUE - Protection of historic and archaeological features on a dynamic coastline	
<p>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?</p>	<p>The policy would lead to the ultimate loss of an SAM (chapel at Leiston Abbey together with historic marshland to the south) at the southern edge of this area. However due to its location adequate time would be provided for its study. The overall effect is however irreplaceable and considered major negative.</p>
<p>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</p>	<p>The management area provides for a gradual/natural approach to realignment which would enable the study and investigation of archaeological features. The management area therefore may lead to the loss of features, but time is provided for their study and</p>

ISSUE	DETERMINATION
appropriate) and ensure the provision of adequate time for the survey of archaeological sites where loss is expected.	the benefit is therefore neutral.
ISSUE - Protection of coastal communities and culture	
<i>Protection of coastal towns and settlements</i>	
<p>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.</p> <p>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?</p> <p>Will SMP policy protect the coastal character of communities which have historically been undefended?</p>	<p>The Policy provides for MR, but provides defences for existing settlements at Coney Hill and Eastbridge. Coupled with the effect of saltmarsh as a defence mechanism, the overall effect is therefore minor positive.</p> <p>The policy will provide defence whilst moving the foreshore nearer to small settlements therefore increasing the coastal character of the area. The effect is therefore minor positive.</p>
<i>Protection of key coastal infrastructure</i>	
<p>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?</p>	<p>The MR policy would lead to the loss of the road connecting Eastbridge to rural areas to the north, west and south. It is anticipated however that due to the length of road affected being relatively small (200m) alternate routes would be provided. The overall effect is therefore considered to be minor negative.</p>

ISSUE	DETERMINATION
<p>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.</p>	<p>While MR would reduce overall levels of access this area is not known to be extensively visited by coastal users for traversing north-south.</p> <p>The overall effect is therefore considered to be minor negative</p>

APPROPRIATE ASSESSMENT - PREFERRED PLAN MA 12

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)**.

<p>Minsmere-Walberswick Heaths and Marshes SPA and Ramsar site features</p>	<p>Ramsar Criterion 1 The site contains a mosaic of marine, freshwater, marshland and associated habitats, complete with transition areas in between. Contains the largest continuous stand of reedbeds in England and Wales and rare transition in grazing marsh plants from brackish to fresh water.</p> <p>Ramsar Criterion 2 The site supports at least nine nationally scarce plants and at least 26 red data book invertebrates. Site supports a population of the mollusc <i>Vertigo Angustior</i> (Habitats Directive Annex II; British Red Data Book Endangered), recently discovered on the Blyth Estuary river walls. Site supports an important assemblage of rare breeding birds associated with reedbeds and marshland: Great Bittern, Eurasian Teal, Gadwall, Northern Shoveler, Pied Avocet and Bearded Tit.</p> <p>Article 4.1. During the breeding season the area regularly supports: Bittern, Nightjar, Marsh Harrier, Avocet, Little Tern Over winter the area regularly supports: Hen Harrier</p> <p>Article 4.2. During the breeding season the area regularly supports: Northern Shoveler, Common Teal, Gadwall Over winter the area regularly supports: Greater White-fronted Goose Northern Shoveler Common Teal</p>	
<p>Sub Feature(s) Swamp, marginal and inundation communities</p>	<p>Sensitivity Maintaining freshwater and coastal/intertidal habitats in situ, and in a favourable condition is not possible. There is a need to consider</p>	<p>Conservation Objective To maintain*, in favourable condition, the habitats for the populations of Annex 1 species* of European importance with particular reference to:</p>

<p>Saltmarsh</p> <p>Shingle</p> <p>Standing waters</p> <p>Grassland</p> <p>Heathland</p> <p>Grassland, marsh and standing water</p>	<p>adaptation for habitats that are not sustainable in the face of a dynamic coastal environment. The site is actively managed to prevent scrub and tree invasion of the heathlands grazing marshes and reedbeds. Much of the land is managed by conservation organisations and positively by private landowners through ESA and Countryside Stewardship schemes. The coastline is going to be 'pushed back' by natural processes. Alternative sites for reed bed creation are being sought to help offset the possible future losses.</p>	<ul style="list-style-type: none"> • Shingle • Swamp, marginal and inundation communities • Saltmarsh • Standing water • Grassland • Heathland <p>* Avocet, Bittern, Little tern, Marsh harrier, Nightjar, Woodlark, Hen harrier</p> <p>To maintain*, in favourable condition, the habitats for the populations of migratory bird species* of European importance, with particular reference to:</p> <ul style="list-style-type: none"> • Grassland, marsh and standing water <p>* Gadwall, Teal, Shoveler, European White-fronted goose</p>
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<p>Minsmere-Walberswick Heaths and Marshes SAC site features</p>		<p>Annex 1 Habitats. Annual vegetation of drift lines; one of only two sites in East of England. European Dry Heaths</p>	
<p>Sub Feature(s)</p> <p>Annual vegetation of drift lines</p> <p>Perennial vegetation of stony banks</p>	<p>Sensitivity</p> <p>Coastal habitats need to be dynamic in order to function, and to respond to coastal change and sea level rise. Currently this dynamism is constrained by the freshwater habitats of the hinterland.</p> <p>Recreational use of the coast is potentially a threat because rare shingle vegetation is highly sensitive to trampling damage, and rare birds which nest on shingle (such as Little Tern) are</p>	<p>Conservation Objective</p> <p>Subject to natural change, to maintain*, in favourable condition, the:</p> <ul style="list-style-type: none"> • annual vegetation of drift lines • perennial vegetation of stony banks <p>* maintenance implies restoration if the feature is not currently in favourable condition.</p>	

<p>Heathland</p>	<p>easily scared away.</p> <p>Annual vegetation of drift lines: This habitat is maintained through the action of natural coastal processes upon the shoreline. The requirement for management is limited and is restricted to ensuring that significant human disturbance of the vegetated shore zone does not occur. This aspect of management is addressed through the RSPB visitor management plan.</p> <p>This habitat is not considered likely to be threatened by actions within the SMP</p>	
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MIN 12.1 to 12.4

Potential effect of policy:

The intent of policy in this management area is the sustainable management of the conservation features in the face of climate change and sea level rise effects, as the northern valley at Minsmere is particularly vulnerable to overtopping and breaching. The policy may lead to the concomitant loss of freshwater and brackish features in the Minsmere Valley to the rear (which includes extensive areas of reedbed which is critical for SPA species such as bittern, marsh harrier etc). A hold the line policy in this location would result in damage to the SAC shingle ridge, but by realigning, natural dynamism can be sustained in the shingle beach and a cut off bank built to sustain the bulk of the freshwater reedbed. North Marsh will, however, change to intertidal habitat and compensation for freshwater features will be required. A current Environment Agency project for this frontage envisages that Minsmere North marsh (MIN12.2) will breach within the next 20 years with associated loss of reedbed. This loss represents an adverse effect on the integrity of the SPA and will be addressed in the Environment Agency's Regional Habitat Creation Programme.

Implications for the integrity of the site:

The loss of reedbed habitat is considered to be an adverse effect on the integrity of the site and will require compensation. In the SAC, the management area enables the natural development of the shingle features in this area and will therefore have no adverse effect on the integrity of the site.

Consideration of alternatives: As mentioned in the above assessment of Management Area 11, the alternative option here would be the maintenance through management of the shingle ridge. This is not considered appropriate and would be detrimental to the natural dynamics of shingle features. The key driver for this approach is to work with natural processes and arrive at a management solution that will allow the conservation *in situ* of habitats and species which can respond to dynamic coastal conditions and to provide replacements for habitats which will become increasingly difficult to manage on a dynamic coast subject to coastal change and sea level rise effects.

Compensation required: The provision of replacement freshwater and intertidal habitat, commensurate with the loss of SPA features, to be provided by the Environment Agency Regional Habitat Creation Programme and agreed in accordance with the assessment of the estuary strategy.

Strategic Environmental Assessment summary table for preferred policy MA MIN 13

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	
<p>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?</p>	<p>Designated sites in this management area are Minsmere Walberswick Heaths & Marshes, Leiston/Aldeburgh, Sizewell Marshes SSSI, Minsmere Walberswick Ramsar/SPA, Sandlings SPA and Minsmere Walberswick Heaths and Marshes SAC. Policy seeks allow a natural evolution of the coastline whilst maintaining the power station. Therefore deemed a minor positive benefit.</p>
<p>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?</p>	<p>The policies in this area promote the natural evolution of this frontage with no adverse effect on integrity. The overall effect is therefore neutral.</p>
<p>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?</p>	<p>The BAP habitat in this area includes: Coastal Floodplain and Grazing Marsh, Lowland Dry Acid Grassland, Coastal Vegetated Shingle, Saline Lowland Heathland and Coastal Cliffs & Slopes. The management area promotes a natural development of the coast. With the exception of the power station frontage, coastal habitat under the policy will be able to function naturally and roll landwards in response to SLR.</p> <p>Therefore, the management area is considered to have a minor positive effect on this area.</p>
<p>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</p>	<p>The SSSIs in this management area is designated for acid grassland, open water and shingle, and grazing marsh. The management area provides for a more natural management of this coast which is unconstrained apart from the power station frontage.</p> <p>Therefore, the management area is considered to have a minor positive effect on this</p>

ISSUE	DETERMINATION
unfavourable declining condition (due to coastal management) wherever possible?	issue.
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	
<p>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.</p> <p>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?</p> <p>Will SMP policy increase actual or potential coastal erosion or flood risk to communities in the future?</p> <p>Will SMP policy commit future generations to spend more on defences to maintain the same level of protection?</p> <p>Does the policy work with or against natural processes?</p>	<p>The Policy seeks to provide a dynamic coastal system which is underpinned by dynamism and natural coastal evolution whilst maintaining the frontage around the power station. This policy therefore has a minor positive effect.</p> <p>Due to local topography, and the defence around the power station this policy would not lead to any increased risk. The overall effect therefore is neutral</p> <p>The management area will require additional defence works to the rear of the power station (also protecting Sizewell village) and also to the front of the power station. Therefore the cost of this defence is minor negative.</p> <p>The overall intent of the management area is to promote a natural evolution of the coast whilst maintaining the defence of the power station. The overall effect is therefore significant positive.</p>

ISSUE	DETERMINATION
ISSUE - Maintenance of water supply in the coastal zone	
<p>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.</p>	<p>The management area will not lead to the threat to any aquifers or boreholes. The overall effect is therefore marginal, and considered neutral</p>
ISSUE - Maintenance of the values of the coastal landscape & Area of Outstanding Natural Beauty (AONB)	
<p>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.</p> <p>Will SMP policy maintain a range of key natural, cultural and social features critical to the integrity of the Suffolk coastal landscape?</p> <p>Will SMP policy lead to the introduction of features which are unsympathetic towards the character of the landscape?</p>	<p>The management area will provide for the natural development of the coast. Overall the benefits of this are minor positive.</p> <p>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.</p>
ISSUE - Protection of historic and archaeological features on a dynamic coastline	
<p>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?</p>	<p>The policy of NAI north of Thorpeness may have an effect on the conservation area however this is considered marginal in this location and the level of erosion expected. The overall effect is therefore neutral.</p>
<p>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</p>	<p>The area has no listed features and the level of erosion of terrestrial areas is limited. The effect is therefore considered to be neutral.</p>

ISSUE	DETERMINATION
where loss is expected.	
ISSUE - Protection of coastal communities and culture	
<i>Protection of coastal towns and settlements</i>	
<p>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.</p> <p>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?</p> <p>Will SMP policy protect the coastal character of communities which have historically been undefended?</p>	<p>The Policy provides for MR, but provides defences for existing settlements at Sizewell. The overall effect is therefore neutral.</p> <p>NA.</p>
<i>Protection of key coastal infrastructure</i>	
<p>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?</p>	<p>No transport routes would be interrupted as a result of this policy, however the power station requires access and this would need to be maintained in the provision of its ongoing defence. The overall effect is therefore neutral.</p>
<p>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?</p>	<p>No transport routes would be interrupted as a result of this policy, however the power station requires access and this would need to be maintained in the provision of its ongoing defence.</p> <p>The overall effect is therefore neutral.</p>

ISSUE	DETERMINATION
<p>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.</p>	<p>The policy would not lead to any loss of continued access along the coast and the effect is therefore neutral.</p>
<p>The nuclear power station at Sizewell is located close to the foreshore. The protection of the power station in situ is important in the national interest and essential for the protection of the environment from contamination - Will SMP policy protect, in situ, Sizewell Nuclear power station.</p>	<p>The policy will provide for the ongoing and defence of the power plant and the effect is therefore minor positive.</p>

APPROPRIATE ASSESSMENT - PREFERRED PLAN **MA 13**

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)**.

<p>Minsmere-Walberswick Heaths and Marshes Ramsar and SPA site features</p>	<p>Ramsar Criterion 1 The site contains a mosaic of marine, freshwater, marshland and associated habitats, complete with transition areas in between. Contains the largest continuous stand of reedbeds in England and Wales and rare transition in grazing marsh plants from brackish to fresh water.</p> <p>Ramsar Criterion 2 The site supports at least nine nationally scarce plants and at least 26 red data book invertebrates. Site supports a population of the mollusk <i>Vertigo Angustior</i> (Habitats Directive Annex II; British Red Data Book Endangered), recently discovered on the Blyth Estuary river walls. Site supports an important assemblage of rare breeding birds associated with reedbeds and marshland: Great Bittern, Eurasian Teal, Gadwall, Northern Shoveler, Pied Avocet and Bearded Tit.</p> <p>Article 4.1. During the breeding season the area regularly supports: Bittern, Nightjar, Marsh Harrier, Avocet, Little Tern</p> <p>Ramsar Criterion 1 The site contains a mosaic of marine, freshwater, marshland and associated habitats, complete with transition areas in between. Contains the largest continuous stand of reedbeds in England and Wales and rare transition in grazing marsh plants from brackish to fresh water.</p> <p>Ramsar Criterion 2 The site supports at least nine nationally scarce plants and at least 26 red data book invertebrates. Site supports a population of the mollusk <i>Vertigo Angustior</i> (Habitats Directive Annex II; British Red Data Book Endangered), recently discovered on the Blyth Estuary river walls. Site supports an important assemblage of rare breeding birds associated with reedbeds and marshland: Great Bittern, Eurasian Teal, Gadwall, Northern Shoveler, Pied Avocet and Bearded Tit.</p> <p>Article 4.1. During the breeding season the area regularly supports: Bittern, Nightjar, Marsh Harrier, Avocet, Little Tern</p> <p>Over winter the area regularly supports:</p>
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	<p>Hen Harrier</p> <p>Article 4.2. During the breeding season the area regularly supports: Northern Shoveler, Common Teal, Gadwall</p> <p>Over winter the area regularly supports: Greater White-fronted Goose Northern Shoveler Common Teal</p> <p>Article 4.2. During the breeding season the area regularly supports: Northern Shoveler, Common Teal, Gadwall</p> <p>Over winter the area regularly supports: Greater White-fronted Goose Northern Shoveler Common Teal</p>	
<p>Sub Feature(s) Vegetated shingle beach</p>	<p>Sensitivity</p> <p>Important habitat for a range scarce shingle flora - sea bindweed, lady's bedstraw, sheeps bit and harebell (rare). Areas suffering from considerable erosion, due to wave action and human activity (trampling). Area suffering from coastal squeeze.</p> <p>Dry reedbed home to specialist dry-litter beetle species. Increase in Juncus spp. on some marsh areas which provides cover for redshank. Risk of loss due to coastal squeeze.</p>	<p>Conservation Objective</p> <p>To maintain*, in favourable condition, the habitats for the populations of Annex 1 species of European importance with particular reference to:</p> <ul style="list-style-type: none"> • Shingle • Swamp, marginal and inundation communities • Saltmarsh • Standing water • Grassland • Heathland <p>+ Avocet, Bittern, Little tern, Marsh harrier, Nightjar, Woodlark, Hen harrier</p> <p>To maintain*, in favourable condition, the habitats for the populations of migratory bird species + of European importance, with particular reference to:</p>

		<ul style="list-style-type: none"> Grassland, marsh and standing water <p>+ Gadwall, Teal, Shoveler, European White-fronted goose</p>
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Minsmere-Walberswick Heaths and Marshes SAC site features		
Annex 1 Habitats. Annual vegetation of drift lines; one of only two sites in East of England. European Dry Heaths		
Sub Feature(s)	Sensitivity	Conservation Objective
Annual vegetation of driftlines	One of only four outstanding sites in the UK	Subject to natural change, to maintain*, in favourable condition, the: <ul style="list-style-type: none"> annual vegetation of drift lines perennial vegetation of stony banks
Perennial vegetation of stony banks	Area of significant importance, as only a small number of these habitats exist in Europe.	
European dry heaths	Considered to be one of the best such areas in the UK. Site dependent upon grazing and/or heather cutting to maintain its characteristics.	

MIN 13.1 to 13.3

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

