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# Minsmere Sea Defences Study Consultation Document

July 2004



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# Introduction

The Environment Agency is responsible for managing the flood risk in many areas arising from rivers and the sea.

The Minsmere sea defences are located on the Suffolk coast approximately 30km south of Lowestoft, in an area of international and national environmental importance. Prompted by growing concern over several areas in Suffolk that are susceptible to tidal flooding, including this area, the Agency has commissioned a flood management plan for the defences.

Previous studies have been undertaken to examine the wider Suffolk coast to assess the current flood defence condition and to provide strategic flood defence and environmental management recommendations to develop further in studies. The more localised Minsmere Sea Defences Study will build on this work by developing a preferred flood defence management option or series of options for the next 100 years for the frontage which runs from the south of Minsmere Cliffs to the northern boundary of Sizewell Power Stations, in the context of the wider developing coastline.



Figure 1 Location of Minsmere

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# Site description

The 5km length of sea defences along the Minsmere frontage comprise a narrow dune belt and relatively narrow sloping shingle beach north of the sluice, and a wider dune belt together with artificial dunes and shingle beach fronting Sizewell Power Stations south of the sluice.

A separate clay cored embankment also runs from the north of the sluice to Minsmere cliffs. This provides a secondary flood defence to the RSPB reserve. There is also a second line of flood defence between the beach and Sizewell Power Stations. Two lines of defence exist so that if the first is breached by flood water the second will continue to protect the land behind and its assets from flooding.

Together the features described above provide flood defence protection for the 863 hectares of low-lying land located between the eroding Dunwich and Minsmere cliffs to the north, and Sizewell Power Stations to the south. The defences, although not in poor condition yet, are deteriorating and plans need to be made now to ensure that flood risk in this area is managed appropriately in the future.

Sizewell Power Stations are important features on this coastline. The proposed management flood defence option for Minsmere will need to take into account the flood defence requirements of the Sizewell Power Station site.

Located midway along the frontage a tidal sluice outfall combines freshwater from three water courses and discharges to the sea via an outfall running under the defence embankment. At an initial stage of the Minsmere Sea Defences study, short term erosion protection works were undertaken to the outfall in March 2003, to reduce the risk of freshwater and saltwater flooding. This work included an appraisal of options and through consultation identified information of relevance to the whole frontage. The findings will be incorporated into this current assessment.

# The Issues

The coastline fronting Minsmere is eroding and the trend is that this will continue. This has implications for long term flood management.

## **Erosion of Defences / Overtopping**

The shingle beach which lies seaward of the clay cored embankment and dunes provides the primary flood defence along the Minsmere to Sizewell frontage. Its slope dissipates high energy waves preventing storm tides from reaching the top of the shore which might otherwise cause floodwater to overtop or breach the embankment.

As sea levels rise, beaches that are prevented from naturally moving back by defences erode as the increasingly deeper water allows greater wave energy to be carried further inshore. This results in a narrowing and steepening of the beach with the increasing risk that the embankment will breach, resulting in flooding behind the defences. Past trends indicate that at the north-east of the site, erosion is occurring at an average rate of 0.5m per year on the mean high water springs line with notable beach steepening. This rate will increase with sea level rise. A small breach event which resulted in a small inundation to the north east of the site occurred during a storm tide on the 15th December 2003. Other freshwater sites on the same coastline were affected badly during the same event.

Erosion of the beach also results in damage to the vegetated shingle habitat.

## **Defence Outflanking at Minsmere Cliffs**

The Minsmere cliffs and defence embankment have different material properties. As a result of wave action, the softer cliffs are eroding landward at a faster rate than the embankment. Past trends indicate that the cliffs are eroding approximately 0.5-1m per year. These differential erosion rates mean that there is an increasing risk of floodwater bypassing the defences where the embankment and cliffs meet. This would result in the flooding of land behind the defences, which would cause damage to the freshwater habitats in the RSPB reserve. Large scale flooding may also result in damage to properties in the Minsmere area.

### **Tidal Sluice Outfall Discharge Capability**

The outfall can only discharge at low tide. Sea level rise will over time lead to a reduction in time available for the outfall to discharge, which potentially will increase the risk of freshwater flooding inland as a result of the backing up of river water. This has flood implications for properties in the Minsmere area and would reduce the abilities of the RSPB to manage water levels within the reserve again resulting in long term habitat change.

### **Fixed Structures on the Coast**

The effects of fixed structures on the coast may be to 'fix' the coastline in its current place. Any changes to these structures and their effects will be considered.

## **The aims of the study and options consultation**

The ultimate goal of this study is to reduce the risk to people and the developed and natural environment from flooding by enabling the provision of technically, environmentally, economically appropriate and sustainable flood defence measures.

The objectives of this consultation document are to:

- Describe the flood defence options that are being considered
- Seek the views of interested and affected parties
- Identify key concerns of individuals and organisations
- Seek further detailed environmental and technical data for the study area

# The need for the study

This study is being undertaken at this time because:

1. 'The Issues' section outlines the main risks to the continued coastal and freshwater flood protection of the Minsmere hinterland. Previous studies of the Suffolk coast have highlighted the increasing risk to the environmentally designated sites from flooding due to outflanking of the cliffs at the north-east of the site or due to breaching of the narrow beach at this point, as well as potential flood risks to property if this occurs. Over the 100 year lifetime of the study, increases in sea level rise will exacerbate current problems. The current standard of defence will also reduce if no renewal works are undertaken. As such, it will become more difficult to maintain the current level of flood protection using methods which have been previously successful. The current situation will change, without any human intervention, affecting the local environmental interest and flood risk. Implementation of a long term sustainable management plan is required to address the changing coastline.
2. Due to the environmental designations at Minsmere, strategic planning is required to enable the implementation of a long-term sustainable defence management scheme and provide for compensatory habitat if required, before the current defences deteriorate further.

# Environmental Features

The Minsmere defences protect an area of significant conservation value against tidal inundation.

A large proportion of the study area is protected by national and international environmental legislation including the Habitats and Birds Directives.

The vegetated shingle habitat and vegetation of the drift line in front of the coastal dunes form part of the Minsmere to Walberswick Heaths and Marshes Site of Scientific Special Interest (SSSI) and candidate Special Area of Conservation (cSAC). The heathland on the higher ground landward of the defences and to the north behind Dunwich Cliffs also has cSAC designation. The area is also recognised for its landscape importance through the Area of Outstanding Natural Beauty designation.

The area behind the defences and the coastal dunes themselves also form part of the SSSI and are designated as a cSAC, Special Protection Area (SPA) and 'Ramsar' wetland site, much of which is also a flagship RSPB nature reserve. These sites contain a range of habitats including brackish lagoons, reedbeds, grazing marshes, lowland heath, acid grassland and mature woodland. Together these support a wide diversity of plants and animals. In particular it provides an exceptional habitat for birds supporting nationally important breeding populations of bittern, marsh harrier, bearded tit, gadwall, pochard and avocet. In winter, the site supports nationally important populations of European white-fronted goose, teal, gadwall and shoveler. Nationally important numbers of black-tailed godwit occur on spring passage.

The Environment Agency's legal obligation to protect the environmental designated sites means that where a flood defence option may adversely affect the designated features of the site, compensatory measures, usually in the form of replacement habitat, may be required under EU and UK law. The delivery of compensatory measures would involve significant works and costs and this will be considered under the assessment of any option where this may be applicable.

The area is also of great archaeological interest. Notably, the first site of Leiston Abbey lies within the RSPB reserve. This is protected under the Ancient Monument and Archaeological Areas Act.

The frontage is also important in terms of tourism and recreation with activities such as walking, bird watching and fishing, all contributing to the local economy.



Photo 1 RSPB reserve

# What are the proposed options for flood risk management at Minsmere?

In response to an increase in the risk of flooding at Minsmere there are a variety of general flood management options available. Such options may be used in combination to produce an overall Preferred Option. This Preferred Option is unlikely to be made up of any one option for the duration of the 100 year period under consideration.

## **Do Nothing or No Active Intervention**

This option would involve ceasing all maintenance, repair and renewal work to the sluice. No active management or repair of the clay cored embankments or dune system would be undertaken.

As erosion of the coastline continues, the current frontage would progressively recede. In addition, a reduction of the standard of defence will arise with time due to the effects of sea level rise. In time, overtopping and breaching of the dune system and eventually the second line of defence fronting the RSPB reserve would occur. Without repair, tidal inundation of the hinterland would become more frequent.

Damage to the sluice would reduce its ability to drain the low lying land of the hinterland. Failure of the sluice would lead to frequent freshwater flooding, affecting the nature reserve and properties in low lying areas.

These mechanisms would eventually: alter the habitats of the RSPB reserve resulting in changes to the associated flora and fauna; more frequent freshwater flooding of the hinterland and surrounding properties; and threaten the continued protection from saline and freshwater flooding of land behind the Sizewell Power station sites.

## **Do Minimum**

This option requires defence repair if damage occurs, but no ongoing maintenance. This option will also lead to a reduced standard of defence over time due to the effects of sea level rise. In time, the frequency of breach will mean repairing is no longer viable, and the decision to Do Nothing or rebuild the defences will need to be taken.

## Hold The Line Options

This flood defence option involves holding the existing defence line by maintaining or improving the standard of protection. Three **Hold the Line** options have been identified, they will keep everything as it is at the moment. However, these options restrain the natural movement of the coastline and may not be sustainable in the long term on highly mobile coastlines.

### 1. *Beach Recharge:*

Addition of sediment to the shingle beach fronting the Minsmere Cliff to Sizewell embankment. This will replace sediment lost through previous erosion and improve the flood defence protection provided by the beach.

### 2. *Offshore Breakwaters:*

Construction of offshore breakwaters parallel to the shore along the Minsmere Cliff to Sizewell frontage. These will reduce the wave energy reaching the frontage and alleviate erosion.

### 3. *Rock Armour Groynes:*

Construction of a series of rock groynes along the Minsmere Cliff to Sizewell frontage. This will reduce removal of sediment from the frontage by long shore currents and encourage beach accretion.

As shown in Figure 2, **partial realignment** at the north-east corner will be considered in conjunction with one of the three 'hold the line' options above. The site for possible partial realignment options is identified by the blue box in Figure 2. Please note that the boundaries shown in Figure 2 are indicative only and subject to further assessment.

To address the reduced ability of the sluice to drain freshwater from the three rivers, replacement of the **tidal sluice** with a pumping station or implementation of an additional tidal sluice will be considered with each 'hold the line' option.

Other options for holding the line using wooden groynes, seawalls, revetments or sheet pile walls are also considered, but in this instance these are unlikely to be viewed as favourable. However, we would welcome any feedback you may want to give on these options.

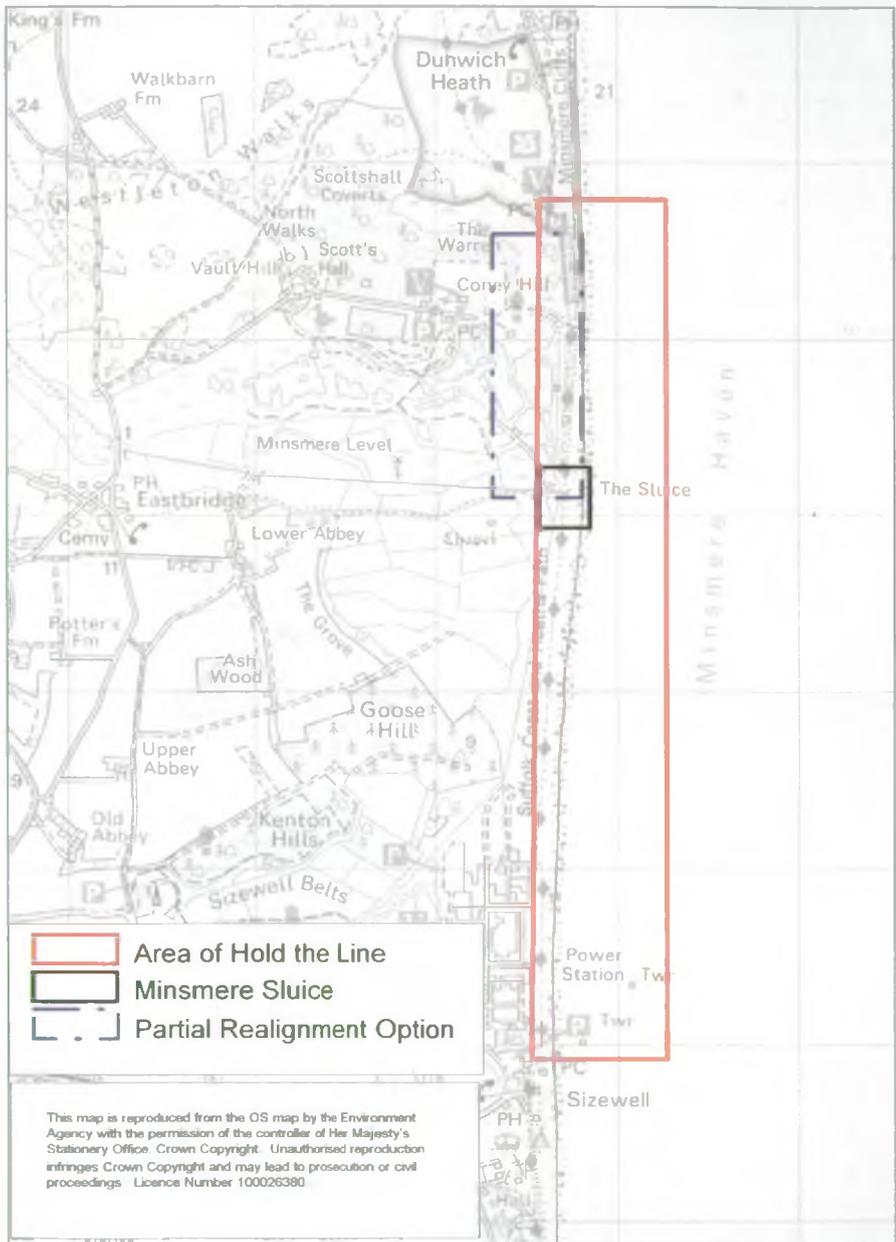


Figure 2 Hold the Line Options (boundary lines of proposed works are indicative)

## Managed Realignment Options

This option involves identifying a preferred landward line of defence and undertaking appropriate implementation. Three **Managed Realignment** options have been identified. Managed realignment options could be implemented over time in a phased approach with shorter-term options, for example, by building a new defence behind a current defence. This new defence could itself be set back at a later date, so allowing the frontage to be realigned to higher ground over a number of years, in a more controlled way than simply breaching the defence line, or allowing it to fail. This would allow time to plan for such changes. Please note that Managed Realignment is not currently the only long term option and that hold the line options may also be adapted for the longer term.

**The boundaries shown in the accompanying figures are indicative only and subject to further assessment.**

### *1. Frontage Realignment:*

Relocate or 'roll back' the embankment from Minsmere Cliffs to Sizewell. This increases beach width, reducing the likelihood of storm tides reaching the defence embankment and reduces the occurrence of floodwater overtopping the defences or breaching the embankment. The position of the tidal outfall would be maintained and the implementation of an additional sluice or replacement with a pumping station will be considered. Under this option areas immediately behind the current embankment would change as the shoreline and coastal features moved landward. This option would allow migration of the designated strandline vegetation but would encroach slightly into the RSPB reserve with some loss of the freshwater interests with the reserve and SPA / Ramsar site.

### *2. Mid Realignment:*

Relocate the existing line of defence further landward than in the frontage realignment option, to the higher ground which surrounds the RSPB reserve, with the addition of flood barriers to protect assets upstream. This would again increase the beach width enlarging the area which would be periodically inundated by the tide. The tidal sluice would be replaced with separate outlets for each river. In the long term, this option would result in the loss of the fresh and brackish water pools, and a large proportion of the freshwater reedbed and grazing marsh habitats within the RSPB reserve along with its designated interest features.

### 3. Extensive Realignment:

Relocate the existing line of defence back to the higher ground which surrounds the RSPB reserve with the addition of flood barriers to protect assets upstream as in the mid realignment option. However, the landward flood barrier of the realignment site would be located further away from the coastal frontage, enlarging the area which would be periodically inundated by the tide. The tidal sluice would again be replaced with separate outlets for each river.

It is unlikely that this option could be reached without prior implementation of shorter-term options. This option would allow the coastline to develop naturally and would result in significant changes to the existing environment, including within the International and European sites and RSPB bird reserve. Saline / brackish habitats (saline lagoons, saltmarsh and mudflats) would eventually replace the established freshwater interests (reedbed, scrapes and grazing marsh) as the influence of tides extended further inland. Species preferring more saline / brackish habitats would eventually replace the current bittern, avocet, bearded tit and marsh harrier communities.

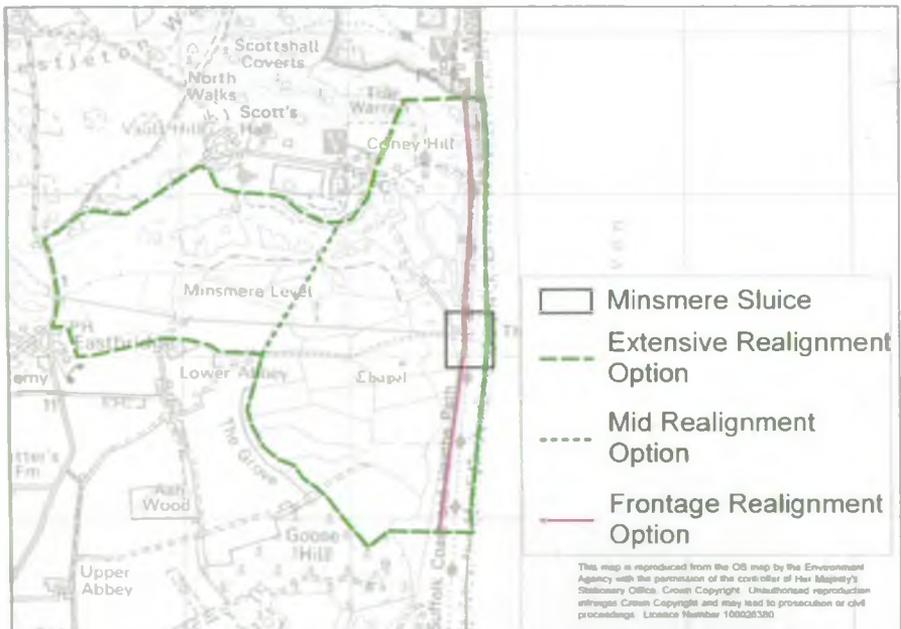


Figure 3 Managed Realignment Options (boundary lines of proposed works are indicative)

# Considering the Options

'Do Nothing', 'Do Minimum', 'Hold the Line' and 'Managed Realignment' options are all being studied. 'Advance the line' is not being considered as an option as this would interfere with the local coastal processes causing possible disruption to defence management schemes along the rest of the Suffolk coast which would be unacceptable.

Given the observed and predicted rates of change on this frontage there is a need to identify a sustainable long term solution which may only be attained through a carefully considered and staged process over many years. As noted, a combination of the engineering options presented may be required not only along the frontage spatially but at different times during the 100 year period under consideration. The study will consider the sustainability of each option in the long term, in the light of local coastline evolution, but may adopt shorter term flood defence measures to achieve the overall recommended long term option. Multiple series of suitable options will be assessed. Staging the process will allow us time to adapt and to ensure that conservation and other user interests are addressed.

Together with consultee feedback, each option will also be assessed in terms of the relevant technical, environmental and economic issues ensuring that consideration is made of the requirement to provide a sustainable long term option.

The technical issues to consider when reviewing options are, generally:

- How the option will be built. This relates to both the construction of the option and what is there at the moment
- How the option will affect river flow and coastal behaviour, both in normal conditions and in times of flooding
- How river and tides will affect the option, both in normal conditions and in times of flooding
- How the option will affect other parts of the coastline
- How effective the option will be in the short, medium and long term
- The sustainability of the option – whether the materials required to construct and maintain it will always be readily available at an acceptable economic and environmental cost, and how much maintenance it will need
- How easy it would be to alter any structures in future, if necessary.

Each option will be considered in terms of its effects on environmental and socio-economic aspects of the area.

- Areas designated for nature conservation and how the management of these areas will impact on the option
- How the option will impact on areas designated for nature conservation
- How the future management of Sizewell Power Stations will impact on the option
- How the option will impact on Sizewell Power Stations
- Other existing and future commercial, residential and leisure uses
- Existing flora and fauna
- River flow, coastline behaviour and flooding and how this will affect present land uses
- Water quality in the study area
- The existing landscape and visual amenity of the area
- Existing archaeological and heritage features.

It is probable that Government funding for any scheme at Minsmere will be justified primarily on the importance of Minsmere for nature conservation and in particular, the presence of the national and international designated sites. The usual economic justification required by the rules set out by the Treasury and the Department of the Environment, Food and Rural Affairs (Defra) for the development of flood defence works will not be undertaken. However, an economic comparison of each option will be undertaken to show that the best use of public money has been made.

Additional works over and above those necessary for the management of the designated sites, which could be carried out to protect life and property will need to be economically justified following the Treasury and Defra guidance.



Photo 2 Minsmere tidal sluice with recently completed erosion protection works

# The Assessment Process

Consultation is a key part of the option selection process and its aim is to ensure that the future management of the sea defences takes into account the needs of all parties affected by the scheme. Consultation will be undertaken throughout the project with the organisations and individuals listed at the rear of this booklet.

Table 1 overleaf outlines the key stages of the study programme.

At present we are consulting on the available scheme options for future management of the Minsmere frontage. This stage is represented by Stage 3 in Table 1. Consultee feedback, along with the outcome of environmental, economic and technical assessments will be taken into account in selecting the preferred option. An opportunity to give feedback on the preferred option is provided during a second round of consultation (Stage 6 in Table 1).

With consideration to the changes forced upon us by the physical environment, we would like to request that consultees express their views on possible long term sustainable solutions, together with the particular engineering options presented here that might best offer the routes towards such an outcome. The options detailed in this document are not definitive and suggestions for additional options will be considered. Your feedback on the range of proposed options is important to us in evaluating and selecting the preferred management option(s) for the Minsmere defences. We would therefore also be interested to receive any comments which you would like to make on their associated potential impacts or opportunities. To assist your response please complete the enclosed questionnaire and return it to the address shown.

We have distributed this document to a wide range of interested parties and are holding a public exhibition on Thursday 12th August 2004 at Minsmere RSPB Visitor Centre, Suffolk, between 2 and 7pm.

**Table 1** | Key stages of the programme

Stage in Programme	Consultation Opportunity
1. Minsmere Tidal Sluice Study and Construction (October 2001- construction March 2003)	This study included two rounds of formal scoping consultation with the local community and interested parties
2. Commencement of Minsmere Sea Defences Study	Established Steering group to represent local and national interests
3. Consultation – Stage 1 (Current stage)	Consultation on all available options by the distribution of this consultation document to organisations and a forthcoming public meeting
4. Detailed Option Assessments	Environmental, economic and technical assessments of each option
5. Selection of Preferred Option	Consultee feedback, along with the outcome of the environmental, economic and technical assessments will be taken into account in selecting the preferred option
6. Consultation – Stage 2	Consultation on the preferred option by the distribution of a consultation document to organisations and a forthcoming public meeting
7. Production of report for the Environmental Assessment Process	Advertisement of report for comment
8. Seek Agency and Defra approval	Submission of Technical Reports
9. Detailed design of preferred option	Consultation with organisations who expressed an interest in response to the consultation document

# Consultees

The following organisations and individuals are being contacted as part of the consultation process.

## **Statutory Consultees**

Countryside Agency

Department for Environment, Food and Rural Affairs

Department for Transport

Marine Consents and Environment Unit

East of England Development Agency

English Heritage - East of England Regional Team

English Nature

Environment Agency

Suffolk Coastal District Council

Waveney District Council

## **Non – Statutory consultees**

Aldeburgh and District Angling Club

Aldringham cum Thorpe Parish Council

Anglian Water plc.

Beccles Sewage Treatment Works

British Association for Shooting and Conservation

Botany Farm

British Energy Generation Ltd

British Nuclear Group

British Telecom

British Trust for Ornithology

Cliff House Holiday Park

Country Landowners Association

Crown Estate Commissioners

Dunwich Cliff Caravan Park

Dunwich Parish Council

Dunwich Private Caravan Park

East Anglia Fisherman's Association

Eastern Sea Fisheries Joint Committee

EDF Energy

Environment Agency - East Anglia

Essex and Suffolk Water

Hawsells Farm

Inland Waterways Association

Internal Drainage Boards

Knodishall Parish Council

Leiston cum Sizewell Town Council

Maritime and Coastguard Agency

Middleton Parish Council

Ministry of Defence  
Minsmere Nature Reserve (RSPB)  
National Farmers Union  
National Monuments Record  
National Trust  
Norfolk & Suffolk Anglers  
Consultative Association  
NTL  
Ramblers Association - Suffolk  
Region  
Royal Yachting Association  
Royal Society for the Protection of  
Birds  
Sizewell Shoreline Management  
Group  
Royal National Lifeboat Institution  
Southwold Harbour and River  
Blythe Users Committee  
Suffolk Biological Records Centre  
Suffolk Coast and Heaths Project  
Suffolk County Anglers Association  
Suffolk County Council Archaeology  
Office  
Suffolk Wildlife Trust  
Theberton Parish Council  
Transco  
Trinity House Lighthouse Service  
Users Committee  
Wildfowl and Wetlands Trust

# Consultation contact

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