EASTERN SOLENT COASTAL PARTNERSHIP

Eastoke Point, Hayling Island: Coastal Defence Works

Appendix K: Environmental Statement

Havant BOROUGH COUNCIL

Environment Agency

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Acronyms

AA	Appropriate Assessment
EA	Environment Agency
LNR	Local Nature Reserves
SAC	Special Area of Conservation
SSSI	Site of Special Scientific Interest
SPA	Special Protection Area
AONB	Area of Outstanding Natural Beauty
SINC	Site of Importance for Nature Conservation
GPS	Global Positioning System
HBIC	Hampshire Biodiversity Information Centre
SERBD	South East River Basin District

Non Technical Summary

This document is an Environmental Statement that builds from 'Guidance for an Appropriate Assessment (AA)', developed by Havant Borough Council. The AA was circulated for formal screening and scoping (July 2011) as part of the planning application scoping work for the proposed Eastoke Point coastal defence scheme. This reports incorporates comments made during this formal screening and scoping process and addresses significant likely impacts of the proposed works. Havant Borough Council received a letter of support from Natural England on 24th August 2011 for the 'Guidance for an Appropriate Assessment document (Annex 6).

This Environmental Statement will be submitted as part of the planning application for these works.

The Study Area

Hayling Island is located on the south coast of England in the Eastern Solent as shown in Figure 1. This summary report makes particular reference to the Eastoke Peninsula, which forms the south-eastern corner of the Island and is surrounded by water on the southern, eastern and northern frontages. The main water body located to the north and east of the peninsular is Chichester Harbour and the water body to the south, is the Solent.

The Eastoke Peninsula is a densely populated area to the south east of Hayling Island. The southern and south eastern frontages of the peninsula comprises mixed shingle beach with timber and rock groyne control structures. The southern Eastoke frontage is at risk from erosion, tidal flooding and over topping flooding. Havant Council Officers, working in partnership with the Environment Agency (EA), have considered in detail the potential risks to the Eastoke area and have developed the approved Eastoke Sectoral Strategy Study which sets out the preferred option for defending the Eastoke Peninsula, (approval date Dec 2006). The Strategy recommends works to protect the Peninsula from coastal erosion and flooding over a 100 year appraisal period and states that *"…the principle concern along the coastal frontage is that unmanaged, the shingle beach would erode leading to breach causing widespread flooding of properties…without intervention the Peninsula would be cut-off and 1,743 properties*, *a nature reserve, marina, sailing club, extensive holiday chalets and caravan parks and associated infrastructure would be lost through flooding from both the northern and southern frontages…".* The Eastoke Point Coastal Defence works is one element of this "intervention". This option is consistent with the hold the line policy as recommended in the North Solent

Shoreline Management Plan, adopted in December 2010, which has recently superseded the East Solent Shoreline Management Plan (June 1997).

The Eastoke Peninsula benefits from a combination of existing defences; the southern Eastoke frontage has an extensive shingle storm beach that is a vital coastal defence for the residential area of the Eastoke Peninsula. Also, the defences already in place at the Eastoke Point area comprise an existing rock revetment, rock groynes, and a splash wall. The Environment Agency has recently constructed a tidal flooding scheme for the north of the Eastoke Peninsular. The scheme consisted of new and raised flood walls, flood gates and various other structures to provide the required degree of flood protection.

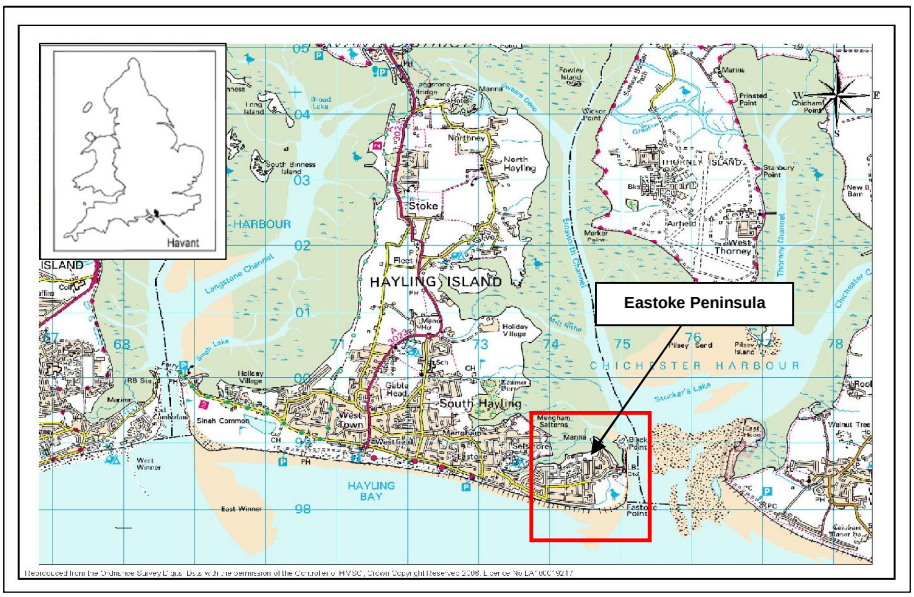


Figure 1: Site Location Plan

1. Project Description

1.1 Summary of scheme

In 2009, Havant Borough Council commissioned HR Wallingford to undertake the Eastoke Point Coastal Defence Study. It was completed in May 2009, and is available to view on the Havant Borough Council website: http://www.havant.gov.uk/eastoke. The study was undertaken to develop a sustainable coastal defence scheme to manage coastal erosion and flooding risks along the Eastoke Point frontage of Hayling Island. The Study considered a total of six main options for coastal defences at Eastoke Point. The studies preferred option, comprised a hybrid of various defences to achieve the desired standard of flood protection of 0.5% Annual Exceedance Probability (1 in 200 year) to these low-lying residential areas. The location of this scheme is illustrated in Annex 1.

The preferred option consisted of the following:

- Groyne replacement or improvement;
- Rock revetment;
- Improvement and maintenance of splash wall;
- Beach recharge;
- Groyne maintenance;
- Revetment maintenance;
- Beach recycling and management.

The proposed scheme, illustrated by Annex 2, will be designed to be capable of adaptation in the light of changes to wave conditions, tide levels, climate change, or for any unforeseen affects. This is thought appropriate due to unpredictable swell waves and variable near shore depths in this area. In the unlikely event that the design created adverse environmental impacts, a navigational hazard or fails to achieve the required standard of protection then the scheme could be adapted to address the situation at relatively low cost.

1.2 Groyne Replacement or improvement

It is proposed that the existing timber groyne numbers 4, 5, 6 and 7 are replaced with new rock groynes. Annex 1 illustrates the general arrangements of these works and highlights groyne numbers. The new groynes will be constructed with 3 to 6 tonne armour rock. The rock type will be confirmed once contracts have been let depending on market forces, however it is expected to be hard granite (syenite). The majority of the groyne will normally be buried by beach. The top of the groyne will generally follow the profile of the beach but may be up to 1m above the level of the beach especially following a storm event. Some work will also be required to Groyne

2, which will consist of shortening the existing timber groyne and replacing the shorter length of groyne with a new rock groyne.

It is also proposed to connect the existing timber groynes (numbered 7, 8, 9, 10 and 11) to the new rock revetment, again with 3 to 6 tonne rock armour. This connection will normally be buried under the beach. This is to stop the timber groynes being outflanked by wave run-up.

A typical cross-section of the proposed groynes is illustrated by Annex 3.

1.3 Rock revetment

It is proposed to construct a new rock revetment between Groyne 2 and Groyne 11 again with 3 to 6 tonne armour rock. Annex 2 illustrates the general arrangement of the revetment and highlights groyne numbers. As with the rock groynes, the rock type will be confirmed once contracts have been let depending on market forces, however it is also expected to be hard granite (syenite). Between Groynes 6 and 11 the revetment will protect the existing concrete recurve seawall from undermining and erosion. It will also assist in stabilising the top of the beach and act as a second line of defence if the beach is removed in a storm event. Between Groynes 4 and 5 the rock revetment will protect the existing sheet piles which are in reasonable condition. Between groynes 2 and 4 the revetment will provide the secondary defence at the back of the beach against erosion. At groyne 2 it will tie in to the previously constructed rock revetment.

The majority of this revetment will be covered in beach material and will therefore not be visible except if it is exposed by a storm event. The elevation of the berm will be set at + 5.6m OD. The elevation has been carefully designed to balance the standard of defence against the visual intrusion of the increased height of the berm.

A typical cross-section of the proposed revetments is illustrated by Annex 3. This is subject to change during the detailed design process.

1.4 Existing splash wall

The existing splash wall is at the rear of the promenade and extends from Groyne 7 westwards (see Annex 2). It provides a tertiary line of defence for the housing on the landward side of the wall from flooding by overtopping water. It is currently a reinforced concrete wall in reasonable condition. The design has been reviewed and it is not necessary to raise the splash wall to contain any overtopping flows. The opportunity will however be taken to refurbish the wall to extend it's life. This will include applying a protective coating to the wall. In addition as part of the overtopping flows review, the opportunity has been taken to review the current

stoplog arrangements at the two access points. This has resulted in the proposal to install new stop logs at one location and to provide an access ramp at the other location that will improve disabled access.

1.5 Beach Recharge

It will be necessary to recharge the beach between groynes 3 and 7 (see Annex 2 for groyne numbers). The Beach will act as the primary coastal defence in this area. In the past it has been difficult to maintain the profile of the beach here and part of the current scheme is to design the groynes to keep the beach in place. The beach recharge material is likely to be similar to that existing on the beach. It is likely to be from an offshore source and delivered to the area by sea. Due to the water depths it is unlikely that it can be delivered to the location that is required. It may therefore be necessary to land the material further to the west and then transport it along the beach to the required location.

1.6 Groyne maintenance

There will be a continuing need to maintain the rock groynes if rocks become displaced or if it is found that the groynes need to be amended in height or length to adjust to changing conditions. Due to the size of the rocks, this maintenance is expected to be minimal.

1.7 Revetment maintenance

There will be a continuing need to maintain the rock revetment if rocks become displaced during a storm event or if the beach is washed away and the revetment becomes a safety hazard. Due to the size of the rocks, this maintenance is expected to be minimal.

1.8 Beach recycling and management

It is likely that the current recycling and management regime will need to continue once the scheme is completed. This is necessary to maintain the primary defence, the beach to the required standard. It is hoped however that the scheme will reduce both the quantity and the frequency of the operation. Future beach management activities for the full Hayling Island frontage are being considered as the South Hayling Beach Management Plan, which is currently being developed by the Eastern Solent Coastal Partnership.

1.9 Construction period

It is estimated that the scheme will take up to six months to construct and the preferred construction period is **April to September**. This is economically advantageous as the Contractor's costs will be lower due to less down time during the summer as a result of better weather and fewer storm conditions. It will also avoid disturbance to over wintering birds. It is believed that the interface with the public can be managed as the scheme location is away from the main beach frontage and access arrangements can be altered to ensure public safety.

2. Alternatives Considered

2.1 Opportunities

Based on the available technical and environmental information, the main opportunities for enhancement on the scheme options are as follows:

- The proposed scheme will be designed to manage both flooding and erosion risk, which will benefit the Eastoke peninsular by providing protection to the local residents, beach users, nearby amenities and businesses as well as protection to the Local Nature Reserve (LNR);
- The scheme may be able to provide environmental enhancement of the LNR through improvements to the drainage across the site;
- The scheme will provide improved access and amenity to users of Eastoke Point. This includes a resurfaced promenade and improved access at two locations via the access and drainage points;
- There will be enhancements to improve disabled access to the area, including improved views of the Solent, and full access via Nutbourne Road;
- There will be an opportunity for enhancement to the vegetated shingle colonies through a seed collection and dispersal programme post construction works with guidance from Hampshire County Council Rangers;
- There will also be an enhancement to the splash wall and promenade along the Eastoke Frontage.

2.2 Proposed Options

In 2009, HR Wallingford set out six main options to consider for the coastal defences of the Eastoke Point area (HR Wallingford. (2009). Eastoke Point Coastal Defence Study). These options included:

- Option 0 Do Nothing;
- Option 1 Do Minimum;
- Option 2 Beach recharge and recycling (alone);
- Option 3 Timber groynes, recharge and recycling;
- Option 4 Rock groynes, recharge and recycling;
- Option 5 Rock revetment with groynes, with recharge and recycling;
- Option 6 Seawall with groynes, recharge and recycling.

Each option was carefully considered in turn, weighing the advantages and disadvantages, then scored against the criterion set in Table 2.1. This multi-criteria analysis considered technical feasibility, environmental acceptability, sustainability and economic benefits of each option.

Criterion	Priority	Weighting
Prevention of flooding at Eastoke (by wave overtopping or breaching of the barrier beach at Eastoke Point).	High	10
Providing continued high beaches and coastal defence standard along Eastoke frontage west of Groyne 7.	High	8
Minimising down-drift erosion and risks of breaching of the spit leading to Black Point.	High	7
Minimising disturbance to flows in Chichester Harbour entrance.	Moderate	5
Impacts on the Sandy Point Nature Reserve.	Moderate	5
Initial and maintenance costs.	Moderate	5
Sustainability.	Moderate	5

Table 2.1: Criteria used to compare Future Coastal Defence Schemes

The multi-criteria analysis technique indicated that the best two coastal defence options for the Eastoke Point frontage are:

- Option 4 Rock groynes and recycling; and
- Option 5 Rock revetment, groynes, recharge and recycling.

After further consideration, the preferred defence scheme for the Eastoke Corner frontage was confirmed as **Option 5**.

For a more detailed review of the different Options along with their advantages and disadvantages, please refer to Section 8 of the HR Wallingford (2009) report which can be found on the Havant Borough Council website: http://www.havant.gov.uk/eastoke.

3. Aspects of Environment likely to be significantly affected

3.1 Nature Conservation Designations

A number of environmental designations have been awarded to sites within the Eastoke Peninsular area, and Eastoke Point tends to form a small part of much wider designated areas (harbour wide). The Peninsula is entirely surrounded by a Special Area of Conservation (SAC), whilst Chichester Harbour is designated as a Site of Special Scientific Interest (SSSI), a Special Protection Area (SPA), Ramsar Site and an Area of Outstanding Natural Beauty (AONB). Sandy Point, located on the eastern tip of the Eastoke Peninsula is designated as a Local Nature Reserve and the Southern Eastoke Frontage is a designated Site of Importance for Nature Conservation (SINC). It is recognised that any shoreline management operations must take account of the environmental value of these areas, and ensure damage is avoided or mitigated against. Figure 3.1 illustrates all the nature conservation designations at Eastoke Point, however these are discussed individually through the remainder of Section 3, with more specific maps for each designation included.

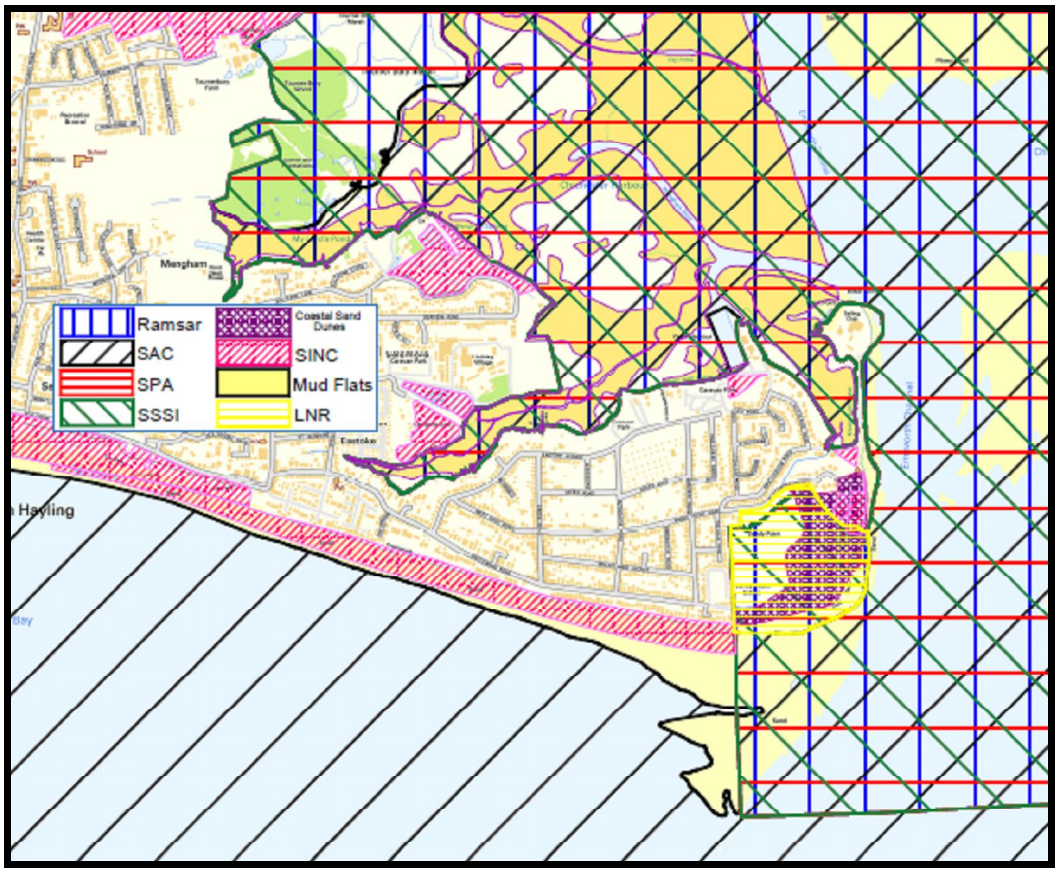


Figure 3.1: Nature Conservation Designations at Eastoke Point

3.2 Special Protection Area (SPA)

A major aim of the EU Birds Directive is to conserve the habitats of qualifying bird species in order to ensure their survival and reproduction within the EU. A key mechanism in achieving this is the classification by Member States of the most suitable sites as SPA.

Chichester & Langstone Harbours qualify as a SPA for supporting an assemblage of c. 102,000 wintering waterfowl. This large population of a number of different species of waterfowl, visit the harbours during migration or overwinter there. Many travel from breeding grounds in Greenland, Iceland, Scandinavia and Siberia. The internationally important assemblage of waterfowl not only includes the internationally important regularly occurring migratory birds but also those bird species that are present in nationally important numbers or whose populations exceed 2,000 individuals. Figure 3.2 illustrates the coverage of the Chichester & Langstone Harbours SPA at Eastoke Point, which is a small part of the full extent of this SPA and the species it qualifies for.

Table 3.1 lists all the species / populations that the whole SPA is designated for. Table 3.1 also highlights our best understanding of the population level of each species on the site of the proposed Eastoke Point Coastal Defence Scheme itself, and whether the scheme is expected to have any direct, indirect or cumulative effects on each species. This knowledge was developed following a site visit with the Hampshire County Council Senior Ranger, who manages the surrounding area. This understanding has also been discussed with a Lead Adviser for Natural England, who is in agreement with these findings.

Table 3.1 Species / Populations that the Chichester and Langstone Harbours SPA is designated for

Site qualifies under:	Species	Population level at site	Effect of scheme
Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance for the following species listed in Annex 1 of the Directive.	• Little Tern (*Sterna albifrons)* during the breeding season; • Sandwich Tern (*Sterna sandvicensis*) during the breeding season; • Little Egret (*Egretta garzetta*) on passage; • Bar-tailed Godwit (*Limosa lapponica*) over winter; • Little Egret (*Egretta garzetta*) over winter; • Ringed Plover (*Charadrius hiaticula*) on passage; • Little Egret (*Egretta garzetta*) on passage;	All of these species use the wider harbour inlets, but are not so frequent on the open coastline for feeding or roosting, as it's fairly well used by tourists. There is one nesting pair of ringed plover (*Charadrius hiaticula*) that use the beach to the north of the proposed scheme, whose eggs often get trampled by beach users.	The proposed scheme will have little affect on the species listed. Disturbance will be kept to a minimum and will only occur over a limited time period (during scheme construction). The nesting pair of Ringed Plover (Charadrius hiaticula) could be indirectly affected by the scheme if it were constructed during their nesting period, however this can be mitigated against (See text, Section 3.2).
Article 4.2 of the Directive (79/409/EEC) by supporting populations of	• Ringed Plover (*Charadrius hiaticula*) on passage; • Black-tailed Godwit (*Limosa limosa islandica*) over winter;	All of these species use the wider harbour inlets, but are not so frequent on the open	The proposed scheme will have little affect on the species listed. Disturbance will be kept to a minimum

Site qualifies under:	Species	Population level at site	Effect of scheme
European importance of the following migratory species.	• Dark-bellied Brent Geese (*Branta bernicla bernicla*) over winter; • Dunlin (*Calidris alpina alpina*) over winter; • Grey Plover (*Pluvialis squatarola*) over winter; • Redshank (*Tringa totanus*) over winter; • Ringed Plover (*Charadrius hiaticula*) over winter;	coastline for feeding or roosting, as it's fairly well used by tourists. There is one nesting pair of ringed plover (*Charadrius hiaticula*) that use the beach to the north of the proposed scheme, whose eggs often get trampled by beach users.	and will only occur over a limited time period (during scheme construction). The nesting pair of Ringed Plover (Charadrius hiaticula) could be indirectly affected by the scheme if it were constructed during their nesting period, however this can be mitigated against. (See text, Section 3.2).
Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl including.	• Wigeon (*Anas Penelope*); • Bar-tailed Godwit (*Limosa lapponica*); • Dark-bellied Brent Geese (*Branta bernicla bernicla*); • Ringed Plover (*Charadrius hiaticula*); • Grey Plover (*Pluvialis squatarola*); • Dunlin (*Calidris alpina alpina*); • Black-tailed Godwit (*Limosa limosa islandica*); • Redshank (*Tringa tetanus*); • Little Grebe (*Tachybaptus ruficollis*); • Little Egret (*Egretta garzetta*); • Shelduck (*Tadorna tadorna*);	All of these species use the wider harbour inlets, but are not so frequent on the open coastline for feeding or roosting, as it's fairly well used by tourists. There is one nesting pair of ringed plover (*Charadrius hiaticula*) that use the beach to the north of the proposed scheme, whose eggs often get trampled by beach users.	The proposed scheme will have little affect on the species listed. Disturbance will be kept to a minimum and will only occur over a limited time period. (during scheme construction). The nesting pair of Ringed Plover (Charadrius hiaticula) could be indirectly affected by the scheme if it were constructed during their nesting period, however this can be mitigated against. (See text, Section 3.2).

Site qualifies under:	Species	Population level at site	Effect of scheme
	• Curlew (*Numenius arquata*); • Teal (*Anas crecca*); • Pintail (*Anas acuta*); • Shovelor (*Anas clypeata*); • Red-breasted Merganser (*Mergus serrator*); • Oystercatcher (*Haematopus ostralegus*); • Lapwing (*Vanellus vanellus*); • Knot (*Calidris canutus*); • Sanderling (*Calidris alba*); • Cormorant (*Phalacrocorax carbo*); • Whimbrel (*Numenius phaeopus*).		

For the majority of wildfowl and wader species, their preferred roosting and breeding grounds are further up in the sheltered harbour areas, and there should be no adverse effects on the species and their use of the SPA as a whole, as a result of the proposed Eastoke Point scheme. It is considered that the scheme will have a 'limited' impact on migratory and breeding birds. Potential disturbance will be reduced through conditions in the works contract that state clear timescales for works that avoid times of the year when there is known heavy bird use of the area. Any disturbance during construction works would be time limited, with large areas of the frontage free from disturbance at any one time.

The Environment Officer at Chichester Harbour Conservancy has indicated that the most important time of the year for feeding and roosting birds in Chichester and Langstone Harbours is between the start of November to the end of February, however October and March can be important dependent on annual climatic conditions in the UK and Europe. Therefore any construction works should be avoided between 1st November and 28th Feb to prevent disturbance to the wildfowl and waders during these important times. If works were expected to run into October

or March, this should be agreed through wider consultation with Natural England and Chichester Harbour Conservancy. The works contract will confirm the timings of construction works.

The Senior Ranger at Hampshire County Council has also highlighted that a pair of Ringed Plover nest between Eastoke and Black Point between March and May each year. These birds have an extended three month nesting period, as their eggs tend to get trampled by walkers and so they may nest three or four times a year. It may be possible to fence off an area for the birds to nest in order to protect the eggs from being trampled earlier in the year. This would shorten their nesting period on the beach, improve the chances of a successful hatch and shorten the time they'd require the use of the beach at this point. In addition, when works are taking place, barriers would be installed to the eastern boundary of the scheme, largely for Health and Safety reasons. Hampshire County Council Countryside Officers have stated that during works we could close access to the foreshore from Footpath 515 which runs around Eastoke Nature Reserve. People could then still use the full footpath to access around the nature reserve, but it would stop access off the footpath on to the foreshore. This will be a requirement of the Contract.

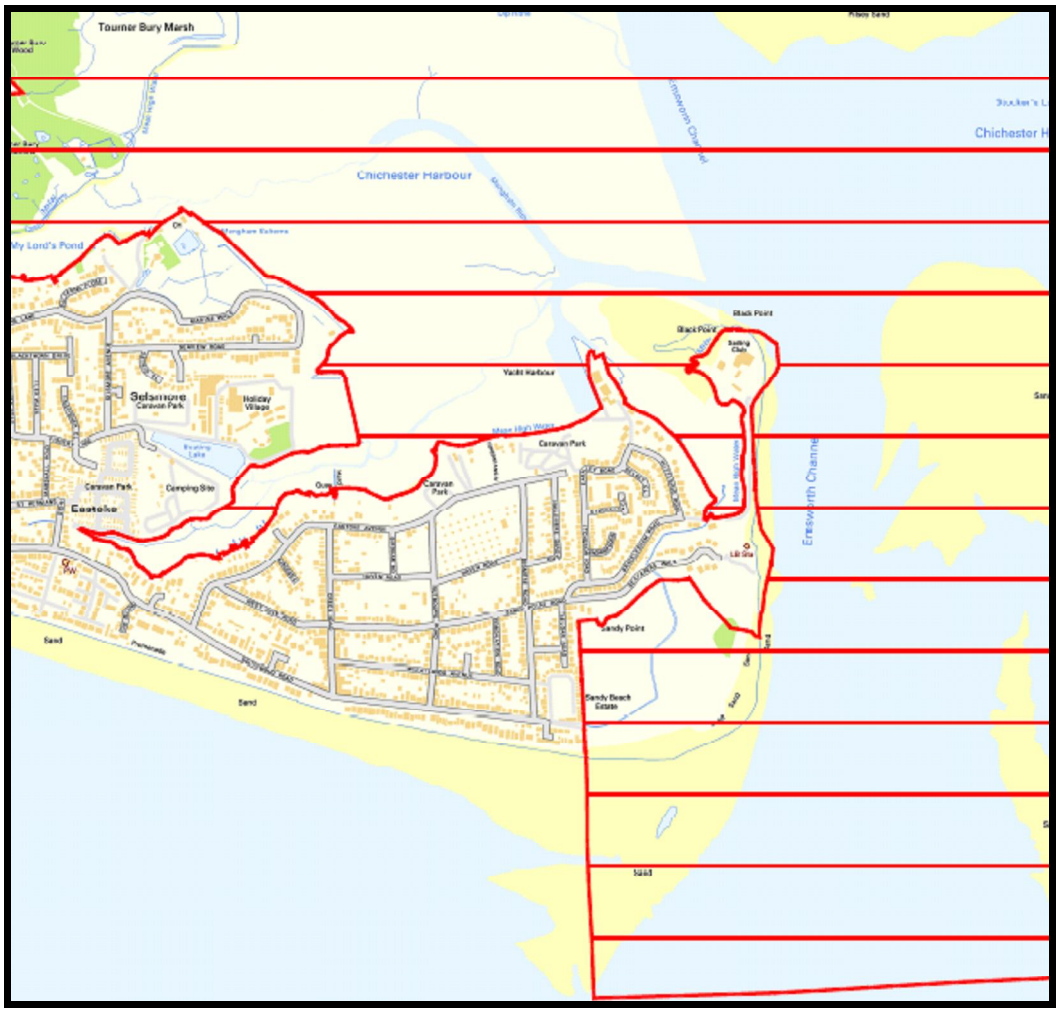


Figure 3.2. Coverage of the Chichester and Langstone Harbours SPA at Eastoke Point

3.3 The Solent Maritime Special Area of Conservation (SAC)

The European habitats Directive is an international agreement, which sets out a number of actions to be taken for nature conservation. The Habitats Directive takes account of economic, social, cultural and regional requirements and sets out measures to maintain or enhance natural habitats at a favourable conservation status. The Conservation of Species and Habitats Regulations 2010 transpose the Habitats Directive into law in Great Britain.

The Solent Maritime Special Area of Conservation was accepted by the European Commission in December 2004 and is now a site of community importance. This SAC, the area of which is illustrated by Figure 3.3, includes a cluster of features qualifying under Annex 1 of the Habitats Directive. The main feature of concern within the location of the proposed scheme site is annual vegetation of drift lines.

Approximately 1/3 of the UK coastline is fringed by beach however much of this coastline is devoid of vegetation.

Table 3.2 lists all the features of interest that the SAC is designated for. Table 3.2 also highlights whether any of the features of interest are present on the site of the proposed Eastoke Point Coastal Defence Scheme, and whether the scheme is expected to have any direct, indirect or cumulative effects on each interest feature. This knowledge was developed following a site visit with the Hampshire County Council Senior Ranger who manages the surrounding area, and through discussions with a Lead Adviser for Natural England.

Table 3.2 Features of interest that the Solent Maritime Special Area of Conservation is designated for

Site qualifies under:	Features of interest	Are features of interest present on site of scheme?	Will scheme effect features of interest
Annex 1 habitats that are a primary reason for selection of this site.	• Estuaries; • Spartina swards (Spartinion maritimae); • Atlantic salt meadows (Glauco-Puccinellietalia).	No – further within sheltered harbour.	No effect, scheme works with natural processes to maintain similar situation to now.
Annex 1 habitats present as a qualifying feature, but not a primary reason for selection of this site.	• Sandbanks which are slightly covered by sea water all the time; • Mudflats and sandflats not covered by seawater at low tide; • Coastal lagoons; • Annual vegetation of drift lines; • Perennial vegetation of sandy banks; • Salicornia and other annuals colonising mud and sand; • Shifting dunes along the shoreline with Ammophila arenaria (‘white dunes’).	Annual vegetation of drift lines is the main habitat that exists within the vicinity of the Eastoke Point scheme.	It could have a direct effect on the vegetated shingle habitat, although this can be limited and there are opportunities to improve this habitat as part of the scheme (See text, Section 3.3). The scheme itself will increase the littoral sediment in the area through beach recharge, which may increase the suitability of the beach to vegetation growth.
Annex II species present as a qualifying feature, but not a primary reason for site selection.	• Desmoulin’s whorl snail (Vertigo moulinsiana).	Not present at Eastoke Point	No effect.

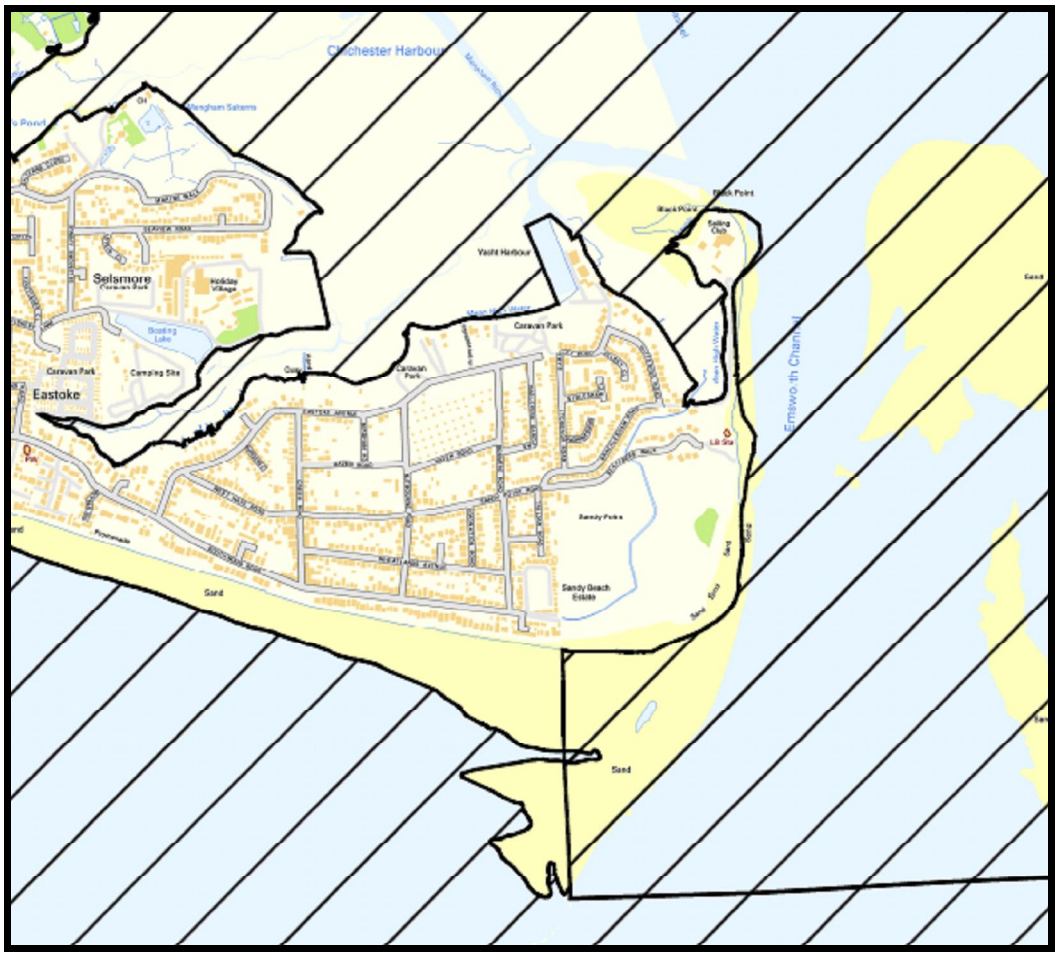


Figure 3.3. coverage of the Solent Maritime SAC at Eastoke Point.

This scheme is not expected to have any negative effects on the Solent and Maritime SAC and the features of interest listed in Table 3.2. Whilst there are patches of annual vegetation of drift lines within the vicinity of the proposed Eastoke Point scheme, any impacts on this will be kept to a minimum during construction activities. It's not possible to avoid all damage to the vegetated shingle, however there will be a requirement in the works contract to ensure the Contractor does not cause unnecessary damage. This can be achieved by restricting the working area. The Eastern Solent Coastal Partnership already undertakes vegetation surveys which highlight areas of vegetated shingle along the Hayling Island frontage, and a more detailed survey will be undertaken by a local expert to identify and record the actual species that are present on the beach.

To mitigate against any potential disruption, it is proposed to undertake a seed collection and dispersal programme pre and post construction works (see Section 3.6 & 3.7 for further information). The Hayling Island Beach Management Plan, which is currently being developed by the Eastern Solent Coastal Partnership, will further consider the vegetated shingle quality along the continuous Hayling Island open

coastal frontage. This BMP and the Eastoke Point Coastal Defence Scheme all seek to maintain or improve the annual vegetation of drift lines, which can be improved as a result of beach management works aimed at maintaining a critical beach volume, upon which this vegetation can become well established.

3.4 Site of Special Scientific Interest (SSSI)

The Eastoke Peninsula lies within units one and two of the Chichester Harbour SSSI (as illustrated by Figure 3.4). The full Chichester Harbour SSSI contains extensive mud and sand-flats, which are exposed at low tide. There are also significant areas of saltmarsh, and unimproved grassland behind the seawall. These pastures support a considerable number of rare invertebrate species, which are a food source for the large populations of waders and other wildfowl that use the site as a wintering ground.

Natural England consider that 91% of Chichester Harbour SSSI is in a favourable condition. This includes the area of Sandy Point Nature Reserve, the main habitat being Dwarf shrub heath - lowland (Unit 1 of the Chichester Harbour SSSI). However, within the study area, the foreshore around the Eastoke Point Peninsula (Unit 2 of the Chichester Harbour SSSI) is considered to be in unfavourable recovering condition due to the likely diminishing areas of saltmarsh in the area. Natural England states that this issue is being addressed through creating compensatory habitats and coastal re-alignment at the Medmerry Regional habitat creation site.

Table 3.3 Habitats and species that the Chichester Harbour SSSI is designated for

SSSI unit name	Habitats & species present	Notable habitats and species present on site of scheme?	Will scheme effect notable habitats and species?
Chichester Harbour Unit 1 (favourable) Sandy Point Nature reserve	• Main habitat: Dwarf shrub heath – lowland; • Mosaic of dune heath; • areas of acid grassland; • dense and scattered patches of gorse and bramble	These habitats and species are not present on the site of the scheme itself. They are all present in the Sandy Point Local Nature Reserve to the rear of the beach, landward of	The scheme will not negatively effect these species and habitats, but will help protect them, by preventing erosion and loss of the Sandy Point

SSSI unit name	Habitats & species present	Notable habitats and species present on site of scheme?	Will scheme effect notable habitats and species?
	scrub; • permanent pond within the centre of the site, surrounded by hard and soft rush; • A fringe of marrum grass occurs around the seaward edge of the unit adjacent to the shingle, which over a very short distance grades into the dune heath inland • Ling and bell heather; • sheep's sorrel • heath bedstraw • bryophytes (*Rhytidiadelphus squarrosus*, *Pseudoscleropodium purum*, *Dicranum scoparium*) • lichens (*Cladonia spp*).	the proposed location of the scheme.	Local Nature reserve, and reduce the occurrences of flooding.
Chichester Harbour – Unit 2 (unfavourable recovering)	• Main Habitat – Littoral Sediment • Large area of Intertidal mud • Extensive areas of pioneer salt marsh • biotypes associated with	Littoral sediment is the main habitat that exists within the vicinity of the Eastoke Point scheme.	It could have a direct effect on the vegetated shingle habitat, although this can be limited and there are opportunities to improve this

SSSI unit name	Habitats & species present	Notable habitats and species present on site of scheme?	Will scheme effect notable habitats and species?
	the intertidal sediments • Birds		habitat as part of the scheme (see text, Section 3.3). The scheme itself will increase the littoral sediment in the area through beach recharge, which may increase the suitability of the beach to vegetation growth.



Figure 3.4. Coverage of the Chichester Harbour SSSI at Eastoke Point, illustrating Units 1 and 2.

Many of the habitats and species present in the Chichester Harbour SSSI are not present on the site of the scheme itself, except for the littoral sediment habitats within unit 2. The scheme itself will offer protection to Sandy Point Nature Reserve (Unit 2 of the SSSI, much of which would be lost over the next 100 years to erosion, resulting in a loss or reduction of the species and habitats noted under unit 1 of the SSSI.

3.5 Ramsar Sites

The study area lies within the Chichester and Langstone Harbours Ramsar Site and has been designated under Criterion 1, 5 & 6 of the Ramsar Convention. Figure 3.5 illustrates the full extent of the Chichester and Langstone Harbours Ramsar site. Table 3.4 illustrates the criterion, and the habitats, species and populations for which this site is designated as Ramsar.

Table 3.4 Habitats, species and populations that the Chichester and Langstone Harbours Ramsar site is designated for

Criteria	Description	How does the criteria relate to the scheme site	Will scheme effect criteria
1	Two large estuarine basins linked by the channel which divides Hayling Island from the main Hampshire coastline. This site includes: • intertidal mudflats; • saltmarsh; • sand and shingle spits; • sand dunes.	The Scheme itself relates to the shingle spit feature of this designation.	Shingle recharge and ongoing recycling will help maintain a healthy volume of shingle, thereby helping to retain a healthy spit. This is key to maintaining the important roosting area at Black Point.
5 – Assemblages of international importance	Species with peak counts in winter: 76,480 waterfowl (5 year peak mean 1998/99 – 2002/03	All of these species use the wider harbour inlets, but are not so frequent on the open coastline for feeding or roosting, as it's fairly well used by tourists.	The proposed scheme will have little affect on the species listed. Disturbance will be kept to a minimum and will only occur over a limited time period (see Section 3.2 for more information).
6 – species / populations occurring at levels of international importance	Species with peak counts in spring / autumn: • Ringed plover (*Charadrius hiaticula*); • Black-tailed godwit (*Tringa tetanus tetanus*); Species with peak counts in winter: • Dark-bellied	All of these species use the wider harbour inlets, but are not so frequent on the open coastline for feeding or roosting, as it's fairly well used by tourists. There is one nesting pair of ringed plover (*Charadrius hiaticula*) that use the beach to the north of the proposed scheme, whose eggs often	The proposed scheme will have little affect on the species listed. Disturbance will be kept to a minimum and will only occur over a limited time period (during scheme construction). The nesting pair of Ringed Plover (Charadrius hiaticula) could be indirectly affected by the scheme if it were constructed during their nesting period,

Criteria	Description	How does the criteria relate to the scheme site	Will scheme effect criteria
	brent goose (*Branta bernicula bernicula*); • Common shelduck (*Tadorna tadorna*); • Grey Plover (*Pluvialis squatarola*) • Dunlin (*Caldris alpina alpina*) • Species/ populations identified subsequent to designation for possible future consideration under criterion 6. Species regularly supported during the breeding season: • Little tern (*Sterna albifrons alpina*)	get trampled by beach users.	however this can be mitigated against (see text, Section 3.2).

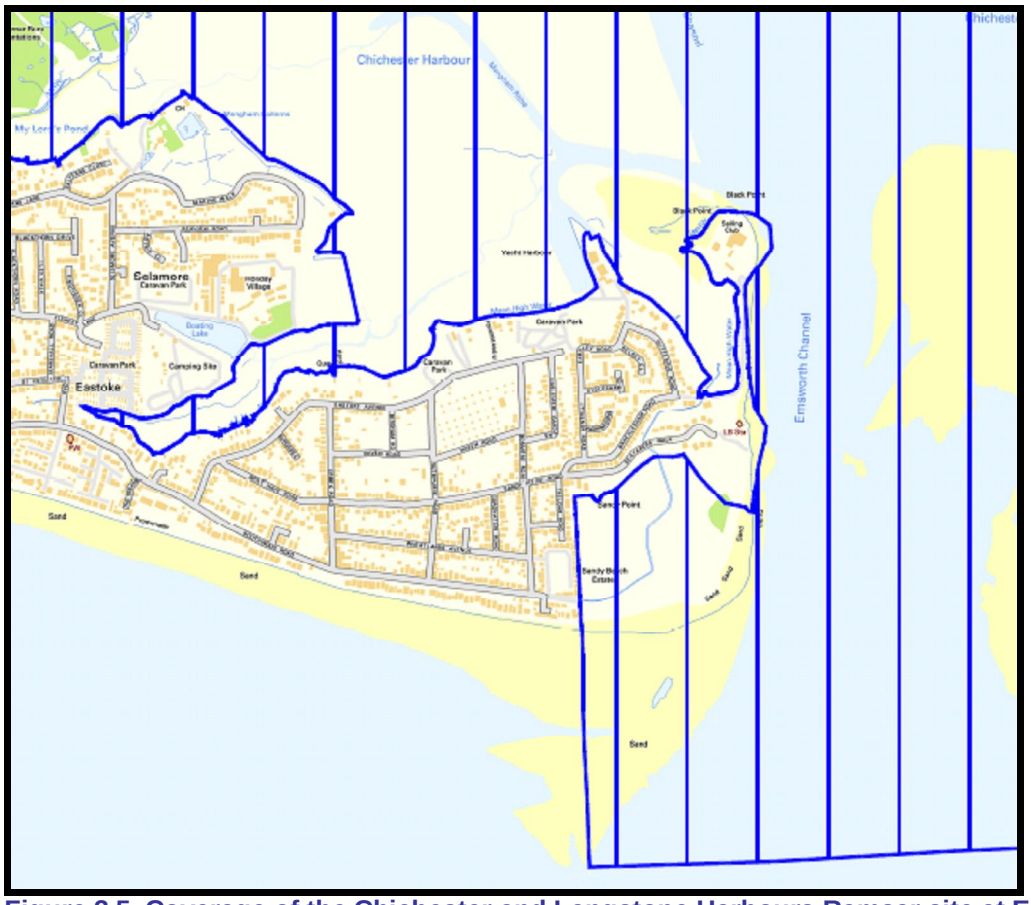


Figure 3.5. Coverage of the Chichester and Langstone Harbours Ramsar site at Eastoke Point.

The most notable criterion that relates specifically to Eastoke Point is Criterion 1, sand and shingle spits. The scheme itself will help maintain a flow of sediment to feed the spit to the north east of the scheme. Without intervention, Eastoke Point would erode through loss of shingle and cliffing. This could result in loss of the spit over time, which is an important feature of the Ramsar site.

3.6 Local Nature Reserve (LNR)

Sandy Point Local Nature Reserve and Countryside Heritage Site lies immediately behind the beach at Eastoke. The full extent of this nature reserve is illustrated by Figure 3.6. This site comprises an area of coastal heathland, sand dunes and scrub. The LNR is considered to be the best example of vegetated sand and shingle with vascular plants and also host to a large number of flora species which are of restricted occurrence in Hampshire, especially mobile sand dune species (N Sanderson, 1998). Viewing the Vegetation Survey of Sandy Point, 1997 report, it can be seen that the vast majority of vegetation is present within the landward area of the perimeter fence of the reserve.

The Eastern Solent Coastal Partnership's in-house surveyor carries out an annual summer vegetation survey along the Eastoke frontage, Hayling Island to identify the locations of the vegetated shingle using a Global Positioning System (GPS). This survey is carried out in accordance with the Eastern Solent Coastal Partnership's Beach Recycling Vegetated Shingle Methodology as shown in Annex 4. This survey data will be used in conjunction with a pre-construction vegetated shingle survey to ensure any impact to the vegetated shingle is kept to an absolute minimum.

Also, as a result from an on-site meeting with the County Ranger of the LNR, it has been suggested that a seed collection and dispersal programme for the vegetated shingle species is carried out both pre (collection) and post (dispersal) construction works. This is to be done with guidance from the County Ranger. This programme will not only help to mitigate any adverse affects to the vegetated shingle but could provide potential enhancement of the colonies.

Impacts of the scheme on vegetated shingle will be kept to a minimum during construction activities. It will not be possible to avoid all damage to the vegetated shingle, however there will be a requirement in the works contract to ensure the contractor does not cause unnecessary damage.

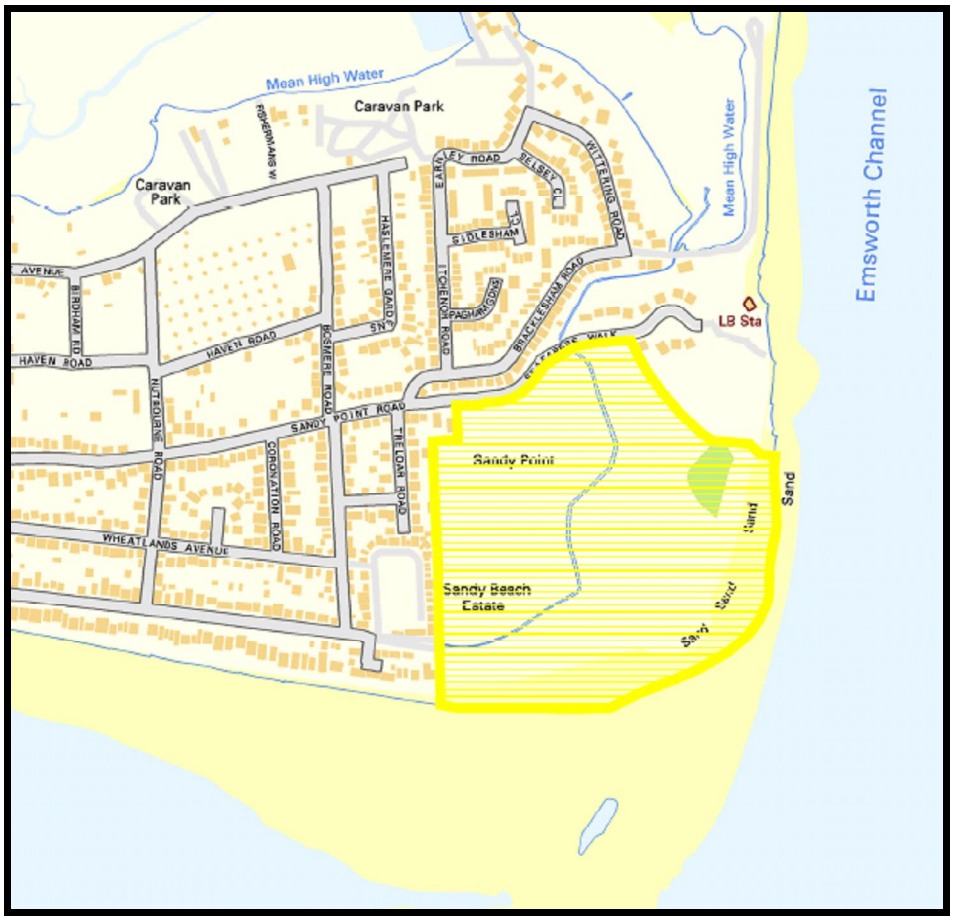


Figure 3.6 Full extent of the Sandy Point Local Nature Reserve.

3.7 Site of Importance for Nature Conservation (SINC)

There are a number of designated SINCs close to the study area, with the most recently designated site (as of beginning February 2011) being located on the beach of Hayling Island frontage, which is across the site of the proposed project works. Figure 3.7 illustrates the location of these SINCs.

A survey carried out and made available by the Hampshire Biodiversity Information Centre (HBIC) indicates that the stretch of beach around Eastoke Point ranges from being 'largely unvegetated shingle' to 'partially vegetated shingle'. The survey indicates that within the area of proposed works, eight areas were surveyed. Of these eight, four areas are recorded as **'Largely unvegetated** shingle banks and beach'. A fifth area is recorded as **'largely unvegetated'** dune apart from a narrow strip of semi-fixed dune grassland comprising Sand Sedge (*Carex arenaria*), Marram (*Ammophila arenaria*), Sea Sandwort (*Honckenya peploides*) and Sea Holly (*Eryngium maritimum*), all of which are classified as 'County Scarce'. A sixth area of

survey is recorded as **'partly vegetated** shingle bank' comprising Stiff Saltmarsh-grass (*Puccinellia rupestrisI*), classified as a 'nationally scarce' species. A seventh area is recorded as shingle community, '**partially vegetated** shingle of Sandy Point Beach' which comprises Sea Kale (*Crambe matitima*), Sea Knotgrass (*Polygonum maritimum*), Yellow-horned Poppy (*Glaicium flavum*) amongst other County scarce species and the eighth area is dune area with patches of Sheep's Fescue (*Festuca ovina*), Common Brent (*Agrostis capillaries*) and Sheep's Sorrel agg (*Rumex acetosella*) grassland. Of the species identified in this area, none were identified by HBIC as being 'species of particular interest'.

As aforementioned in Sections 3.3 & 3.6, the Eastern Solent Coastal Partnership's in-house surveyor carries out an annual summer vegetation survey along the Eastoke frontage, Hayling Island to identify the locations of the vegetated shingle using a Global Positioning System (GPS). This survey data will be used in conjunction with any pre-operation vegetated shingle survey to ensure any impact to the vegetated shingle is kept to an absolute minimum throughout the proposed works. To further mitigate against potential disruption, it is proposed to undertake a survey of the vegetation species present, and a seed collection and dispersal programme both pre and post construction works, to mitigate against any losses during the works. The scheme itself will stabilise the beach, which over time is expected to develop larger vegetated shingle communities.

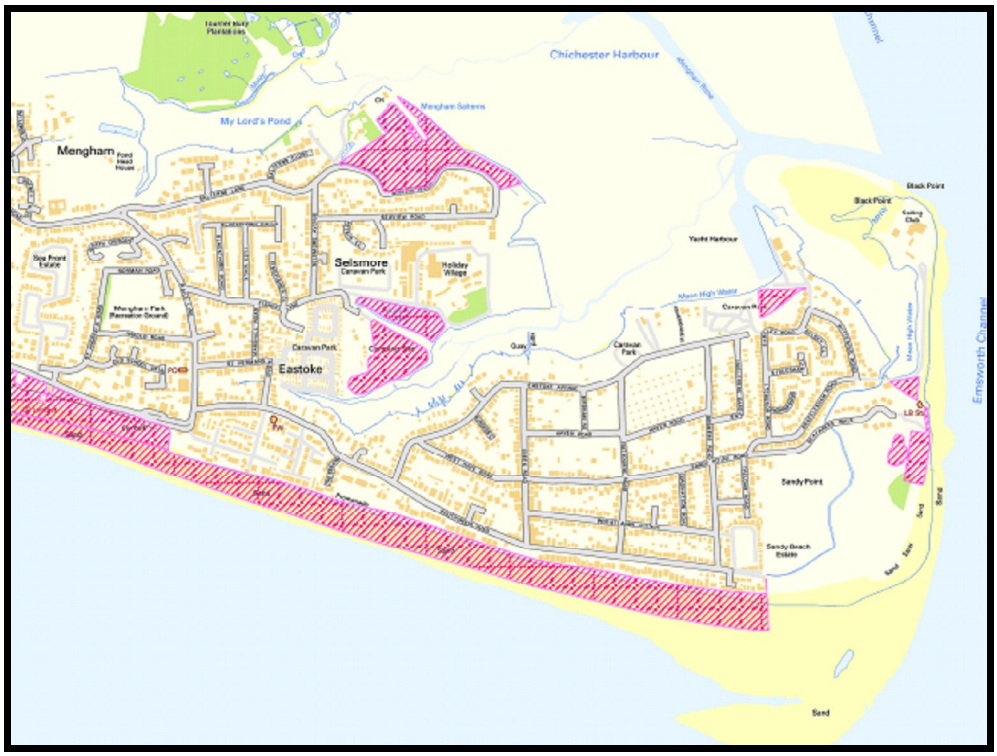


Figure 3.7. Location of SINCs within the location of Eastoke Point.

3.8 Requirement for Appropriate Assessment

For all European Sites specified under Regulation 61 of the Conservation of Species and Habitats Regulations 2010, an Appropriate Assessment is required to be undertaken by law. A European Site is any classified SPA or SAC from the point where the Commission and the Government agree the site as a Site of Community Importance. Appropriate Assessment is also required, as a matter of Government Policy, for potential SPAs, candidate SACs and listed Ramsar Sites for the purpose of considering development proposals affecting them (PPS 9 Biodiversity and Geological Conservation). Therefore, under the EU 'Habitats Directive', Havant Borough Council acting as the competent authority has completed a guidance for an appropriate assessment document (Annex 5), which forms an integral part of this Environmental Statement.

Havant Borough Council has worked with the Hampshire Biodiversity Information Centre (HBIC), Natural England and Sandy Point Nature Reserve Rangers (the latter two sit on the steering group for the project and have been consulted for their input.)

Natural England provided Havant Borough Council with a letter of support stating "Natural England agrees with the outcomes in the Appropriate Assessment". This letter can be found in Annex 6: Natural England Letter of Support, dated 24th August 2011.

The potential environmental impacts of the scheme have been assessed as detailed in table 3. below, but the Appropriate Assessment (Annex 6), provides full information.

Table 3.5 Potential Environmental Impacts of the Scheme

Potential Impact	Significant likely impact	Mitigation measures
Disruption to the hydrodynamics/ processes of the Estuary's function	No	The design will use current research and historic data to minimise any potential impacts on the Estuarine function. The scheme will be adaptable so that any unforeseen effects can be rectified and there will be close consultation with other bodies during the design process to address any concerns. Without the scheme, flooding and erosion over time could disrupt the hydrodynamics / processes of the Estuary's

		function.
Disturbance of nesting, roosting birds	No	Restrict working period of construction activities and prevent access to nesting birds.
Noise and vibration	No	Restrict working hours and select time of year. Use appropriate equipment during construction.
Destruction of areas of vegetated shingle	Not significant, but some impacts can't be avoided.	Carry out survey prior to construction commencing and prevent access to vegetated areas. It is not possible to avoid all damage to the vegetated shingle, however there will be a requirement in the works contract to ensure the contractor does not cause unnecessary damage. This can be achieved by restricting the working area. Upon completion of a species survey, a seed collection and dispersal plan will be developed to mitigate against any unavoidable damage.
Suspended solids discharged to seawater affecting Mullusca	No	Restrict methods of working / tidal operation timings (see Section 3.9).
Scheme causing beach material to migrate in to unexpected areas causing damage to habitats	No	Scheme is likely to reduce the migration of beach material, not increase it.
Public access	No	Make suitable alternative arrangements and include clear signage and consultation.

3.9 Method Statement to prevent pollution through construction stage:

The scheme has the potential to cause localised, short-term pollution of the water body through increased turbidity during construction. Without appropriate operating methods, there would also be the potential for hydrocarbon pollution resulting from accidental spillages of vehicle fuels, oils and other construction materials.

As part of the tender process for the works, the Contractor would be requested to provide a written method statement and Construction Environmental Management

Plan, to highlight how water quality, amongst other environmental aspects would be protected during construction. This would be checked against the relevant UK legislation and Environment Agency Pollution Prevention Guidelines, in particular:

- PPG1 – General guide to the prevention of pollution;
- PPG5 – Works and maintenance in or near water;
- PPG2 - Above ground oil storage tanks;
- PPG6 – Pollution prevention guidance for working at construction and demolition sites.

The Eastoke works are adjacent to Chichester Harbour Shellfish Waters (Figure 3.8). The proposed works are similar to the beach management works that have been undertaken along the full Hayling Island Coastal frontage in the past and are not expected to negatively affect the waters. The AONB manager at Chichester Harbour Conservancy has stated that similar works historically have not been recorded to have deteriorated the water quality and therefore is not concerned by these proposals.

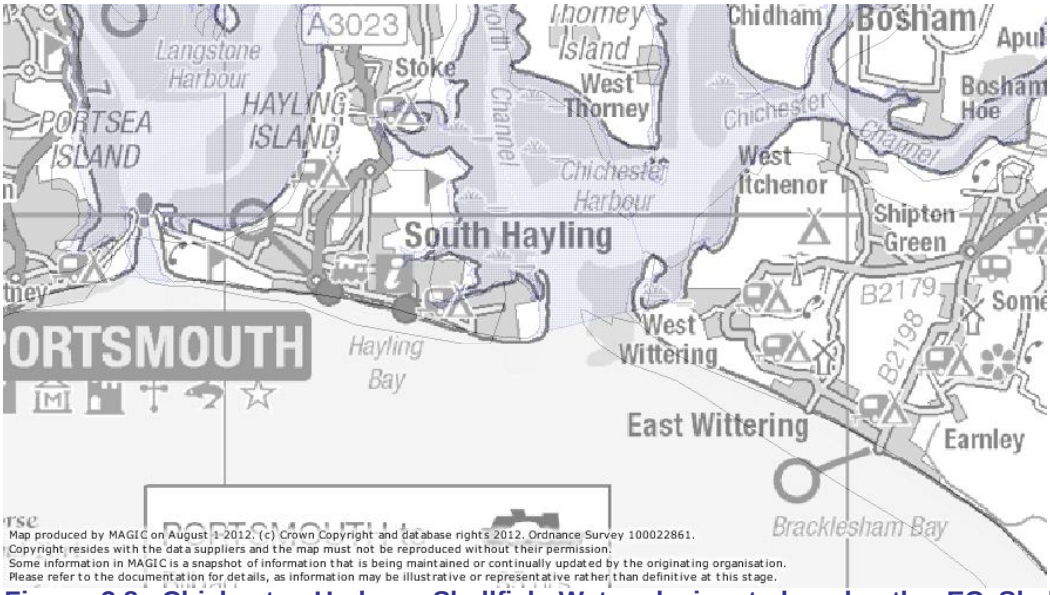


Figure 3.8: Chichester Harbour Shellfish Water designated under the EC Shellfish Waters Directive (2006/113/EEC) Chichester Harbour is split into three Shellfish Waters (Emsworth Channel, Thornham Channel and Chichester Channel). The Chichester Harbour (Emsworth Channel) Shellfish Water is adjacent to the proposed works at Eastoke. Designated area highlighted blue.

Annex 1 of the EC Shellfish Waters Directive (2006/113/EEC) sets out the parameters that are measured to determine the quality of shellfish waters. These are listed below:

- pH;
- Temperature;
- Coloration;
- Suspended Solids;
- Salinity;
- Dissolved Oxygen;
- Petroleum Hydrocarbons;
- Organohalogenated substances;
- Metals;
- Faecal coliforms;
- Substances affecting the taste of the shellfish;
- Saxitoxin.

Of the above, the proposed works could have a short term, localised effect on coloration, suspended solids and petroleum hydrocarbons, however this can be controlled to avoid deterioration below standards for shellfish waters. Any fuels used for equipment will be adequately stored, and machinery will be refuelled in bunded areas. Biodegradable hydraulic oils will be used in plant to ensure any hydraulic pipe leaks would not have a negative effect on shellfish waters or the environment generally.

Changes in colouration of the localised water body could occur, due to shingle movement operations, and this could increase the suspended solids locally, however as the proposed works relate to Chichester Harbour entrance, any localised increase in suspended solids or change in coloration would be quickly diluted by the constant flushing of Chichester Harbour each tide.

The EA will be consulted to ensure any changes in coloration and suspended solids are kept to a minimum, and we will work with their ongoing monitoring programme to ensure no negative effects if considered necessary. Any localised changes in colouration or suspended solid levels would likely be short term, as they would be flushed away from the harbour during falling tides. This would significantly reduce the chance of any impacts on the shellfish water bodies.

The Eastoke Point scheme will not cut off the sediment supply to Black Point, north of Eastoke Point (to the east in terms of longshore drift). One of the key aims of the scheme design, is to maintain this supply, otherwise this would damage natural processes within the harbour and could cause problems to the inner harbour coastline (to the rear of Eastoke). Continued shingle supply to Black Point will

ensure it remains an important high tide roost site, which Chichester Harbour Conservancy is keen to ensure.

The rock groynes that are proposed will be no longer than the existing timber groynes they replace and therefore the sediment pathway will not be significantly affected. In addition they are not built as a terminal groyne, which could act as a complete barrier to sediment.

When new structures are installed, there can be a lag in sediment movement, as shingle needs to build up within the shingle retaining structures before it bypasses the groynes. However, as beach recharge forms a significant part of this scheme, this lag has been removed, as the groynes will be filled with shingle once they are constructed.

Should there be any negative effect on the supply of shingle to Black Point, the rock groynes are adaptable and can be shortened by removing the rock at the seaward end. The sediment transport is closely monitored along this frontage, and this will continue during and after the scheme to ensure no negative effect. The Eastern Solent Coastal Partnership are also developing a BMP for the Hayling Island frontage, working with natural processes to maintain critical quantities of beach material along the Hayling Island frontage.

The identified 0.4ha of habitat loss over the short to medium term as a result of 'holding the line' at this location is being compensated through the Medmerry Managed Realignment Scheme. This has been confirmed by the Environment Agency in a letter relating to the Regional Habitat Creation Programme (Included as Annex 8). This loss to the ecology of the wider Chichester Harbour is considered negligible, as the scheme itself will help maintain the important high tide roost site at Black point, which is key to the wildfowl and waders using the wider harbour.

Flood Defence Consent may be required from the Environment Agency prior to any works commencing.

4.0 Traffic – including navigation

Due to the close proximity of residential property to the storm beach at the Eastoke Peninsula, the free flow of traffic on the surrounding highways has been considered as a potential problem associated with the scheme. Previous successful schemes for this frontage include the Beach Nourishment and Beach Recycling and therefore the traffic restrictions placed on these have been used again for the Eastoke Point Coastal Defence works. There is currently an existing haul route along the top of the

shingle ridge, which is used periodically to transport shingle from east to west during the annual recycling operation (see Annex B). It is therefore unlikely that any proposed scheme will require the creation of additional access points to the beach.

It is recommended that restrictions are placed on the contractor to only allow work between 7.00am and 7.00pm. No machinery will be allowed to be operated outside of those hours, which includes delivery, collection and maintenance. In addition to this, no weekend working or work on recognised Public Holidays will be permitted except in special cases. An exception to this would be marine based activities, for example material arriving on a ship, which would need suitable tidal conditions and would therefore need to be able to operate over a 24hour/day time period. See section 4.7.1 for more details.

In the interest of free flowing traffic on and off the island, restrictions will be put in place so that no delivery to or collection from, the construction site using construction vehicles between the hours of 3.00pm and 9.30am on any day except in special cases. Also, the construction vehicles will be restricted to a specified route of transport to minimise disturbance (see Annex C).

It is expected that the rock armour will be imported by sea and will therefore not cause any traffic problems on the island. It is less certain if the beach nourishment will be imported by sea or land which is dependant on availability of sea bourne plant, exact quantities of recharge required, fuel costs and other market forces . If the beach recharge is less than about 10,000m³ it is likely that it will be carried out by land. If this is the case it would equate to 900 lorry movements probably spread over a 3 month period equating to 14 movements per day. It has to be emphasised that this is very much a worse case.

In addition to the delivery of beach nourishment there will be the incidental deliveries of such items as plant and geotextile but it is anticipated that this will result in no more than five movements per day.

The Development Engineer of Havant Borough Council's Transport and Implementation Team commented that as long as the restrictions detailed above are enforced then the works are **unlikely to have a significant** on traffic and transportation within the surrounding highways.

4.1 Sea transport

The entrance to Chichester Harbour lies adjacent to the study area. This serves fishing boats, pleasure craft, and limited commercial vessels. It is important that any proposed scheme will not adversely affect the dredged harbour channels. Also,

should material arrive by ship, a specific approach route will be agreed in advance with Chichester Harbour Conservancy and disseminated to all local fisherman as has been successfully done in previous years to keep disruption to local seafarers to a minimum (for example, the 2009 Beach Nourishment Project).

The Hayling Island Lifeboat station is located at the eastern end of the study area. Access for launch, recovery and operation of RNLI lifeboats at this site will be maintained during construction works period.

5.0 Noise and Vibration

5.1 Noise

Activity within the study area is limited and, as such, noise levels are typical for a coastal location. Existing noise levels are dominated by the natural sounds of the sea and the wildlife.

Due to the urban nature of Eastoke Peninsula, vehicles and plant on the beach are allowed between 07:00 and 19:00 during the annual recycling operations. Although dependent on the types of operation being carried out, it is thought that any proposed works would also adhere to these time limits to minimise disturbance, although a review would be carried out if any complaints were received.

Renourishment works using dredgers generally operate 24 hours a day. This is to allow for tidal conditions as vessel activity will typically occur 3 hours either side of high water. This may give rise to some disturbance should the proposed scheme include beach recharge by sea; the disturbance would be moderate and of reasonably short duration. In particular, elevated noise levels will occur whilst the vessels discharge their load onto the beach, which is typically over 60 minute periods. In recent years, dredgers have discharged shingle and sand onto the beaches at Eastoke using a “rainbow” technique. If at some future date it was decided to use a pipeline to deliver such materials, this would reduce noise levels during such operations.

5.2 Vibration

Due to the close proximity of the residential properties to the proposed construction area, the movement of operational machinery and the construction works may cause a potential problem through vibration, particularly to the residential dwellings located closest to the operation area (far east of the promenade on the southern frontage) and those dwellings neighbouring the compound at 72 Southwood Road where plant

will be stored. Plant will be delivered to the public carpark at Eastoke Corner well away from any buildings and then tracked/ driven along the beach to be stored at the compound.

In order to limit the disturbance through vibrations, it is recommended restrictions are placed on the contractor to only allow work between 07:00 and 19:00. No machinery will be allowed to be operated outside of those hours, which includes delivery, collection and maintenance. In addition to this, no weekend working nor on recognised Public Holidays, will be permitted except in special cases.

There has also been a change of layout to the compound at 72 Southwood Road that has largely addressed the issue of vibration caused by plant at this location. Plant is now restricted to being stored in the Southern end of the compound away from adjacent houses which has successfully addressed issues with vibration at this location

This document has been reviewed by the Environmental Health Team Leader of Havant Borough Council's Environmental Health Department who commented with regards to Noise & Vibration "…I accept that there may be some problems with vibration in close proximity to certain residential properties but anticipate that provided works are limited to the proposed hours of operation the residents may well take the pragmatic view that it is a price worth paying…". Should complaints arise, the Environmental Health Department would review whether the best practicable means were being taken to minimise disturbance. Therefore we anticipate that the scheme is **unlikely** to have a significant impact on area but may well have some localised impact throughout the construction phase.

Also, consideration is given to the likely affects the construction works may have on the SPA bird species. It is believed that the SPA bird's favoured roosting and breeding grounds are further up in the shelter harbour area, there should therefore be no adverse effects on the designated interest features of these sites. The proposed construction works for the Eastoke Peninsula frontage is based on the more exposed coastal area. A meeting with Natural England and Hampshire County Council's Local Nature Reserve ranger revealed that construction works along the Eastoke Peninsula frontage are likely to have only a 'limited' impact on migratory and breeding birds (see Table 2 for the Conservational Objectives of the SPA).

6.0 Water Quality

6.1 Groundwater

Water resources throughout Hampshire depend on groundwater stored within the Chalk aquifer of the Hampshire Downs. This groundwater is replenished by winter rainfall which percolates down into the water table. It then drains out of the aquifer to provide reliable flows in chalky rivers such as the Test, Itchen and Meon. This water is usually of very high quality and as such requires very little treatment for public supply. No groundwater protection zones are located within the study area.

6.2 Surface water

There are three main surface water features within close proximity to the study area. These are:

- Eastoke Boating Lake – This lies to the north-west of the study area;
- The Solent – The study area is bordered by the Solent; and
- Emsworth Channel – This body of water lies to the east of the study area at the mouth of Chichester Harbour.

6.3 Bathing water quality

The EU Bathing Water Directive (76/160/EEC) imposes statutory objectives on bathing waters. Its two main objectives are:

- To improve or maintain the quality of bathing water for reasons of amenity; and
- To protect human health.

Samples taken during the past 10 years from the sampling point closest to the study area have consistently achieved an excellent rating for all parameters.

West Beachlands Central beach, which is located to the west of the study area, currently holds a “Blue Flag” which is a symbol of high environmental standards as well as good sanitary and safety facilities at beaches and marinas.

During the construction stage, there is potential for suspended solids to affect the turbidity of the water which may impact on the rating. However, once the construction phase is completed, it is considered **unlikely for the proposed design to have a significant impact** on this rating due to the inert nature of proposed construction material.

6.4 South East River Basin District (SERBD) Water Bodies

River Basin Management Plans have been drawn up for river basin districts across England and Wales under the Water Framework Directive. Their aim is to protect and improve the water environment. They contain the main issues for the water environment and the actions needed to deal with them.

The South East River Basin Management Plan sets out the pressures facing the water environment in the SERBD, and the actions that will address them.

Eastoke Point is located at the divide of three coastal water bodies that form part of the SERBD, as illustrated by Figure 6.1:

- Chichester Harbour – GB680705210000;
- Solent – GB650705150000;
- Isle of Wight East GB650705530000.



Figure 6.1: The three coastal water bodies adjacent to Eastoke Point, Hayling Island (from the South East River Basin District).

Data sheets for these three water bodies are included as Annex 7, which includes details on the ecological potential and status of the water body. The Solent and Chichester Harbour water bodies both have current overall potential of moderate, whereas Isle of Wight East has a good current overall potential. Table 6.1 summarises the quality and status of these three water bodies.

Table 6.1: Quality and status of water bodies adjacent to Eastoke Point, Hayling Island

Name of Water Body	Solent	Chichester Harbour	Isle of Wight East
ID	GB650705150000	GB680705210000	GB650705530000
Current Overall Potential	Moderate	Moderate	Good
Status Objective (overall)	Good by 2027	Good by 2027	Good by 2015
Status Objectives	• Good ecological potential by 2027; • Good chemical status by 2027	• Good ecological potential by 2027; • Good chemical status by 2015	• Good ecological potential by 2015; • Good chemical status by 2015
Ecological potential	Moderate	Moderate (uncertain)	Good
Chemical status	Fail (uncertain)	Good	Good
Heavily modified?	Yes, due to coastal and flood protection	Yes, due to coastal protection, navigation and shellfisheries.	Heavily modified due to coastal and flood protection

As can be seen by Table 6.1, the Isle of Wight East water body is currently in compliance with the WFD overall aim of Good Ecological Potential. The Solent and Chichester Harbour water bodies are not currently compliant with the WFD objective overall aim of Good Ecological Potential, but the status objectives of both water bodies is to achieve this by 2027. For all three water bodies, mitigation measures have been identified to help achieve / maintain Good Ecological Potential and these are summarised in Table 6.2.

Table 6.2 Mitigation measures to help achieve / maintain good ecological potential

Mitigation Measure	Chichester Harbour	Isle of Wight East	Solent
Vessel Management	X		
Manage Disturbance	X	X	X
Site Selection (dredged material disposal) (e.g. avoid sensitive areas)	X	X	X
Alter timing of dredging / disposal	X		
Prepare a dredging / disposal strategy	X		
Indirect / offsite mitigation (offsetting measures)	X		X
Retain marginal aquatic and riparian habitats (channel alteration)	X		
Preserve and where possible enhance ecological value of marginal habitat, banks and riparian zone	X		X
Managed realignment of flood defence	X		X
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	X		X
Sediment Management		X	X
Bank rehabilitation / reprofiling		X	
Remove obsolete structure		X	

The proposed Eastoke Point scheme is not expected to impact upon the overall ecological quality of the three water bodies. The works are an improvement of what already exists to extend the life of the beach retaining structures that are in need of renewal. Therefore no habitat is being lost as a direct result of the works as the line of defence will not change. Ongoing maintenance of the beach through recycling and recharge is a continuation of current management practices at Eastoke Point. Therefore risks to the water quality arising from the project are not expected to be significant.

There is the potential for the scheme to contribute towards a failure to achieve the objective of Good Ecological Potential for Chichester Harbour and the Solent by 2027, as aspects of the scheme do not conform with the mitigation measures identified for the water bodies. This is considered negligible, as:

- The extent of the proposed works is minimal relative to the scale of the water body as a whole;
- The key elements of the scheme (rock revetment / groynes) are adaptable, and can be moved to provide localised enhancement / create new habitat if necessary;
- Although the line of defence will be fixed, previous engineering and beach management works have held this line of defence since at least 1946 when the first sea wall was installed at Eastoke Point. Historically the seawall led to undermining and beach lowering, and the proposed rock revetment and groynes will respond much better to wave attack, preventing the wave reflection and beach lowering / habitat losses experienced historically;
- Option development is in line with SMP policy of 'Hold The Line' and the Hayling Island: Eastoke Point Sectoral Strategy Study for the 'Southern Frontage – Eastoke Point' of 'Hold The Line to provide protection to a 0.5% Standard Of Protection'. The scheme has therefore met the specific environmental and flood risk management requirements for the frontage within which the site is located.

Whilst the extent of the proposed works is minimal in relation to the entire water bodies, the proposed scheme may contribute towards cumulative adverse effects due to the overriding long-term management policy of 'Hold The Line' for much of the Solent. The assessment of potential cumulative impacts should be undertaken at the water body scale, and is therefore beyond the scope of this environmental statement.

7.0 Landscape and Visual Amenity

In order to identify the potential visual impact of the proposals, a full Landscape and Visual Impact Assessment was carried out by the Councils Landscape Architect. The report is an accompanying document to the planning application.

The report looks at the various landscape designations and character assessments that cover the area and assess the effects of the scheme on the local area. It looks in detail at the local area, its characteristics and the main sensitive receptors likely to be affected by the proposals.

The Report concludes that the proposed sea defences could be successfully accommodated within the landscape without causing significant harm to the surrounding landscape character, visual amenity or landscape elements of the area.

8.0 Conclusions

The Eastoke Point Scheme has the potential to effect various designated species and habitats during construction activities, however these can be controlled, as set out throughout this statement. Any negative effects are expected to be short term, very localised and a full recovery is expected. For some key features, the scheme could be of benefit, and various environmental opportunities have been highlighted, such as seed collection and dispersal to improve the vegetated shingle communities, which will benefit from a more stable beach, allowing the vegetation to become better established.

Table 8.1 summarises the key construction activities that will take place to deliver the scheme, to highlight how they could effect the designated species and habitats, and how any effects could be mitigated. The table goes on to highlight the resultant effect, once the mitigation measures have been incorporated.

In summary, well planned and managed construction activities are expected to have a short-term localised effect on the environment, which will recover in the short – medium term, with the potential for an enhanced local environment.

	Construction activity that may result in this effect												
Potential effect of scheme on designated species / habitats	Excavation of beach material and stockpiling	Importation of rock armour by road or sea	Placing of Rock Armour	Laying of geotextile	Filling of beach and rock armour	Import of beach recharge by land or sea	Concrete paving and steps to new access / drainage points	Resurfacing of promenade	Concrete repairs and coating of sea wall	Stop log improvements at Bosmere Road	Pedestrian Ramp at Bosmere Road	Mitigation	Resultant effect
Disturbance to nesting pair of Ringed Plover, which return annually	x	x	x	x	x	x						Time construction activities to avoid disturbance, and fence area off to protect eggs from trampling – to shorten nesting period.	A quicker and potentially more successful nesting period due to trampling being prevented.
Loss of vegetated shingle habitat.	x		x	x	x							Map and record species in works area. Requirement in works contract to prevent unnecessary damage. Areas to be protected will be fenced off. Seed collection and	Short term loss of vegetated shingle / potential long term gain

												dispersal programme pre and post construction works. Development of critical beach volume, suitable for vegetated shingle development.	
Changes to the Shingle Spit	X		X		X							The scheme itself, will maintain a supply of shingle to the spit, which will help maintain it as a feature. Without beach recharge and recycling, the spit could fail over time if the supply of shingle diminishes.	The spit maybe more stable as a result of these works due to an ongoing feed of sediment.
Localised pollution to water bodies	X	X	X		X	X						Contractor will be requested to provide a written method statement and construction environmental management plan to highlight how water, amongst other	Pollution prevented

												environmental aspects would be protected during construction	
Chichester Harbour Shellfish Water (particularly Emsworth Channel)	X	X	X		X	X						Fuels will be adequately stored, and machinery refuelled in bunded areas. Biodegradable hydraulic oils will be used in plant to ensure any hydraulic pipe leaks do not have a negative effect on shellfish waters or the environment generally. Changes in coloration or suspended sediments due to shingle works would be short term, and quickly diluted by the flushing action of Chichester Harbour. The Environment Agency will be consulted to ensure changes are minimal, and works will be	Proposed works could have a short-term localised effect on coloration and suspended solids. Not expected to affect shellfish waters.

												completed in line with their ongoing monitoring programme.	
Water Bodies	X	X	X		X							The scheme is not expected to impact on the overall ecological quality of the three water bodies (see Section 6.4)	No negative effect.
Habitat loss (saltmarsh / mudflat)			X		X							It is believed 0.4ha of habitat may be lost due to holding the line. Compensated through Regional Habitat Creation Programme through the Medmerry managed realignment scheme. This has been confirmed by the Environment Agency (Annex 8).	Localised loss of habitat, compensated elsewhere

Table 8.1 summary of the key construction activities that will take place to deliver the scheme, highlighting how they could effect the designated species and habitats, and how these effects could be mitigated.

Annex 1

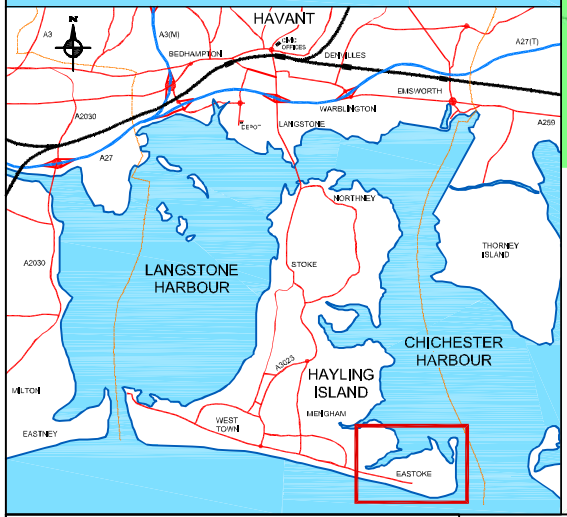
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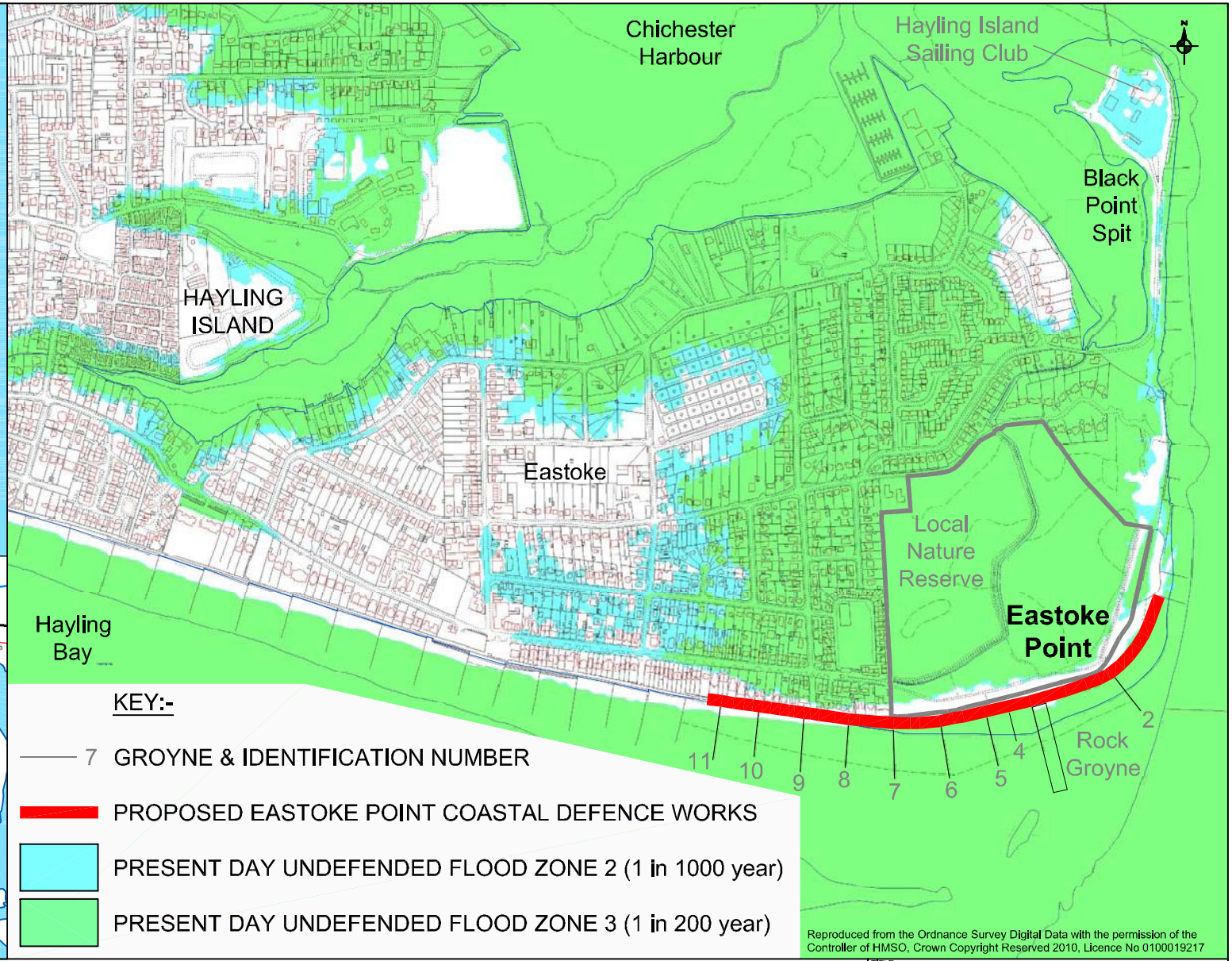
Appendix K: Environmental Statement:

Site Location Plan

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REV	DESCRIPTION	DATE	INITS

TITLE

APPENDIX A

LOCATION PLAN

DRAWN BY	CHECKED BY	DRG No.
BJR		
DATE		DIR NAME
MAR 2010		P:\CT\BC\M\P\E\E'P\E'P'2009-11\F\F'7A'
SCALE		CAD NAME
NTS @ A4		Appendix-A-Location-Plan

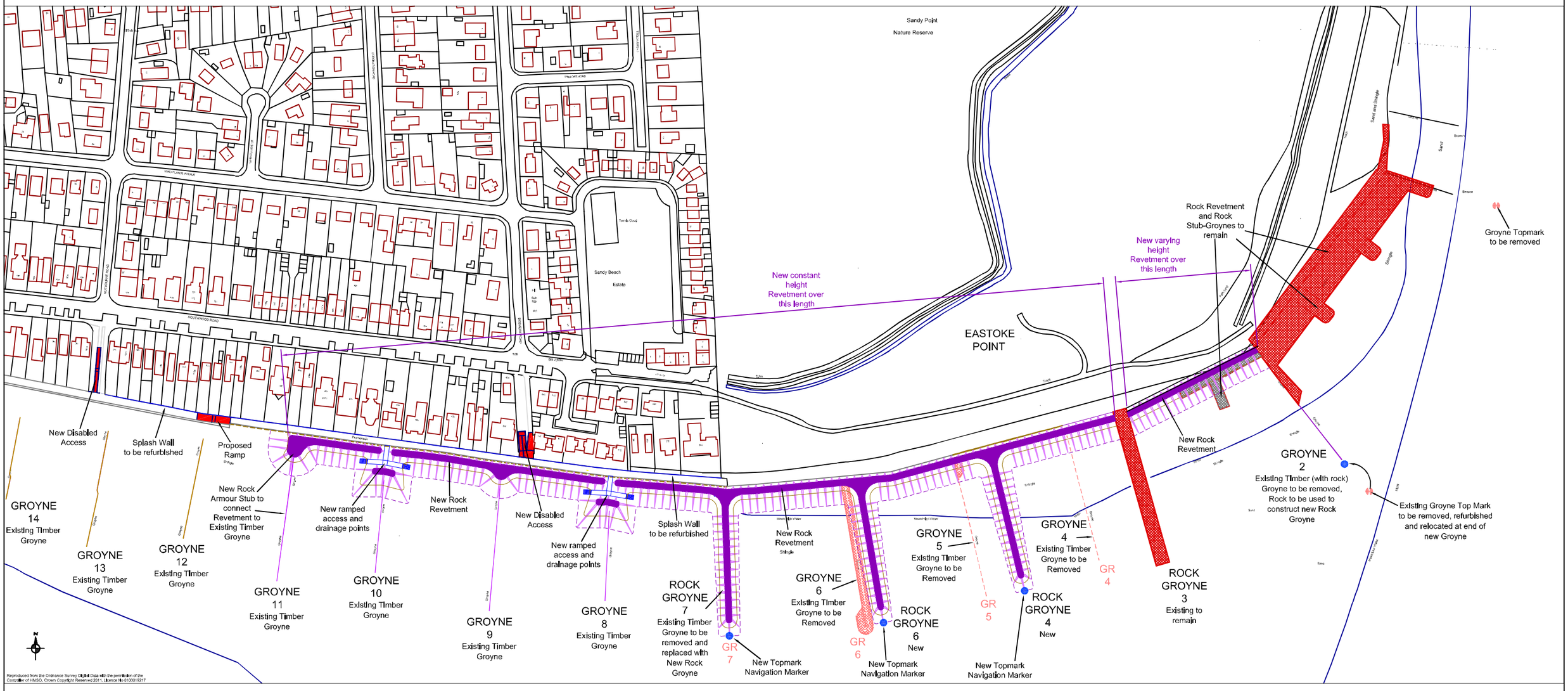
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Appendix K: Environmental Statement:

Proposed Scheme Design

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Notes:-

All Topmark Navigation Markers to be agreed with Trinity House

REV	DESCRIPTION	DATE	INITIALS

TITLE: EASTOKE POINT COASTAL DEFENCE SCHEME GENERAL ARRANGEMENT

DRAWN BY: BJR	CHECKED BY:	DRG No.	
DATE: SEP 2011		DIR NAME: P:\CTB\CMP\EIE\PER\2010\DWG	
SCALE: AS SHOWN @ A1		CAD NAME: EASTPT\PROP\PROF	

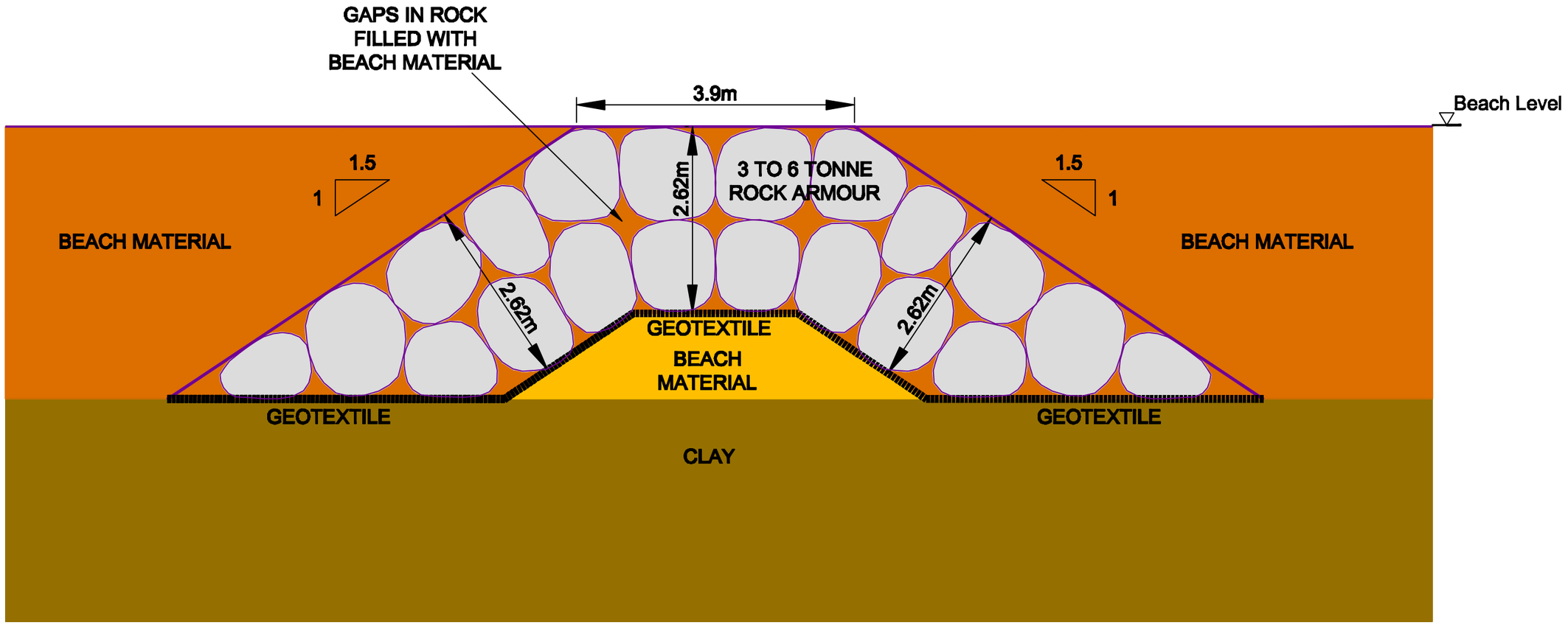
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Appendix K: Environmental Statement:

Typical cross-section of proposed groyne

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EASTERN SOLENT | COASTAL PARTNERSHIP

REV	DESCRIPTION	DATE	INITS

TITLE: EASTOKE POINT WORKS 2012
PLANNING PERMISSION
TYPICAL CROSS SECTION
THROUGH ROCK GROYNE

DRAWN BY	CHECKED BY	DRG No.
BJR		SE13/897
DATE: JUL 2012		DIR NAME: P:\CT\BCMP\E\EP\EPCW\D\2009\CPD
SCALE: As Shown @A3		CAD NAME: SE13_897_EPW_PP_XS_G'

Annex 4:

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Appendix K: Environmental Statement:

Vegetated Shingle Methodology

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West Sussex
Vegetated Shingle Project

Guidelines for Good Practice when working on beaches with Vegetated Shingle.

Introduction to the guidelines

These guidelines are aimed at coastal defence engineers and others planning to carry out works on shingle beaches which host native shingle vegetation or have the potential to do so. Highly mobile beaches with no stable shingle would not be able to support vegetation. The guidelines indicate the various ways that vegetated shingle can be damaged during the works and suggest ways in which this damage can be avoided, or at least limited.

It is recognized that it will not always be possible to incorporate all the suggestions, for example during emergency works. There are also substantial cost implications involved with some of the measures. The guidelines should therefore be viewed as suggestions to be seriously considered and implemented where costs, time and resources allow. However, some of the suggestions take the minimum of time and effort, such as limiting the number of access points to the beach, and therefore may still be possible.

It is hoped that the guidelines will be used during the planning stage so that contractors can be given clear instructions as to the measures they are required to take to protect areas of vegetated shingle.

Introduction to vegetated shingle

Vegetated shingle is recognized as an internationally important habitat. It is scarce in Europe with the UK supporting a high proportion of the European resource. Elsewhere, coastal shingle has few occurrences outside Japan and New Zealand. Coastal vegetated shingle is listed as a priority habitat in the UK Biodiversity Action Plan (BAP) and supports 9 BAP priority species.

It is characterised by specialised plants that have adapted to survive in harsh coastal conditions where lack of fresh water and nutrients are compounded by fierce winds and impact by waves. Shingle habitats are also particularly important for invertebrates and for some breeding and roosting birds.

ENGLISH NATURE · west sussex county council · ENVIRONMENT AGENCY · ARUN DISTRICT COUNCIL · CHICHESTER District Council · ADUR DISTRICT COUNCIL

Much has already been lost to housing developments, agriculture and coastal defence while the remaining areas face a number of threats including trampling and un-natural enrichment of the shingle substrate, for example by dog fouling and bonfires. One of the main long-term threats to vegetated shingle is as a result of man's intervention in natural coastal processes, with coast protection work changing the accretion rate of shingle to coastal areas. Trapped between urban development on the landward side and rising sea levels on the seaward side, vegetated shingle is also threatened by "coastal squeeze".

Shingle banks form a natural coastal defence, which may require replenishment in order to maintain the bank crest height and width. With coastal protection techniques moving towards a more integrated approach allowing natural processes to work where possible and relying more on "soft" defences rather than "hard" structures such as sea walls, there is an opportunity to create new, stable areas of shingle. If planned with care, these could be used to create new areas of shingle vegetation.

Vegetated Shingle Communities

Pioneer communities of vegetated shingle can begin to recover naturally from damage within a few years, as long as the seed bank remains intact and further damaging activities are halted. However, the more established communities, such as moss and lichen communities and closed-turf communities are unlikely to recover as they take many decades to develop. Some can take hundreds of years to establish. It is important that these types of vegetated shingle communities are not damaged, as they are extremely rare.

Threats from coastal defence engineering works

Vegetated shingle can be damaged in a number of ways when coastal defence and other works are being carried out on the beach. It should be noted that damage could be done not only by vehicles and machinery but also by trampling, especially on the older communities.

Damage can be in a variety of forms:

- ***Physical damage to plants***
- ***Physical damage to communities (pioneer, intermediate, closed-turf, moss and lichen etc)***
- ***Disturbance to breeding birds***
- ***Movement and/or compaction of shingle***
- ***Destruction of the seed bank***
- ***Imported marine-dredged shingle causing nutrient enrichment***
- ***Imported shingle of unsuitable type/size[1]***
- ***Nutrient enrichment through mixing of the shingle and soil layers***

Measures to prevent damage or to offset unavoidable damage

There are a number of measures that can be taken, both before the commencement of coastal defence operations and while the work is being carried out. It is important that all contractors are informed in advance the procedures they must follow to limit any impact on the vegetated shingle.

Note: *English Nature's consent must be sought before any work is carried out within a statutory designated site.*

Preventative measures that can be taken are:

- ***Brief the works unit/contractors before commencement of work to ensure that each individual is clear about the measures being taken.***
- ***Limit the number of beach access points for vehicles.***
- ***Clearly define beach access points avoiding any vegetated areas where possible. If the loss of some vegetation is unavoidable, ensure that it is limited to the pioneer community and not the established, closed-turf communities that will not recover.***
- ***Mark off any particularly valuable or important areas of vegetation prior to commencement of operations to ensure its protection. Use old groyne timber, tape or any other highly visible barrier laid around the perimeter. Keep all vehicles, machinery and people out of the marked area.***
- ***If possible, wash imported marine-dredged shingle to prevent nutrient enrichment.***
- ***If possible, use imported shingle of a suitable type/size[1] for vegetation, at least in those more stable areas where plants are likely to re/colonise.***
- ***If possible, limit vehicle movement along the beach to below High Water Mark to prevent impact to vegetation or compaction of shingle on the ridge.***
- ***Limit work to the period outside the bird nesting season. Shingle nesting birds generally nest between March and August.***

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- ***Include information about the shingle vegetation protection measures that are being taken, in any interpretation on the site***

- ***Seek advice from the West Sussex Vegetated Shingle Project (WSVSP) or other coastal conservation body.***

[1] Land-sourced shingle tends to have sharp edges and be more angular than marine-sourced shingle, making it less suitable for coastal shingle vegetation. Pebble size is very important in determining which plants can grow. Pebbles with an average size greater than 8cm diameter are normally unsuitable for vegetation. Shingle species generally prefer an average diameter of up to 4cm. Patches of different sized pebbles are the most desirable as they allow a mosaic of vegetated and bare shingle areas to develop. A variety of pebble sizes will also allow a greater variety of species to colonise.

Measures that can be taken to offset unavoidable damage:

- ***If the loss of an area of vegetated shingle is unavoidable it may be possible to incorporate the creation of a new area elsewhere along the coast in order to ensure no net loss of this very rare habitat. Opportunities for creation of vegetated shingle habitat should be sought during all planning stages of coastal defence.***

- ***If unavoidable damage to an area of vegetated shingle is foreseen, liaise with the WSVSP about seed collection prior to work in order that restoration can be attempted after the work is complete. (Up to 12 months notice may be required for this, depending on the time of year)***

Information and advice

The West Sussex Vegetated Shingle Project Officer can be contacted at:

Town Hall,
Clarence Road,
Bognor Regis,
West Sussex
PO21 1LD
Telephone *01903 737949*

The East Sussex Coastal Biodiversity Project Officer can be contacted at:

East Sussex County Council
County Hall
St. Anne's Crescent
Lewes
East Sussex
BN7 1UE
Telephone *07786 171465*

Plant ID cards for contractors

A guide for identifying vegetated shingle communities is available from both the West Sussex Vegetated Shingle Project and East Sussex Coastal Biodiversity Project.

GIS survey data

Vegetated shingle along the West Sussex coast from East Head to Shoreham has been mapped and the information is available on CD ROM in both MapInfo and Arc View formats. To obtain a copy please apply to:
Sussex Biodiversity Record Centre, Woods Mill, Henfield, West Sussex BN5 9SD.

Glossary of terms

Coastal defence	*a combination of both Coast Protection (generally to prevent erosion – where the land is higher than sea level) and Sea Defence (to prevent flooding- where the land is lower than sea level).*
Coastal squeeze	*the shrinking of coastal habitats caught between rising sea level and fixed coastal defences.*
Interpretation	*means of displaying explanatory information for example in the form of a leaflet or notice board.*
Nutrient enrichment	*increase in nutrient content (soil/humus etc) of shingle.*
Vegetated shingle	*shingle supporting a wildlife community of flora and fauna.*
Pioneer communities	*plant and animal communities that establish within a relatively short time and are usually the first to colonise a new area.*
Intermediate communities	*plant and animal communities that are intermediate between pioneer and established, closed-turf communities.*
Closed-turf communities	*species rich plant and animal communities that develop over a relatively long time, gradually building up a layer of soil and humus over the shingle, eventually completely covering it with vegetation, with no bare shingle visible.*

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Appendix K: Environmental Statement:

Guidance for an Appropriate Assessment

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EASTOKE POINT
COASTAL DEFENCE WORKS
Southern Hayling Frontage

Guidance for an Appropriate Assessment

October 2011



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Appendix 4	Correspondence: Natural England Letter of Support
Appendix 5:	Southern Regional Habitat Creation Programme Letter confirming 0.4ha for the Eastoke Coastal Defence Works

1.0 Non Technical Summary

This document is a guidance note to inform an Appropriate Assessment (AA) for the development of a sustainable coastal defence scheme for managing coastal erosion and flooding risks along the Eastoke Point frontage of Hayling Island, Hampshire, UK. The report reviews the current state of knowledge regarding the study area, describes the present coastal protection concerns and addresses any issues that arise from the proposed operation.

Havant Borough Council, acting in its capacity of Coast Protection Authority, is responsible for managing the flood risk from the sea at Eastoke Peninsula, which is located along the south eastern frontage of Hayling Island, Hampshire.

A number of environmental designations have been awarded to sites within the Eastoke Peninsular area. The Peninsula is entirely surrounded by the Chichester and Langstone Harbour's Special Area of Protection (SPA). Chichester Harbour is also designated as a Site of Special Scientific Interest (SSSI), a Ramsar Site and an Area of Outstanding Natural Beauty (AONB). The peninsular also falls within the boundaries of the Solent Maritime Special Area of Conservation (SAC). Sandy Point, located on the eastern tip of the Eastoke Peninsula is designated as a Local Nature Reserve and the Southern Eastoke Frontage is a designated Site of Importance for Nature Conservation (SINC).

For all European Sites specified under Regulation 61 of the Conservation of Species and Habitats Regulations 2010, an Appropriate Assessment is required to be undertaken by law where any project:

(a) is likely to have a significant effect on a European site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site (Part 2 (Section 21))

A European Site is any classified SPA and any SAC from the point where the Commission and the Government agree the site as a Site of Community Importance. An Appropriate Assessment is also required, as a matter of Government Policy, for potential SPAs, candidate SACs and listed Ramsar Sites for the purpose of considering development proposals affecting them (PPS 9 Biodiversity and Geological Conservation). Therefore this report has been designed to act as guidance to the 'Competent Authority' who will be undertaking the assessment as part of the consideration of the planning application for the proposed Eastoke Point Coastal Defence works.

Through correspondence, Natural England requested that an Appropriate Assessment is to be carried out to assess whether the proposed development is likely to have a significant effect on the interest features on the Solent Maritime SAC either alone or in combination with other plans or projects. The main concerns that Natural England highlighted relate particularly to the potential impacts to the estuaries interest feature from the proposed scheme, which is listed below:

- Saltmarsh communities,
- Intertidal mudflat and sand flat communities,
- Intertidal mixed sediment communities,
- Subtidal sediment communities.

This report has addressed the four key areas of interest (as highlighted above) and concluded that the Eastoke Point Coastal Defence Works is considered unlikely to cause an adverse affect on the integrity of the SAC, SPA and Ramsar Site during the construction phase. With regards to whether the scheme will cause an adverse affect to these environmental interest features over the next 100 years, there is some debate and uncertainty amongst professionals about whether the scheme will cause intertidal habitat losses through coastal squeeze. The Eastoke Point Sectoral Strategy Study (October 2006) concluded that there *could* be some intertidal habitat losses through coastal squeeze over the 100 year strategy period and judged to be between negligible and 0.4ha. Therefore as a precautionary approach, compensatory habitat between negligible and 0.4ha will need to be provided for. The Southern Region Habitat Creation Programme have been informed for the potential need for an additional 0.4ha to be set aside for the Eastoke Point Coastal Defence Works scheme.

This report concurs with the North Solent Shoreline Management Plan (NSSMP), 2010 that; implementing the 'Hold the Line' policy primarily through beach management over the next 100 years along the Eastoke Peninsula is considered as supporting natural development. This is supported by a number of observations:

(a) Maintaining, replacing and/ or improving the rock groynes will not adversely impact on the loss of habitat of the SAC for the following reason:
    i) The groyne footprints have varied considerably since initial installation and therefore have created an adaptable environment.
    ii) The proposed rock groynes will not extend beyond the footprint of the existing or previous groyne structures.

(b) Beach recharge will not have an adverse affect on the Estuary function for the following reasons:
    i) the scale of the recharge is relatively small in comparison to the volumes of material already in the system (proposal of recharging approximately 3 groyne bays in comparison to the approved beach management of the whole Eastoke frontage).
    ii) the existing ebb-dominated tidal flows within Chichester Harbour will limit the recharge material being carried into the harbour and smothering intertidal habitats.
    iii) the volume of recharge proposed will be less than what has existed at this location in the recent past.

(c) Sediment contamination from both the recharge and introduction of new materials will not have a significant affect on the Estuary function as tests will have already been undertaken on the proposed recharge materials to ensure that they are not contaminated.

Through implementing the NSSMP policy of Hold the Line (HTL) along the Eastoke peninsula, the natural coastal processes could potentially be restricted, which could in turn affect the ability of the estuary to evolve and adapt in response to rising sea levels. However, it should be noted that as the Eastoke Point Coastal Defence works is primarily proposing to maintain the beach frontage via beach management, Eastoke Peninsula is considered to be a dynamic (not fixed) frontage and these soft engineering techniques are deemed to be "supporting the natural development" of the frontage (North Solent SMP, 2010). Also it should be noted that through implementing 'Hold the Line' at Eastoke Peninsula, the proposed scheme will protect the integrity of the Sandy Point Local Nature Reserve and provide ongoing protection for terrestrial and foreshore SSSI and SAC/SPA/Ramsar habitats on the Peninsula. It will also afford protection and maintenance of features within the AONB (Eastoke Point Sectoral Strategy Study, 2006) .

As part of the Appropriate Assessment for the NSSMP, the effects on estuary process within the sites of international importance have been assessed. It was concluded that with designated habitats seaward of coastal defences, holding the line at these defences cannot avoid having an adverse effect on seaward habitats. The NSSMP Appropriate Assessment has been approved under Imperative Reason of Overriding Public Interest (IROPI) by the Secretary of State, and the habitat creation requirements arising from the NSSMP will be delivered by the Environment Agency's Southern Regional Habitat Creation Programme (SRHCP) at Medmerry. Please see Appendix 5 for a letter of confirmation from the Regional Habitat Creation Programme (RHCP) Manager that 0.4ha of intertidal habitat to compensate for losses to Natura 200 sites potentially caused by the Eastoke Point Coastal Defence works has been included in the South East RHCP.

With respect to estuary function Natural England provides the following comments *"Natural England is satisfied that through the habitat creation at Medmerry a new and sustainable estuary function will be created in the region. As each estuary is different with its own ecological and physiological characteristics it would be unrealistic to attempt to replicate each estuary in a like for like basis. The new estuary at Medmerry will provide its own ecological and physiological characteristics to support Ramsar and SPA bird interests and contribute to ensuring a sustainably functioning coast."*

Natural England states that "the impacts identified and assessed in the strategy [sic, recte scheme] are in accordance with the North Solent SMP Appropriate Assessment and subsequent IROPI case, thus it is considered that the IROPI case for the higher level SMP Appropriate Assessment can be used for

this strategy [sic, recte scheme].” Natural England has provided Havant Borough Council with a letter of support for the scheme stating “Natural England agrees with the outcomes in the Appropriate Assessment” (see Appendix 4).

2.0 Background

2.1 The Habitats Directive

Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora – the 'Habitats Directive' - provides legal protection for habitats and species of European importance. Article 2 of the Directive requires the maintenance or restoration of habitats and species of European Community interest, at a favourable conservation status. Articles 3 - 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as *Natura 2000*. Natura 2000 sites are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC).

For all European Sites specified under Regulation 61 of the Conservation of Species and Habitats Regulations 2010, an Appropriate Assessment is required to be undertaken by law where any project:

(a) is likely to have a significant effect on a European site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site

(Part 2 (Section 21))

A European Site is any classified SPA and any SAC from the point where the Commission and the Government agree the site as a Site of Community Importance. An Appropriate Assessment is also required, as a matter of Government Policy, for potential SPAs, candidate SACs and listed Ramsar Sites for the purpose of considering development proposals affecting them (PPS 9 Biodiversity and Geological Conservation). Therefore this report has been designed to act as guidance to the 'Competent Authority' who will be undertaking the assessment as part of the consideration of the planning application for the proposed Eastoke Point Coastal Defence works.

2.2 The Appropriate Assessment Process

The Habitats Directive promotes a hierarchy of avoidance, mitigation and then compensatory measures, where avoidance of significant adverse effects to a Natura 2000 site should take precedent. To achieve this hierarchy, there are set stages that should be followed under the Habitats Directive decision making process (Scott Wilson et al, 2006). These stages are illustrated in Figure 1.

"Stage 1: Screening" of the process has already been carried out for the Eastoke Point Coastal Defence Works *"A Study to Inform the Scoping Phase for an Environmental Impact Assessment"* (Screening Report) which determined that due to the presence of a number of environmental designations awarded to sites within the Eastoke Peninsular area, an Appropriate Assessment is likely to be required by law for the proposed works. This is Stage 2 of the process which consists of six sub-stages or tasks as shown below. This report is therefore concentrating on Stage 2A through to 2B of the decision making process for Stage 2C through to 2F is to be carried out by the 'Competent Authority'.

a) Stage 2A: Analyse the site(s) and the reasons for its designation, and the underlying trends affecting it.
b) Stage 2B: Analyse the plan, including its key components and how it would be implemented in practice.
c) Stage 2C: Analyse other plans and projects that could contribute to 'in combination' effects
d) Stage 2D: Analyse how the plan, in combination with other plans and projects, and the site will 'interact' when the plan is implemented, i.e. Appropriate Assessment
e) Stage 2E: Where applicable, propose and assess mitigation measures for addressing adverse effects
f) Stage 2F: Prepare an Appropriate Assessment Report for consultation with key stakeholders including Natural England

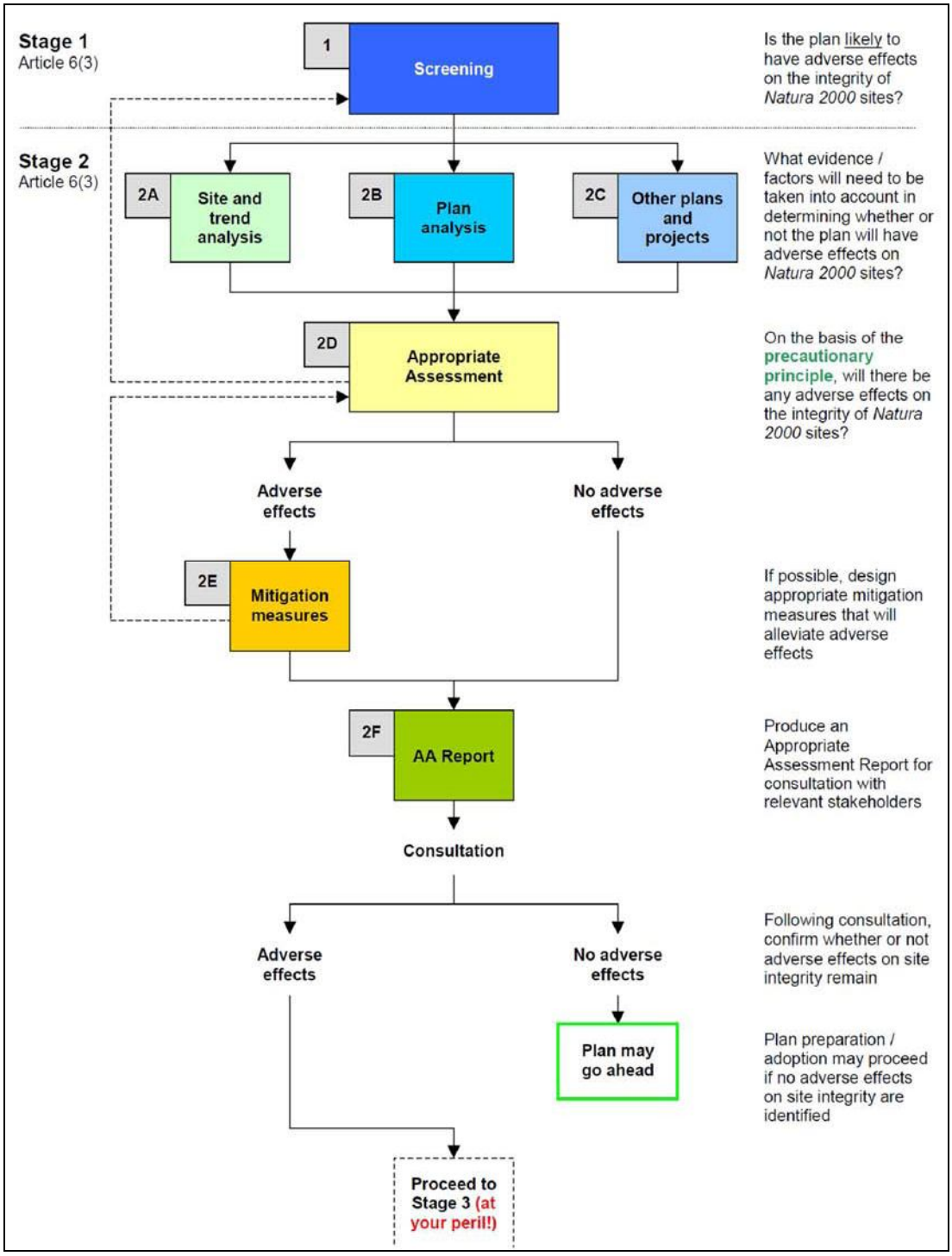


Figure 1: Summary of Appropriate Assessment Stages

3.0 Stage 2A: Analyse the site(s) and reasons for designations

3.1 The Study Area

Hayling Island is located on the south coast of England in the Eastern Solent as shown in Figure 2. The red box highlights the area of Eastoke Peninsular. The main water body located to the north and east of the peninsular is Chichester Harbour and the water body to the south, is the Solent.

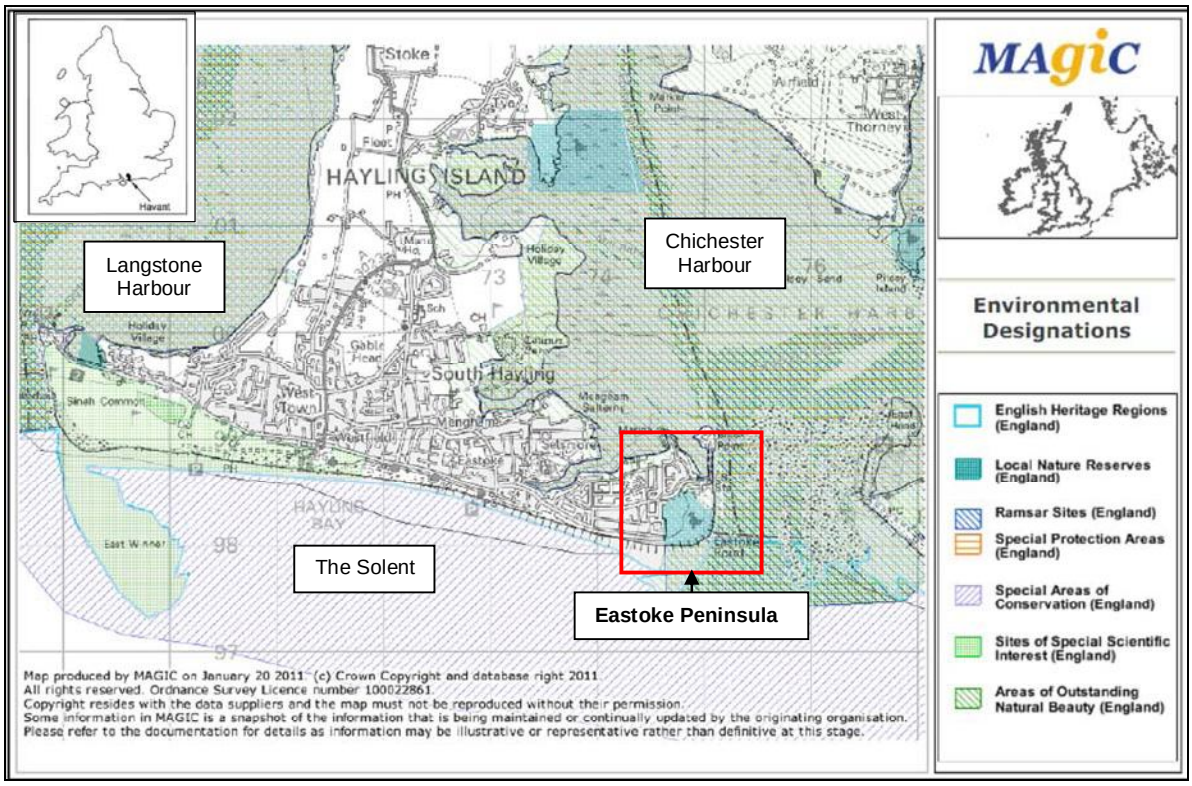


Figure 2: Site Location Map

The southern Eastoke frontage has an extensive shingle storm beach that is a vital coastal defence for the residential area of the Eastoke Peninsula. The Peninsula is entirely surrounded by the Chichester and Langstone Harbour's Special Area of Protection (SPA). Chichester Harbour is also designated as a Site of Special Scientific Interest (SSSI), a Ramsar Site and an Area of Outstanding Natural Beauty (AONB). The peninsular also falls within the boundaries of the Solent Maritime Special Area of Conservation (SAC). Sandy Point, located on the eastern tip of the Eastoke Peninsula is designated as a Local Nature Reserve and the Southern Eastoke Frontage is a designated Site of Importance for Nature Conservation (SINC).

3.2 Chichester and Langstone Harbours SPA

The boundary of the SPA is shown in Figure 2 and is shown to include both Chichester and Langstone Harbours. The sites qualifying features are:

- Internationally important populations of regularly occurring Annex 1 species; sandwich tern *Sterna sandvicensis*, common tern *Sterna hirundo* and little tern *Sterna albifrons;*
- Internationally important populations of regularly occurring migratory species; Grey Plover *(Pluvialis squatarola*), Sanderling (*Calidris alba*), Dunlin (*Calidris alpina*), Redshank (*Tringa totanus*), Brent Geese (*Branta bernicla*), Shelduck (*Tadorna tadorna*) and Teal (*Anas crecca*);

- Internationally important assemblage of waterfowl; and
- Nationally important populations of the following migratory species; Ringed Plover (*Charadrius hiaticula*), Curlew (*Numerius arquata*), Bar-tailed Godwit (*Limosa lapponica*), Turnstone (*Arenaria interpres*), Wigeon (*Anas penelope*), Pintail (*Anas acuta*), Shoveler (*Anas clypeata*) and Red-breasted Merganser (*Mergus serrator*).

The table below was developed for the Screening Report for the Eastoke Point Coastal Defence Works and shows the qualifying interest features of the SPA and Ramsar sites for the area.

Interest Feature	Conservation Objective	Consequences of the operation on conservation objective	Mitigation Measures proposed
Internationally important populations of regularly occurring Annex 1 Species	Subject to natural change, maintain in a favourable condition the habitats for the internationally important populations of the regularly occurring Annex 1 species namely; • Sand and shingle • Saltmarsh • Intertidal mudflats and sandflats • Shallow coastal waters	Nil	N/A
Nationally important regularly occurring Migratory Species	Subject to natural change, maintain in a favourable condition the habitats for the internationally important populations of the regularly occurring migratory species, namely; • Saltmarsh • Intertidal mudflats and sandflats • Boulder and cobble shores • Mixed sediment shores	Nil	N/A
Internationally important wetland regularly supporting 20,000 waterfowl	Subject to natural change, maintain the wetland regularly supporting 20,000 waterfowl in a favourable condition.	Nil	N/A
Wetland supporting 1% or more of the individuals in a population of one species or sub-species of waterfowl	Subject to natural change, maintain the wetland supporting 1% or more of the individuals in a population of waterfowl species in a favourable condition.	Nil	N/A

Table 1: SPA & Ramsar Features, Conservation Objectives & Impacts from the Proposed Operation

3.3 Chichester and Langstone Harbours Ramsar Sites

The proposed Eastoke Coastal Defence Works lies within an area that has been designated under Criterion 1a of the Convention as it comprises internationally important wetland characteristics of the Atlantic biogeographical region including:

- estuaries
- saltmarshes
- intertidal mudflats and sandflats

It qualifies under Criterion 3a of the Ramsar Convention as the wetland regularly supports 20,000 waterfowl. It also qualifies under Criterion 3c of the Convention by supporting 1% or more of the individuals in a population of waterfowl species. Table 1 above shows the qualifying interest features for the designated Ramsar Site and Figure 2 above illustrates the boundary of the designated Ramsar Site.

3.4 The Solent Maritime Special Area of Conservation (SAC)

The boundary of the SAC incorporates the two local harbours (Chichester and Langstone) and extends out into the Solent, thus surrounding the Eastoke Peninsular, see Figure 2.

The qualifying interest features of the Solent Maritime SAC are in Table 2 opposite, taken from the Screening Report, highlights the Interest Features, Conservational Objectives and the identified consequences of the operations on the conservational objectives as outlined in the Eastoke Point Coastal Defence Works report “A Study to Inform the Scoping Phase for an Environmental Impact Assessment”.

Table 2: SAC Features, Conservation Objectives & Impacts from the Proposed Operation…

Interest Feature	Conservation Objective	Consequences of the operation on conservation objective	Mitigation Measures proposed
Annual vegetation of drift lines	Subject to natural change, maintain the Annual vegetation of drift lines in a favourable condition.	Construction plant would run adjacent to a site populated with vegetated shingle. Construction of defences in areas populated with vegetated shingle.	Identify the extent of the vegetated shingle and cordon off the site to ensure that there is no disturbance from plant traffic. Identify areas of vegetated shingle to keep disturbance to a minimum. Carrying out a seed collection and dispersal programme for the vegetated shingle species pre (collection) and post (dispersal) construction works. Guidance from the County Ranger will be sort on this programme.
Sandbanks which are slightly covered by seawater all the time • Subtidal gravelly sand and sand • Subtidal muddy sand • Subtidal eelgrass beds	Subject to natural change, maintain the sandbanks slightly covered by seawater all the time in a favourable condition.	Nil	N/A
Atlantic Salt Meadows • Low-marsh communities • Mid-marsh communities • Upper marsh communities • Transitional high marsh communities	Subject to natural change, maintain the Atlantic salt meadows in a favourable condition.	Nil	N/A

Salicornia and other annuals colonising mud and sand • Annual *Salicornia* saltmarsh communities • *Suaeda maritima* saltmarsh communities	Subject to natural change, maintain the *Salicornia* and other annuals colonising mud and sand in favourable condition.	Nil	N/A
Mudflats and sandflats not covered by seawater at low Tide: • Intertidal mud communities • Intertidal muddy sand communities • Intertidal sand communities • Intertidal mixed sediment communities	Subject to natural change, maintain the mudflats and sandflats not covered by seawater at low tide in favourable condition	Nil	N/A
Estuaries • Saltmarsh communities. • Intertidal mudflat & sandflat communities. • Intertidal mixed sediment communities. • Subtidal sediment communities. • cordgrass swards (including *Spartina maritime*, *Spartina alterniflora* and *Spartina x townsendii* communities);	Subject to natural change, maintain the Estuaries in a favourable condition.	Implementing the SMP policy of Hold the Line along the Eastoke peninsula is considered to potentially restrict natural coastal processes and thus affect the ability of the estuary to evolve and adapt in response to rising sea levels. Construction plant running along the beach may cause potential pollution through increasing turbidity and hydrocarbon pollution (spillages/ leakages)	*"Natural England is satisfied that through the habitat creation at Medmerry a new and sustainable estuary function will be created in the region... The new estuary at Medmerry will provide its own ecological and physiological characteristics to support Ramsar and SPA bird interests and contribute to ensuring a sustainably functioning coast."* Restrict contractors method of working: • i.e. No land based plant to drive into the sea • Contractors to keep vehicles maintained to avoid fuel/ oil leaks • Contractors to submit method statements to avoid potential pollution • Designated vehicle refuelling areas away from beach frontage (Site Compound).

...continued Table 2: SAC Features, Conservation Objectives & Impacts from the Proposed Operation

After consulting with Natural England, their key interest feature of concern is the likely affects of the proposed scheme to the SAC, in particular the effects on the Estuary Feature. With reference to the 'Solent European Marine Site' report (English Nature 2001), the importance of the Estuary feature are as follows:

- The Solent European marine site encompasses a major estuarine system on the south coast of England with examples of several different types of estuary.
- It is the only European marine site within the UK to contain more than one physiographic estuary type, comprising four bar-built estuaries (Newtown Harbour, Beaulieu, Langstone Harbour and Chichester Harbour) and four coastal plain estuaries (Yar, Medina, Kings Quay Shore and the Hamble).
- The estuaries contain a wide range of both intertidal and subtidal habitats, with important examples of natural transitions from terrestrial to marine environments
- Estuaries are highly dynamic physiographic systems, they have a natural tendency to accumulate sediment, thereby changing their form from their original Holocene morphology to a state where tidal energy is dissipated by subtidal and intertidal sediments.
- Eelgrass beds are found in both Chichester and Langstone harbours and are nationally rare. They are an important habitat as they provide spawning, nursery and refuge areas for fish. They also help stabilise the sediment, contribute to primary productivity and are also an important food source for over wintering waterfowl such as dark-bellied brent geese *Branta bernicla bernicla* (Davison and Hughes, 1998).

National guidelines on what constitutes "favourable condition" have been prepared by English Nature (now known as Natural England) for each habitat type. Conservation objectives have also been defined. A copy of the conservation objectives and accompanying favourable condition tables is provided in Section 5, Table 2 of the 'Solent European Marine Site' (English Nature 2001) (found in Appendix 1).

English Nature has prepared a favourable condition table for the Solent Maritime cSAC interest features (now a full SAC), against which the impacts of any proposed projects would be measured. The targets for the attributes of each interest feature supplement the conservation objectives as follows:

a) subject to natural change, maintain the estuaries in favourable condition, in particular:
    - no decrease in extent from an established baseline
    - the intra and inter-estuarine tidal prism/cross section (TP/CS) relationship should not deviate from an established baseline
    - average temperature and salinity should not deviate from an established baseline
    - average phytoplankton concentration should not deviate from an established baseline
    - range and distribution of subtidal communities

b) subject to natural change, maintain the annual vegetation of drift lines in favourable condition, in particular:
    - no decrease in linear extent of vegetation
    - no increase in extent constrained by introduced structures, landforms or operations
    - sediment supply to and within the site through coastal processes to allow a balance of accretion and erosion
    - substrate composition with sufficiently low levels of human induced disturbance
    - presence and broad distribution of stands of *Atriplex prostrate/Beta vulgaris maritime*-dominated community and other local variants

c) subject to natural change, maintain the Atlantic Salt Meadows in favourable condition, in particular:
    - distribution and extent of low marsh, mid-marsh, upper-marsh and upper transitional marsh communities

- presence and abundance of constant species of characteristic low-marsh, mid-marsh, upper-marsh and upper transitional marsh communities

d) subject to natural change, maintain the *Salicornia* and other annuals colonising mud and sand in favourable condition, in particular:
   - no increase in algal material cover
   - no increase in extent
   - no change in distribution and extent of annual *Salicornia* saltmarsh communities

e) subject to natural change, maintain the cordgrass swards in favourable condition, in particular:
   - distribution and extent of smooth and Townsend's cordgrass communities

f) subject to natural change, maintain the intertidal mudflats and sandflats in favourable condition, in particular:
   - no decrease in extent
   - no change in shore profile
   - average abundance of macroalgal mats should not increase
   - average PSA parameters, measure, organic carbon content and black layer depth should not deviate significantly
   - range and distribution should not deviate significantly

g) subject to natural change, maintain the sandbanks which are slightly covered by seawater at all times in favourable condition, in particular:
   - no decrease in extent
   - average grain size parameters, range and distribution and depth should not deviate significantly
   - distribution and extent of characteristic biotopes should not deviate.

3.5 Environmental Baseline

The Eastoke Peninsula benefits from a combination of existing defences; the southern Eastoke frontage has an extensive shingle storm beach that is a vital coastal defence for the residential area of the Eastoke Peninsula. This is maintained through beach management via approved annual beach recycling and periodic re-nourishment of the beach. Also, the defences already in place at the Eastoke Point area comprise an existing rock revetment, rock groynes, and a splash wall.

For the Beach Re-nourishment works, both a Study to inform an Appropriate Assessment (AA) and an Environmental Impact Assessment was commissioned by Havant Borough Council and carried out by Halcrow Group Limited in July 2005. The 2005 AA report considers the potential affects of the re-nourishment works on the Environmental Designations within the Eastoke Peninsula area. This report was produced for the purpose of informing the Competent Authority (Havant Borough Council) when undertaking the AA as part of consideration for approving planning permission for the works. Natural England (then English Nature) was consulted during this process and confirmed that they had *no objection* to the scheme (as confirmed in Section 1: Background of the Study to inform an Appropriate Assessment, July 2005). For the purpose of this report, the information provided in previous reports has been reviewed and the relevant information utilised.

3.5.1 Coastal Processes

Chichester Harbour Entrance

An extract from the SCOPAC Sediment Transport Study, last updated 2004, explains the coastal processes within the study area (extract can be found in Appendix 2) which is summarised below.

The sediment circulation within Chichester Harbour is made up of complex circulations varying both spatially and temporally. Sediment supply to the channel is possible by either eastward or westward littoral drift at the harbour entrance; Figure 3 below, taken from the SCOPAC Sediment Transport Study, illustrates sediment transport for the study area. The purple arrows demonstrate the littoral drift transport mechanism, whilst the red arrows demonstrate the Estuarine sediment transport mechanism.

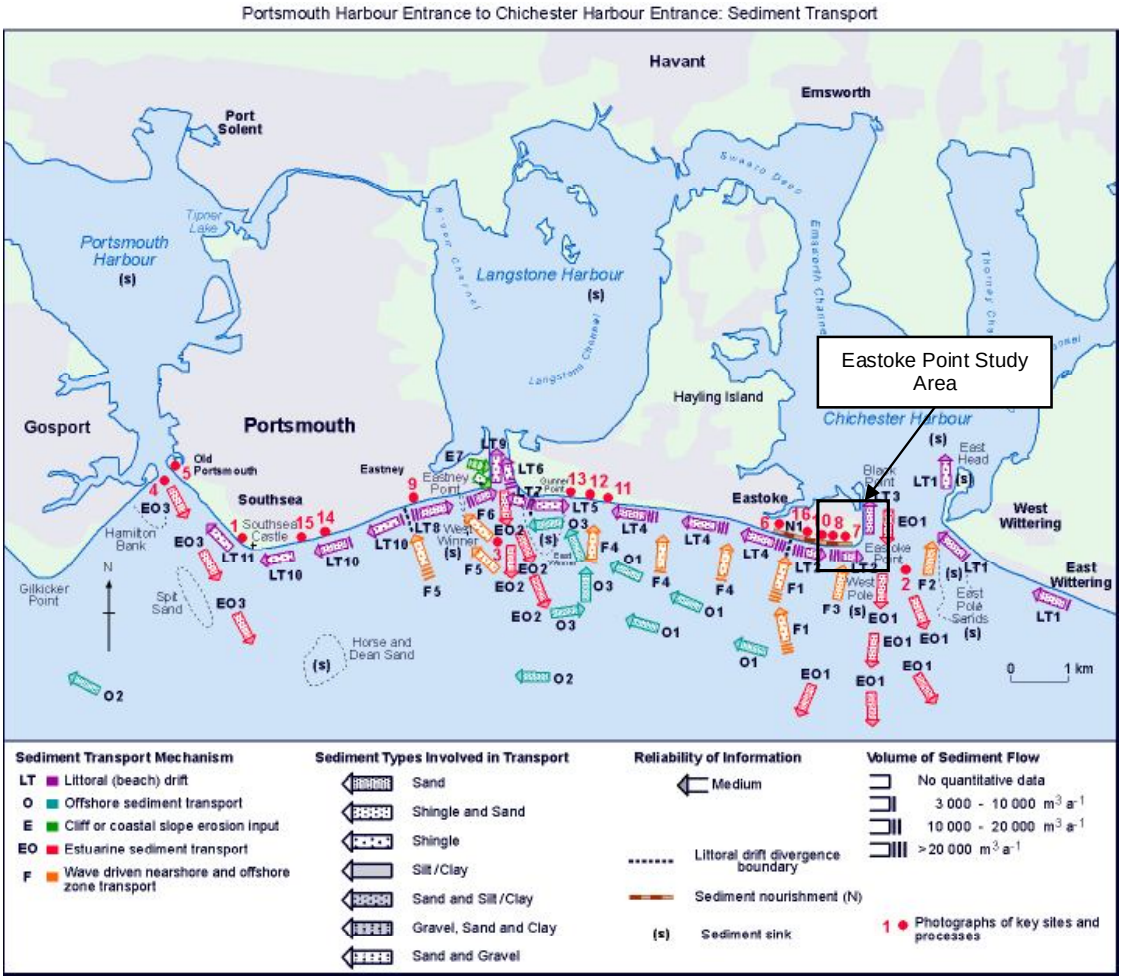


Figure 3: Sediment Transport for Portsmouth to Chichester Harbour Entrances, supplied by SCOPAC.

The littoral drift transport system demonstrates a drift divide along the Eastoke southern frontage (Creek Road) where sediment west of Creek Road transports westwards along the frontage to Gunner Point and material east of Creek road is generally transported eastwards, around Eastoke Point and up into Chichester Harbour. On the Eastern side of Chichester Harbour, sediment is supplied at rates up to 70,000m^3a^{-1} from East Head via the Winner gravel bank or directly from the distal end of the spit (Webber, 1979; ABP Research and Consultancy Ltd, 2000). Supply from this source has reduced significantly with the progressive and comprehensive protection of the shoreline of Bracklesham Bay since 1874 (Harlow, 1980) and has probably now virtually ceased following extension and upgrading of the groynes at West Wittering in the mid 1980s (SCOPAC, 2004). Contemporary supply to the tidal channel consists almost entirely of eastward drift of mostly fine gravel and sand from Eastoke Point. Virtually no fresh material is now introduced into the offshore transport pathway in the tidal channel; sediments transported will be those periodically pushed onshore from the tidal delta by storms from the south (SCOPAC, 2004).

The combination of transport patterns over short and long term, suggests that there may be an overall counter-clockwise circulation of sediments in the entrance to Chichester Harbour, with material moving

out of the estuary on the western side through Emsworth Channel under the influence of the strong ebb currents (Halcrow 2005). Compared with the other harbours, the entrance channel to Chichester Harbour is deeper and has higher ebb and flood tidal current velocities. Sediments entering the tidal channel are flushed offshore and deposited at varying distances from the entrance depending upon sediment size, wave conditions and water depth. Gravel can be transported a maximum of 1 to 2km offshore and sand a maximum of 3.5km offshore (Webber, 1979).

Analysis of the hydraulic regime at the entrance channel, via hydrodynamic modelling (ABP Research and Consultancy, 2000; HR Wallingford, 1998) has shown that there has been a rather variable pattern of channel narrowing and deepening; widening and shallowing since the mid-nineteenth century. The channel initially decreased in size, as the Winner bank accreted, 1887-1923; but overall, given the rotation and retreat of East Head and subsequent lowering of the Winner, the cross-sectional area of the channel has increased over the last 150 years. This suggests that it is adjusting towards a new equilibrium condition, but is below its optimum cross-sectional area given the tidal prism of Chichester Harbour. It stimulates the suggestion (ABP Research and Consultancy, 2000) that the harbour mouth has adjusted, or is adjusting, to a change from a wave-dominated littoral transport fed sediment budget to one which is controlled more strongly by tidal currents (SCOPAC, 2004).

3.5.2 Benthic Flora and Fauna (an extract from Halcrow, 2005)

"Sandbanks which are slightly covered by seawater all the time" is a qualifying feature of the SAC. Subtidal gravel and sands is a recognised sub-feature of this habitat type, which is present within Chichester Harbour Channel. The diversity and types of associated biological communities depend on sediment type and other physical factors. Typical in fauna are worms, crustaceans, bivalve molluscs and echinoderms. Surface mobile fauna often includes shrimps, crabs and fish.

In 2002, Baldock *et al* undertook subtidal surveys in Chichester Harbour, which recorded 127 species, which are typical of habitats sheltered from wave action but exposed to moderate to strong tidal currents. Of particular interest in the survey were a small sea anenome *Halcampa chrysantellum,* an opisthobranch mollusc *Haminoea* sp, a small nudibranch *Eubranchus doriae,* an alien bryozoan species *Tricellaria inopinata* and red alga *Callophyllis laciniata.*

A sandy reef of the polychaete Ross worm *Sabellaria spinulosa* is present on the steep eastern side of the entrance to Chichester Harbour, where strong currents scour out deep channels. These solid structures do not receive statutory protection but often represent important sub-features of other Annex 1 habitats. The worm itself is fairly common and widespread, often found attached to rocks and boulders in a rough tube of sand and gravel. In the right conditions, they can occur in dense aggregations, the tubes massing together to form large, irregular blocks. *Sabellaria spinulosa* extracts both food and tube-building materials from passing seawater. The right level of movement and the right grade of building materials are essential for the formation of large blocks.

4.0 Stage 2B: Analyse the plan, including its key components and how it would be implemented in practice.

4.1 Project Description

Havant Borough Council recently commissioned HR Wallingford to undertake a study (Eastoke Point Coastal Defence Study, May 2009 available to view on the Havant Borough Council website at: http://www.havant.gov.uk/havant-11342) to develop a sustainable coastal defence scheme to manage coastal erosion and flooding risks along the Eastoke Point frontage of Hayling Island. The Study considered a total of six main options for coastal defences of the Eastoke Point area. The studies preferred option for the Eastoke Peninsula, comprised a hybrid of various defences to achieve the desired standard of flood protection of 0.5% Annual Exceedance Probability (1 in 200 year) to these low-lying residential areas.

This preferred option proposed the following:

- Groyne replacement or improvement,
- Rock revetment,
- Improvement and maintenance of splash wall,
- Beach recharge,
- Groyne maintenance,
- Revetment maintenance,
- Beach recycling and management.

The proposed scheme will be designed to be capable of adaptation in the light of changes to wave conditions, tide levels or for unforeseen effects. This is thought appropriate due to unpredictable waves and near shore depths in this area. Also, the scheme will be designed to be capable of adaptation to ensure that should the design create adverse environmental impacts, or a navigational hazard, then steps can be taken to address the situation at relatively low cost.

4.1.1 Groyne Replacement or improvement

At this stage it is proposed that the existing timber groyne numbers 4, 5, 6 and 7 are replaced with new rock groynes. The new groynes will probably be constructed with 3 to 6 tonne armour rock. The majority of the groyne will normally be buried by beach. The top of the groyne will generally follow the profile of the beach but may be up to 1m above the level of the beach; this may increase after a storm event. Some work may also be required to Groyne 2.

It is also proposed to connect the existing timber groynes numbers 9, 10 and 11 to the new rock revetment, again probably with 3 to 6 tonne rock armour. This connection will normally be buried under the beach.

4.1.2 Rock revetment

It is proposed to construct a new rock revetment between Groyne 2 and Groyne 12 again probably with 3 to 6 tonne armour rock. Between Groynes 6 and 12 the revetment will protect the existing concrete recurve seawall from undermining and erosion. It will also assist in stabilising the top of the beach and act as a second line of defence if the beach is removed in a storm event. Between Groyne 4 and 5 the rock revetment will protect the existing sheet piles which are in reasonable condition. Between groyne 2 and 4 the revetment will provide the secondary defence at the back of the beach against erosion. At groyne 2 it will tie in to the previously constructed rock revetment.

The majority of this revetment will be covered in beach material and will therefore not be visible except if it is exposed by a storm event. In some areas it may be necessary to use the rock to increase the height of the back of the beach and to use it to help in keeping the beach in place. The elevation of the berm is yet to be decided but it is unlikely to exceed +6m. OD. The elevation will need to be carefully designed to balance the standard of defence against the visual intrusion of the increased height of the berm.

4.1.3 Existing splash wall

The existing splash wall is at the rear of the promenade and extends from Groyne 7 westwards. It provides a tertiary line of defence for the housing on the landward side of the wall from flooding by overtopping water. It is currently a reinforced concrete wall in reasonable condition. Part of the design will involve reviewing the overtopping flows and drainage for these flows. This may involve the need to raise the splash wall to contain these flows. If this is the case the increase in level will be balanced against the visual impact of the increased height and the opportunity will be taken to consider visual enhancement of the area.

In addition as part of the overtopping flows review the opportunity will be taken to review the current stoplog arrangements at the two access points and see if they can be altered to reduce the amount of overtopping flows they are allowed to pass and also to improve disabled access at these locations.

4.1.4 Beach Recharge

It will be necessary to recharge the beach between groynes 3 and 7. This is needed to act as the primary coastal defence in this area. In the past it has been difficult to maintain the profile of the beach here and part of the current scheme is to design the groynes to keep the beach in place. The beach recharge material is likely to be similar to that existing on the beach. It is likely to be from an offshore source and delivered to the area by sea. Due to the water depths it is unlikely that it can be delivered directly to the required location. It may therefore be necessary to land the material further to the west and then transport it along the beach to the required location.

4.1.5 Groyne maintenance

There will be a continuing need to maintain the rock groynes if rocks become displaced or if it found that the groynes need to be amended in height or length to adjust to changing conditions.

4.1.6 Revetment maintenance

There will be a continuing need to maintain the rock revetment if rocks become displaced during a storm event or if the beach is washed away and the revetment becomes a safety hazard due to the displaced rocks.

4.1.7 Beach recycling and management

It is likely that the current recycling and management regime will need to continue once the scheme is completed. This is necessary to maintain the primary defence, the beach to the required standard. It is hoped however that the scheme will reduce both the quantity and the frequency of the operation.

4.1.8 Construction period

It is estimated that the scheme will take approximately six months to construct and the preferred construction period is **April** to **September**. This is economically advantageous as the Contractors costs will be lower with less down time during the summer. It will also avoid disturbance to over wintering birds. It is believed that the interface with the tourists can be managed safely as the scheme location is away from the main beach frontage.

4.2 Purpose

The purpose of the project is to develop and maintain a sustainable and adaptable coastal defence scheme to manage coastal erosion and flooding risk along the Eastoke Point frontage of Hayling Island. The aim of the design is to incorporate a hybrid of various defences to achieve the desired standard of flood protection of 0.5% Annual Exceedance Probability (1 in 200 year) to these low-lying residential areas.

4.3 Likely Significant Effects

Havant Borough Council commissioned Halcrow Group Ltd in 2005 to carry out a Study to inform an Appropriate Assessment for Beach Renourishment on the Eastoke Frontage. These works include replenishing the beach with materials which have been dredge from either Chichester Harbour or from

local dredge sites. The 2005 report considered the likely affects of the replenishment scheme on the European designated sites within the study area, considering both by the likely affects of the scheme on sediment transport system and the likely affects from dredging the Chichester Harbour Channel. The report quotes correspondence with English Nature (now known as Natural England) confirming that English Nature had no objections to the scheme. Therefore, this report will utilise the conclusions drawn in the 2005 report and expand on them in this section.

Through correspondence, Natural England has requested that an Appropriate Assessment be carried out to assess whether the proposed development is likely to have a significant effect on the interest features on the Solent Maritime SAC either alone or in combination with other plans or projects. The main concerns that Natural England highlighted relate particularly to the potential impacts to the estuaries interest feature from the proposed scheme, which are listed below:

- Saltmarsh communities,
- Intertidal mudflat and sand flat communities,
- Intertidal mixed sediment communities,
- Subtidal sediment communities.

This report will now consider each aspect of the proposed scheme in turn and assess whether there is likely to be a significant affect on the SAC.

4.3.1 Groyne replacement and improvement

Maintaining, replacing and/ or improving the rock groynes will have an affect on the littoral drift of sediment eastwards from the Creek Road area. It will be designed to reduce the feed of material around Eastoke Point and up into Chichester Harbour.

Historic drawings and designs illustrate that the groynes along Eastoke Point have varied in length, shape and size since they were first introduced to the Eastoke Southern Frontage in the approximately 1910 (HMSO, 1907 – 1911) see Appendix 3.

It is the intention of the new scheme to keep the length of the new rock groynes within the footprint of the historic groynes in order to reduce but not eliminate the eastwards littoral drift of beach material. This will reduce the need for the annual beach recycling from the Ness at Chichester Harbour entrance on to the main frontage. This in turn will produce a more stable foreshore which is more likely to encourage the development of vegetated shingle.

4.3.2 Rock revetment

The new rock revetment will be buried under the existing beach and will be largely above MHWS. For this reason it will not have an effect on the SAC from a physical perspective.

The potential for introducing contaminated material to the beach area when introducing new materials for the rock revetment structure needs to be considered. To avoid this, the rock material will need to meet appropriate specifications set by our in-house engineer to assure the quality, dimensions, material type, resistance to abrasion etc of the material used.

4.3.3 Improvement and maintenance of splash wall

The possible improvements to the splash wall will take place on the existing footprint of the wall and will have no effect on the SAC.

4.3.4 Beach recharge and Beach recycling and management

Of the beach material placed on the Eastoke Point area, namely between groynes 3 and 7, even though the rock groynes will be designed to manage the beach movement by maintaining the beach profile, some material may naturally be transported eastwards through littoral drift, around Eastoke Point and into Chichester Harbour. Whilst some of this may be carried out of the harbour by the strong ebb tidal currents in the entrance channel, some of the material passing has the possibility to cover intertidal habitats such as mudflats. However, in the 2005 report for the Beach Renourishment scheme, this possibility was considered and it concluded that due to the *'…modest scale of the re-nourishment works, it is unlikely that additional material at Eastoke Beach is affecting annual losses of sediment or movement of the material eastwards…'* (Halcrow, 2005). The beach recharge and recycling proposed by this scheme is of a much smaller scale (recharging approximately 3 groyne bays compared to the whole Eastoke frontage as with the current approved beach recycling project) than the Beach Renourishment/ Recycling scheme which has already been approved.

The potential for introducing contaminated material to the beach area when recharging the beach using dredged material should be considered. As stated in the 2005 report (5.2(c)), '*as the material to be used for recharge will be coarse grained (sand/gravel)…it is unlikely to contain pollutants. Information on whether pollutants are contained within the dredged sediment should be available for the licensed offshore extraction sites.'*

Considering the above, it is deemed unlikely that the beach recharge/ recycling as part of the proposed scheme will significantly adversely affect the interest feature.

4.3.5 Groyne and Revetment maintenance

Maintenance of the groynes and revetments will consist of replacement of any rock armour units if they become dis-lodged during a storm event. This would normally be accompanied by the reshaping of the beach in the area, following the same event. There is therefore unlikely to be to be adverse effects on the estuarine features over and above that which has occurred naturally.

5.0 Conclusions

This report has demonstrated that the proposed Eastoke Point Coastal Defence Works will largely remain within the footprint of the existing coastal defences and is not considered to cause adverse affect on the integrity of the SAC, SPA and Ramsar Site during the construction phase. With regards to whether the scheme will cause an adverse affect to these environmental interest features over the next 100 years, there is some debate and uncertainty amongst professionals about whether the scheme will cause intertidal habitat losses through coastal squeeze. The Eastoke Point Sectoral Strategy Study (October 2006) concluded that *"the option to hold the line may cause impact through coastal squeeze over 100year period, resulting in a potential loss of 0.4ha of designated intertidal habitat"*. Therefore as a precautionary approach, compensatory habitat between negligible and 0.4ha will need to be provided for. The Southern Region Habitat Creation Programme have been informed for the potential need for an additional 0.4ha to be set aside for the Eastoke Point Coastal Defence Works scheme.

This report concurs with the North Solent Shoreline Management Plan (NSSMP), 2010 that; implementing the 'Hold the Line' policy primarily through beach management over the next 100 years along the Eastoke Peninsula is considered as supporting natural development. This is supported by a number of observations:

(a) Maintaining, replacing and/ or improving the rock groynes will not adversely impact on the loss of habitat of the SAC for the following reason:
    i) The groyne footprints have varied considerably since initial installation and therefore have created an adaptable environment.
    ii) The proposed rock groynes will not extend beyond the footprint of the existing or previous groyne structures.

(b) Beach recharge will not have an adverse affect on the Estuary function for the following reasons:
    i) the scale of the recharge is relatively small in comparison to the volumes of material already in the system (proposal of recharging approximately 3 groyne bays in comparison to the approved beach management of the whole Eastoke frontage).
    ii) the existing ebb-dominated tidal flows within Chichester Harbour will limit the recharge material being carried into the harbour and smothering intertidal habitats.
    iii) the volume of recharge proposed will be less than what has existed at this location in the recent past.

(c) Sediment contamination from both the recharge and introduction of new materials will not have a significant affect on the Estuary function as tests will have already been undertaken on the proposed recharge materials to ensure that they are not contaminated.

Through implementing the NSSMP policy of Hold the Line (HTL) along the Eastoke peninsula, the natural coastal processes could potentially be restricted, which could in turn affect the ability of the estuary to evolve and adapt in response to rising sea levels. However, it should be noted that as the Eastoke Point Coastal Defence works is primarily proposing to maintain the beach frontage via beach management, Eastoke Peninsula is considered to be a dynamic (not fixed) frontage and these soft engineering techniques are deemed to be "supporting the natural development" of the frontage (North Solent SMP, 2010). Also it should be noted that through implementing 'Hold the Line' at Eastoke Peninsula, the proposed scheme will protect the integrity of the Sandy Point Local Nature Reserve and provide ongoing protection for terrestrial and foreshore SSSI and SAC/SPA/Ramsar habitats on the Peninsula. It will also afford protection and maintenance of features within the AONB (Eastoke Point Sectoral Strategy Study, 2006) .

As part of the Appropriate Assessment for the NSSMP, the effects on estuary process within the sites of international importance have been assessed. It was concluded that with designated habitats seaward of coastal defences, holding the line at these defences cannot avoid having an adverse effect on seaward habitats. The NSSMP Appropriate Assessment has been approved under Imperative Reason of Overriding Public Interest (IROPI) by the Secretary of State, and the habitat creation

requirements arising from the NSSMP will be delivered by the Environment Agency's Southern Regional Habitat Creation Programme (SRHCP) at Medmerry. Please see Appendix 5 for a letter of confirmation from the Regional Habitat Creation Programme (RHCP) Manager that 0.4ha of intertidal habitat to compensate for losses to Natura 200 sites potentially caused by the Eastoke Point Coastal Defence works has been included in the South East RHCP.

With respect to estuary function Natural England provides the following comments *"Natural England is satisfied that through the habitat creation at Medmerry a new and sustainable estuary function will be created in the region. As each estuary is different with its own ecological and physiological characteristics it would be unrealistic to attempt to replicate each estuary in a like for like basis. The new estuary at Medmerry will provide its own ecological and physiological characteristics to support Ramsar and SPA bird interests and contribute to ensuring a sustainably functioning coast."*

Natural England states that "the impacts identified and assessed in the strategy [sic, recte scheme] are in accordance with the North Solent SMP Appropriate Assessment and subsequent IROPI case, thus it is considered that the IROPI case for the higher level SMP Appropriate Assessment can be used for this strategy [sic, recte scheme]." Natural England has provided Havant Borough Council with a letter of support for the scheme stating "Natural England agrees with the outcomes in the Appropriate Assessment" (see Appendix 4).

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Appendix 1:

Section 5 of the Solent European Marine Site

English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994



SOLENT
EUROPEAN MARINE SITE

comprising:

Solent Maritime candidate Special Area of Conservation
Solent and Southampton Water Special Protection Area & Ramsar Site
Chichester and Langstone Harbours Special Protection Area & Ramsar Site
Portsmouth Harbour Special Protection Area & Ramsar Site

English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994

18th October 2001

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5. Background to favourable condition tables

The favourable condition table is supplied as an integral part of English Nature's Regulation 33 advice package. It is intended to supplement the conservation objectives only in relation to management of activities and requirements on monitoring the condition of the site and its features. The table **does not by itself** provide a comprehensive basis on which to assess plans and projects as required under Regulations 20 and 48-50, but it does provide a basis to inform the scope and nature of any 'appropriate assessment' that may be needed. It should be noted that appropriate assessments are, by contrast, a separate activity to condition monitoring, requiring consideration of issues specific to individual plans or projects. English Nature will provide more detailed advice to competent and relevant authorities to assess the implications of any given plan or project under the Regulations, where appropriate, at the time a plan or project is being considered.

The favourable condition table is the principle source of information that English Nature will use to assess the condition of an interest feature and as such comprises indicators of condition. On many terrestrial European sites, we know sufficient about the preferred or target condition of qualifying habitats to be able to define measures and associated targets for all attributes to be assessed in condition monitoring. Assessments as to whether individual interest features are in favourable condition will be made against these targets. In European marine sites we know less about habitat condition and find it difficult to specify favourable condition. Individual sites within a single marine habitat category are also all very different, further hampering the identification of generic indicators of condition. Accordingly, in the absence of such information, condition of interest features in European marine sites will be assessed against targets based on the existing conditions, which may need to be established through baseline surveys in many cases.

The assumption that existing interest features on European marine sites are in favourable condition will be tested in the 2000 - 2006 reporting period and the results subsequently fed back into our advice and site management. Where there is more than one year's observations on the condition of marine habitats, all available information will need to be used to set the site within long-term trends in order to form a view on favourable condition. Where it may become clear that certain attributes are a cause for concern, and if detailed studies prove this correct, restorative management actions will need to be taken to return the interest feature from unfavourable to favourable condition. It is the intention of English Nature to provide quantification of targets in the favourable condition table during the 2000 - 2006 reporting period.

This advice also provides the basis for discussions with management and advisory groups, and as such the attributes and associated measures and targets may be modified over time. The aim is to produce a single agreed set of attributes that will then be monitored in order to report on the condition of features. Monitoring of the attributes may be of fairly coarse methodology, underpinned by more rigorous methods on specific areas within the site. To meet UK agreed common standards, English Nature will be committed to reporting on each of the attributes subsequently listed in the final version of the table, although the information to be used may be collected by other organisations through agreements.

The table will be an important, but not the only, driver of the site monitoring programme. Other data, such as results from compliance monitoring and appropriate assessments, will also have an important role in assessing condition. The monitoring programme will be developed as part of the management scheme process through discussion with the relevant authorities and other interested parties. English Nature will be responsible for collating the information required to assess condition and will form a judgement on the condition of each feature within the site, taking into account all available information and using the favourable condition table as a guide.

Box 1 Glossary of terms used in the favourable condition table

Interest Feature	The habitat or species for which the site has been selected.
Sub-feature	An ecologically important sub-division of the interest feature.
Attribute	Selected characteristic of an interest feature/sub-feature which provides an indication of the condition of the feature to which it applies.
Measure	What will be measured in terms of the units of measurement, arithmetic nature and frequency at which the measurement is taken. This measure will be attained using a range of methods from broad scale to more specific across the site.
Target	This defines the desired condition of an attribute, taking into account fluctuations due to natural change. Changes that are significantly different from the target will serve as a trigger mechanism through which some further investigation or remedial action is taken.
Comments	The rationale for selection of the attribute.

Table 2 Favourable Condition Table for SAC interest features for the Solent European marine site. NB - Many of the attributes will be able to be monitored at the same time or during the same survey. The frequency of sampling for many attributes may need to be greater during the first reporting cycle in order to characterise the site and establish the baseline. Where relevant, National Vegetation Classification codes (NVCs) and marine biotope codes are provided and then referenced in Appendices XI and XII

SOLENT MARITIME SAC INTEREST FEATURES

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
Estuaries		Extent	Area (ha) of the estuaries measured periodically during the reporting cycle (frequency to be determined).	No decrease in extent from an established baseline[10], subject to natural change.	Extent is an attribute on which reporting is required by the Habitats Directive.
		Morphological equilibrium.	Intra and inter-estuarine Tidal Prism/Cross Section ratio (TP/CS ratio) measured during the reporting cycle (frequency to be determined).	The intra- and inter-estuarine TP/CS relationship should not deviate significantly from an established baseline subject to natural change.	TP = Tidal Prism = total volume of water crossing a given cross section during the flood tide (m^3). CS = Area of a given cross section at high water springs (m^2). The relationship between TP & CS provides a measure of the way the estuary has adjusted to tidal energy. Substantial departures from this characteristic relationship (determined on a regional basis) may the indicate the influence of anthropogenic factors and this would trigger more detailed evaluation of potential problems.
		Water density - temperature and salinity	Water temperature and salinity measured periodically during the reporting cycle (frequency to be determined).	Average temperature and salinity should not deviate significantly from an established baseline, subject to natural change.	Temperature and salinity are characteristic of the overall hydrography of the area. Changes in temperature and salinity influence the presence and distribution of species (along with recruitment processes and spawning behaviour) including those at the edge of their geographic ranges and non-natives.
		Nutrient status	Average phytoplankton concentration in summer, measured periodically during the reporting cycle (frequency to be	Average phytoplankton concentration should not deviate significantly from an established baseline, subject to natural change.	Nutrient enrichment stimulating excessive growth of phytoplankton is a common factor contributing to a reduction in water clarity. Single species-dominated phytoplankton blooms can also have harmful effects on shellfish.

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
			determined).		
Estuaries (contd.)	Saltmarsh communities	*For information on the attributes of the saltmarsh communities sub-feature see the sections of this table which relate to the following interest features: cordgrass swards and Atlantic salt meadows, pages 29 -32*			
	Intertidal mudflat and sandflat communities	*For information on the attributes of the intertidal mudflat & sandflat communities sub-feature see the sections of this table which relate to the following interest features intertidal mudflats and sandflats pages 33 - 35*			
	Intertidal mixed sediment communities	*For information on the attributes of the intertidal mixed sediment communities sub-feature see the sections of this table which relate to the following interest features: intertidal mudflats and sandflats, pages 33 - 35*			
	Subtidal sediment communities	Extent	Area (ha) of subtidal sediments, measured periodically during the reporting cycle (frequency to be determined).	No decrease in extent from an established baseline, subject to natural change.	Extent is an attribute on which reporting is required by the Habitats Directive. Loss of subtidal sediment communities is likely to be detrimental to the structure of the interest feature, e.g. associated with a change in sediment budget or geomorphological regime, and may indicate long term changes in the physical conditions of the estuaries interest feature.
		Range and distribution of characteristic subtidal sediment biotopes, for example: IMU biotopes (see Appendix VII)	Range and distribution of biotopes measured during reporting cycle (frequency to be determined).	Range and distribution should not deviate significantly from an established baseline, subject to natural change	The variety and location of subtidal biotopes is an important structural and functional aspect of the interest feature. Specific biotopes such as IMU.AphTub and IMU.NhomTub are typical of subtidal areas within Solent European marine site such as Southampton Water and in some areas support a high number of species as well as large amounts of particular species such as cockles. Subtidal Eelgrass beds (e.g. IMS.Zmar) contribute to sediment structure and stabilise foreshore sediments by reducing wave energy, they provide an important food source for birds, and are important habitats for other organisms such as fish. The subtidal biotopes demonstrate biological assemblages representative of a range of salinity conditions.
Annual vegetation of drift lines		Extent	Linear extent of annual vegetation of drift lines and the geomorphological structures that support	No decrease in linear extent of vegetation from an established baseline[10], subject to natural change.	This attribute is dependent on there being sufficient shingle available through coastal processes to maintain the form of the shingle bank in its short and long-term development . Judgements in changes to linear extent will have to take particular care to

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
			this feature, measured once per reporting cycle in late summer (July - September)	Extent must take account of natural variation of this habitat as a result of dynamic coastal processes (storm events etc.). Indicative target is for 10% of vegetation maintained seasonally over structure that could support it.	distinguish changes as a result of natural functions vs. anthropogenic actions because of the highly variable nature of this habitat. As there are likely to be significant seasonal variations in the area covered, assessment of the average width may be valuable. Where there are abrupt truncations of the feature as a result of known anthropogenic activities, these will need to be carefully assessed. The 10% is an initial estimate which may be modified as a result of monitoring.
		Mobility	Percentage of extent of substrate suitable for colonisation by annual vegetation of drift lines not immediately constrained by introduced structures, landforms or operations measured once per reporting cycle.	No increase in extent constrained by introduced structures, landforms or operations. These areas to be identified whilst undertaking baseline monitoring.	An important aspect of this habitat is its ability to modify its distribution in response to natural dynamic coastal processes. Physical constraints or operations can reduce the extent and quality of this community and affect the overall structure of the drift line communities.
		Coastal processes	Number and location of coastal defence operations within sediment cell influencing coastal processes. Measured once per reporting cycle.	Maintain sediment supply to and within the site through coastal processes to allow a balance of accretion and erosion. A net balanced sediment budget should prevail, subject to natural variation.	The gravel sediments that support many of the features of interest are mobile as a result of dynamic coastal processes and are subject to variation over time. This results in both erosion and accretion within the site and redistribution of sediments over relatively rapid timescales. Coast defence works involving shingle recycling within or outside of the site can reduce the extent of this vegetation and have the potential to disrupt the patterns of erosion and accretion that underpin the site's structure and function.
Annual vegetation of drift lines (contd.)		Substrate composition	Presence of sand/shingle in combination with surface or buried organic material	Maintain substrate composition with sufficiently low levels of human-induced disturbance to allow drift	The combination of inorganic and organic substrate is an important precursor to development of annual vegetation of drift lines. Substrate (i.e. sediment) supply should be regulated by natural coastal processes. Drift line organic materials (tidal-derived seaweed, driftwood etc.) on the surface of and in combination with the shingle matrix are important

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
				line vegetation to complete its vegetation cycle. As an indicative target, drift line organic materials should be present along at least 10% of length surveyed, with artificial (non-organic) debris not restricting or suppressing vegetation establishment and growth. Targets appropriate to site should not deviate significantly from an established baseline[10], subject to natural change.	sources of nutrients and anchoring points essential for vegetation development and survival and may play a part in maintaining a seed bank.
Annual vegetation of drift lines (contd.)		Characteristic species of annual vegetation of drift lines	Presence of characteristic species of the annual vegetation of drift lines, particularly *Atriplex prostrata*, *Atriplex littoralis*, *Beta vulgaris maritima* and *Honkenya peploides*. Assessments will need to be made during late summer (July - September) at least once per reporting cycle.	Maintain the presence and broad distribution of stands of *Atriplex prostrata*/*Beta vulgaris maritima* - dominated community and other local variants of drift line vegetation across the feature, allowing for natural variation. As these communities can be very variable, local baselines[10] will need to be established, but should not be lower than 10% of the area that could be colonised. Targets appropriate to site should not deviate	This community is found in a narrow strip at the extreme high water mark. Changes in the frequency and abundance of *Atriplex* spp. should be expected to occur seasonally as a result of natural disturbance by storm events, but the community is sensitive to disturbance by human activities. Some of these communities do not fit well into the NVC classification for strand line vegetation, but this is currently under review.

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
				significantly from an established baseline[10], subject to natural change.	
Atlantic salt meadows	Low marsh communities	Distribution and extent of low marsh communities.	Distribution and extent of low marsh communities, measured once during the reporting cycle.	Distribution and extent of low marsh communities should not deviate significantly from an established baseline, subject to natural change.	The extent of vegetation cover of the low marsh community can have a seasonal variability and may have up to 50 per cent of bare mud or algal mat cover.
Atlantic salt meadows (contd)		Species composition of characteristic low marsh communities, for example: - SM10 - SM11	Presence and abundance of constant species, measured once during the reporting cycle	Presence and abundance of constant species of characteristic low marsh communities should not deviate significantly from an established baseline, subject to natural change.	In the Solent European marine site low marsh communities can be relatively simple communities or more complex associations of species, and species composition will vary depending on geographical location and other physical factors.
	Mid-marsh communities	Distribution and extent of mid-marsh communities.	Distribution and extent of mid-marsh communities, measured once during the reporting cycle.	Distribution and extent of mid marsh communities should not deviate significantly from an established baseline, subject to natural change.	Vegetation cover of the mid-marsh community can be quite variable and may comprise a number of NVC communities, these will be determined by future surveys.

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
	Mid-marsh communities	Species composition of characteristic mid-marsh communities, for example: - SM10 - SM 13 - SM14	Presence and abundance of constant species, measured once during the reporting cycle	Presence and abundance of constant species of characteristic mid marsh communities should not deviate significantly from an established baseline, subject to natural change	In the Solent European marine site mid marsh communities can be simple communities or complex associations of specie. Species composition will vary depending on geographical location and other physical factors.
	Upper Marsh	Distribution and extent of upper marsh communities.	Distribution and extent of upper marsh communities, measured once during the reporting cycle.	Distribution and extent of upper marsh communities should not deviate significantly from an established baseline, subject to natural change.	The relative distribution of the upper marsh communities is an important structural aspect of the saltmarsh zonation.
Atlantic salt meadows (contd)		Species composition of characteristic upper marsh communities, for example: - SM15 - SM16	Presence and abundance of constant species, measured once during the reporting cycle	Presence and abundance of constant species of characteristic upper marsh communities should not deviate significantly from an established baseline, subject to natural change	In the Solent European marine site upper marsh communities can be relatively simple communities or more complex associations of species, and species composition will vary depending on geographical location and other physical factors (*e.g.* less frequent tidal inundation).
	Transitional high marsh communities	Distribution and extent of upper transitional marsh communities.	Distribution and extent of upper transitional marsh communities, measured once during the reporting cycle.	Distribution and extent of upper transitional marsh communities should not deviate significantly from an established baseline,	There are limited locations within the Solent European marine site where upper transitional communities occur. Elsewhere high marsh transitional vegetation is truncated by sea walls and sea level rise may result in habitat loss through coastal squeeze. The extent of this habitat which can migrate inland as sea levels rise is likely to be especially valuable in redressing

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
				subject to natural change.	losses incurred to the feature.
	Transitional high marsh communities	Species composition of characteristic transitional marsh communities	Presence and abundance of constant species, measured once during the reporting cycle.	Presence and abundance of constant species of characteristic transitional marsh communities should not deviate significantly from an established baseline, subject to natural change.	Sites with a complete sequence of habitats from salt meadow to coastal, terrestrial or freshwater/brackish habitats are the most valuable for nature conservation. In the Solent European marine site such habitats include sand dunes, shingle, reedbeds and woodland.
Salicornia and other annuals colonising mud and sand	Annual *Salicornia/Suaeda maritima* saltmarsh communities (SM8 and SM9)	Algal mat cover.	Area (and thickness) of algal mat, measured periodically (frequency to be determined).	No increase in algal mat cover from an established baseline.	Algal mats (*e.g. Enteromorpha* and *Ulva* spp.) are often associated with pioneer and low marsh communities and are important primary producers, but can be affected by changes to water quality - eutrophication may lead to expansion and smothering of vegetation, or pollution can cause a decline which can lead to destabilisation of sediment surfaces and initiate erosion. An increase in algal cover can also indicate a decline in grazing invertebrates. *NB* a reduction in algal mat cover can indicate active erosion
Salicornia and other annuals colonising mud and sand (contd)		Common cordgrass (*Spartina anglica*) community (SM6)	Distribution and extent of Common cordgrass, measured once during the reporting cycle.	No increase in extent from an established baseline, subject to natural change	Not of conservation importance in the UK but an invasive pioneer species. Could impact on intertidal pioneer and low-mid marsh communities but may be a precursor to the development of other saltmarsh communities in some circumstances.
	Annual *Salicornia/Suaeda maritima* saltmarsh communities (SM8 and SM9)	Distribution and extent	Distribution and extent of annual *Salicornia/Suaeda maritima* saltmarsh communities measured once during reporting cycle	No change in distribution and extent of annual *Salicornia* saltmarsh communities from an established baseline, subject to natural change	Annual *Salicornia* saltmarsh communities must be carefully defined for the purpose of monitoring. Species within the *Salicornia* genus have different niches and are not necessarily spatially connected.

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
Cordgrass swards	Small cordgrass communities	Distribution and extent of small cordgrass communities, for example: - SM4	Distribution and extent of small cordgrass communities, measured once during the reporting cycle.	Distribution and extent of small cordgrass communities should not deviate significantly from an established baseline, subject to natural change.	The extent and distribution of this community are important structural aspects of the saltmarsh zonation. They are associated with different levels of the intertidal region and the turbidity of the water column.
	Smooth cordgrass communities	Distribution and extent of smooth cordgrass communities, for example: - SM5	Distribution and extent of smooth cordgrass communities, measured once during the reporting cycle.	Distribution and extent of smooth cordgrass communities should not deviate significantly from an established baseline, subject to natural change.	The extent and distribution of this community are important structural aspects of the saltmarsh zonation. They are associated with different levels of the intertidal region and the turbidity of the water column.
	Townsend's cordgrass communities	Distribution and extent of Townsend's cordgrass communities, for example: - SM6	Distribution and extent of Townsend's cordgrass communities, measured once during the reporting cycle.	Distribution and extent of smooth cordgrass communities should not deviate significantly from an established baseline, subject to natural change.	The extent and distribution of this community are important structural aspects of the saltmarsh zonation. They are associated with different levels of the intertidal region and the turbidity of the water column.
Intertidal mudflats and sandflats		Extent	Area (ha) of intertidal mudflats, measured periodically during the reporting cycle(frequency to be determined).	No decrease in extent from an established baseline, subject to natural change.	Extent is an attribute on which reporting is required by the Habitats Directive. Loss of intertidal mudflat communities is likely to be detrimental to the structure of the interest feature, e.g. associated with a change in sediment budget or geomorphological regime, and may indicate long term changes in the physical conditions of the estuaries interest feature.
		Topography	Tidal elevation and shore	Shore profile should not	In the intertidal, topography reflects the energy conditions and stability

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
			slope, measured periodically during the reporting cycle (frequency to be determined).	deviate significantly from an established baseline, subject to natural change.	of the sediment, which is key to the structure of the interest feature. Topography is a major influence on the distribution of communities throughout the mudflats. Measuring topography may also indicate the position of channels through the interest feature, which is another important indicator of the processes influencing the site.
		Nutrient enrichment - macroalgal mats	Extent and cover of macroalgal mats, measured in the summer during the reporting cycle (frequency to be determined).	Average abundance of macroalgal mats should not increase from an established baseline, subject to natural change.	Nutrient status is a key functional factor that influences biota associated with sediments, including fauna as well as plants/algae at the surface. Certain macroalgae (*e.g. Enteromorpha* and *Ulva* spp.) can act as indicators of elevated nutrient levels which can reduce the quality of the sediments and their communities, primarily through smothering and deoxygenation. The duration of the algal mats on the surface of the sediments is also important.
		Sediment character	1. Particle size analysis (PSA). Parameters include percentage sand/silt/gravel, mean and median grain size, and sorting coefficient, used to characterise sediment type. Measured in summer, once during the reporting cycle.	Average PSA parameters should not deviate significantly from the baseline, subject to natural change.	Sediment character defined by particle size analysis is key to the structure of the feature, and reflects all of the physical processes acting on it. Particle size composition varies across the feature and can be used to indicate spatial distribution of sediment types thus reflecting the stability of the feature and the processes supporting it.
			2. Sediment penetrability - degree of sinking	Average measure should not deviate significantly from an established baseline, subject to natural change.	Penetrability is an indicator of sediment stability, degree of compaction indicates the shear strength of the sediment and thus the susceptibility of that sediment type to erosion. Compaction of the sediment influences the biological community within the sediment. Penetrability of the sediment is determined by a combination of grain size and water content, which may provide a surrogate index of the penetrability of the sediments.
Intertidal mudflats and sandflats (contd)		Sediment character (contd.)	3. Organic content - % carbon from sediment sample measured periodically (frequency	Average organic carbon content should not deviate significantly from an established baseline,	Organic content critically influences the infaunal community and can cause deoxygenation of the feature which can be detrimental to the boita. However, a balance needs to be struck as organic content provides a measure of the material available to detritovores. A reduction in organic

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
			to be determined)	subject to natural change.	content could lead to a reduction in detritovores, with subsequent knock on effects throughout the food chain.
			4. Oxidation - reduction potential. Depth of black anoxic layer. Measured periodically during the reporting cycle (frequency to be determined).	Average black layer depth should not deviate significantly from an established baseline, subject to natural change.	Degree of oxidation / reduction, reflecting oxygen availability within the sediment, critically influences the infaunal community and the mobility of chemical compounds. It is an indicator of the structure of the feature.
	Intertidal mud communities	Range and distribution of characteristic mud biotopes, for example: LMU biotopes (see Appendix XI)	Range and distribution of characteristic mud biotopes measured during late summer / early autumn, periodically during the reporting cycle (frequency to be determined).	Range and distribution should not deviate significantly from an established baseline, subject to natural change.	The variety and location of biotopes is an important structural and functional aspect of the feature. Littoral mud biotopes such as LMU.HedScr, LMU.HedStr and LMU.HedMac often support a high number of polychaete worms and bivalve molluscs, which form an important food source for birds and marine predators such as fish.
Intertidal mudflats and sandflats (contd)	Intertidal muddy sand communities	Range and distribution of characteristic sand and gravel biotopes, for example: LMS biotopes (see Appendix XI)	Range and distribution of biotopes measured during reporting cycle (frequency to be determined).	Range and distribution should not deviate significantly from an established baseline, subject to natural change	The variety and location of biotopes is an important structural and functional aspect of the feature. Shellfish beds (e.g. LMS.Pcer),play an important role in the marine food chain. They also reduce tidal flow and encourage sedimentation in their lee, and are therefore important in indicating changes in coastal processes. Eelgrass beds (e.g. LMS.Znol) contribute to sediment structure and stabilise foreshore sediments by reducing wave energy, they provide an important food source for birds, and are important habitats for other organisms such as fish. Muddy sands dominated by the worm *Arenicola marina* (e.g. LMS.MacAre) are found throughout this sub-feature. The invertebrates within the sediment play an important structural and functional role as well as providing an important source of food for marine predators and birds.

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
		Extent of *Zostera* beds	Extent (m^2) of the *Zostera* beds measured during the peak growth period (May to Aug) every three years during the reporting cycle	No decrease in extent from an established baseline subject to natural change	The extent of *Zostera* (Eelgrass) beds is a key structural component of the sediments and provides a long term integrated measure of environmental conditions across the feature, and is also particularly important in being an internationally scarce and declining habitat. The eelgrass beds provide a rich source of food for wintering wildfowl and provide an important nursery area for fish.
	Intertidal mixed sediment communities	Range and distribution of characteristic intertidal mixed sediment biotopes, for example: LMX biotopes (see Appendix XI)	Range and distribution of characteristic biotopes measured during reporting cycle (frequency to be determined).	Range and distribution should not deviate significantly from an established baseline, subject to natural change	The variety and location of biotopes is an important structural and functional aspect of the feature. Characteristic intertidal mixed sediment communities such as LMX.Mare are typical of reduced salinity sheltered marine inlets. The substratum generally consists of sand, gravel and cobbles in varying degrees, usually with mud and silt. The presence of larger stones and cobbles on the surface often leads to the growth of fucoids and other seaweeds. The infauna, characterised by polychaetes, amphipods and snails and bivalves provide a food source for marine predators and birds.
Sandbanks which are slightly covered by seawater all the time		Extent	Area (ha) of the subtidal sandbanks measured periodically (frequency to be determined).	No decrease in extent from an established baseline, subject to natural change.	Monitoring will need to take into account the dynamic nature of the feature, but reduction in extent may indicate long term changes in the physical conditions influencing the feature.
		Sediment character	Grain size analysis. Parameters include percentage sand/silt/gravel, mean and median grain size, and sorting coefficient, used to characterise sediment type. Sediment type to be	Average grain size parameters should not deviate significantly from an established baseline, subject to natural change.	Sediment character defined by grain size is key to the structure of the feature, and reflects all of the physical processes acting on it. Particle size composition aries across the feature and can be sued to indicate spatial distribution of sediment types, thus reflecting the stability of the feature and the processes supporting it.

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
			measured during summer once during the reporting cycle.		
		Topography	Depth distribution of sandbanks from selected sites, measured periodically (frequency to be determined).	Depth should not deviate significantly from an established baseline, subject to natural change	Depth and distribution of the sandbanks reflects the energy conditions and stability of the sediment, which is key to the structure of the feature. Depth of the feature is of a major influence on the distribution of communities throughout.
Sandbanks which are slightly covered by seawater all the time (contd)	Subtidal muddy sand communities	Extent	Area (ha) of subtidal sediments, measured periodically during the reporting cycle (frequency to be determined).	No decrease in extent from an established baseline, subject to natural change.	Extent is an attribute on which reporting is required by the Habitats Directive. Loss of subtidal sediment communities is likely to be detrimental to the structure of the interest feature, e.g. associated with a change in sediment budget or geomorphological regime, and may indicate long term changes in the physical conditions of the estuaries interest feature.
		Range and distribution of characteristic subtidal muddy sand biotopes, for example: IMU biotopes (see Appendix XI)	Range and distribution of biotopes measured during reporting cycle (frequency to be determined).	Range and distribution should not deviate significantly from an established baseline, subject to natural change	The variety and location of subtidal biotopes is an important structural and functional aspect of the interest feature. Specific biotopes such as IMU.AphTub and IMU.NhomTub are typical of subtidal areas within Solent European marine site such as Southampton Water and in some areas support a high number of species as well as large amounts of particular species such as cockles. Subtidal Eelgrass beds (e.g. IMS.Zmar) contribute to sediment structure and stabilise foreshore sediments by reducing wave energy, they provide an important food source for birds, and are important habitats for other organisms such as fish. The subtidal biotopes demonstrate biological assemblages representative of a range of salinity conditions.
	Subtidal gravelly sand and sand	Distribution and extent of characteristic range of biotopes	Distribution and extent of biotopes measured by extent once during the reporting cycle	Distribution and extent of characteristic biotopes should not deviate from an established baseline subject to natural	The distribution and extent of the biotopes listed under this sub-feature in Appendix XI, is an important structural aspect of the site. Changes in extent and distribution may indicate long term changes in the physical conditions of the subtidal sand interest feature.

Interest Feature	Sub-feature	Attribute	Measure	Target	Comments
				change	
	Subtidal eelgrass *Zostera marina* beds	Extent	Area (ha) of eelgrass bed communities measured during peak growth period twice during reporting cycle.	No decrease in extent from an established baseline, subject to natural change	The extent and distribution of seagrass beds provides a long-term integrated measure of environmental conditions.

[10] Baselines to be determined during the first reporting cycle

NB: Extreme events (such as storms reducing or increasing salinities or warm summers) also need to be recorded as they may be critical in influencing ecological issues in the Solent European marine site and may well be missed by routine monitoring

16. Glossary

Abrasion	**The process of scraping or wearing down by friction**
Advisory Group	**The body of representatives from local interests, user groups and conservation groups, formed to advise the management group**
Algal bloom	**A massive reproduction and growth of algae, often free-floating, in response to the presence of higher than normal levels of nutrients.**
Annex 1 birds	**Birds species listed on Annex 1 of the Birds Directive. These are in danger of extinction, are rare, or are considered vulnerable within the European Union. Those that regularly occur at levels over 1% of the national population meet the SPA qualifying criteria.**
Annex I habitat type(s)	**A natural habitat(s) listed in Annex I of the Habitats Directive for which Special Areas of Conservation can be selected.**
Annex II species	**A species listed in Annex II of the Habitats Directive for which Special Areas of Conservation can be selected.**
Annex V	**The listing, in the Habitats Directive, of the animal and plant species whose taking in the wild and exploitation may be subject to management measures.**
Anthropogenic	**Produced by human activity.**
Assemblage	**A collection of plants and/or animals characteristically associated with a particular environment but not necessarily interdependent.**
Attribute	**Characteristic of an interest feature/sub-feature which provides an indication of the condition of the feature or sub-feature to which it applies.**
BAP	**Biodiversity Action Plan.**
Baseline	**A standard or value from which it is possible to determine any deviation in the integrity of the interest features for which the site has been designated.**
Benthos	**Those organisms attached to, or living on, in or near, the seabed, including that part which is exposed by tides.**
Bioaccumulation	**The ability of organisms to retain and concentrate substances from their environment. The gradual build-up of substances in living tissue, usually used in referring to toxic substances, may result from direct absorption from the environment or through the food chain.**
Biodegradation	**Breakdown or decomposition by bacteria or other biological means.**

Biodiversity	**The total variety of life on earth. This includes diversity within species, between species and of ecosystems.**
Biogeographic region	**A region which is separated from adjacent regions by barriers or a change in environmental conditions which limits the movement of species or prevents their establishment outside their natural geographical range.**
Biomagnification	**Increasing concentrations of a substance in successive trophic levels of a food chain.**
Biomass	**The total quantity of living organisms in a given area.**
Biotope	**The physical habitat with its biological community; a term which refers to the combination of physical environment and its distinctive assemblage of conspicuous species.**
Bioturbation	**The mixing of a sediment by the burrowing, feeding or other activity of living organisms.**
Characteristic	**Special to, or especially abundant in, a particular situation or biotope. Characteristic species should be immediately conspicuous and easily identified.**
Chenier banks	**Chenier banks are formed by the deposition of broken shells by wave action on the saltmarsh edge.**
Circalittoral	**The rocky subtidal zone dominated by animals and below that which is dominated by algae (Animal dominated subtidal zone).**
Community	**A group of organisms occurring in a particular environment, presumably interacting with each other and with the environment, and identifiable by means of ecological survey from other groups.**
Competent authority	**Any Minister, government department, public or statutory undertaker, public body or person holding a public office that exercises legislative powers.**
Conservation objective	**A statement of the nature conservation aspirations for a site, expressed in terms of the favourable condition that we wish to see the species and/or habitats for which the site has been selected to attain. Conservation objectives for European marine sites relate to the aims of the Habitats Directive.**
Crustaceans	**A class of invertebrates which include crabs, shrimps and barnacles.**
Diversity	**The richness of different types in a location, including the number of different biotopes and numbers of species.**

Epifauna	**Animals living on the surface of sediments or hard substrates**
Eulittoral	**The main part of the intertidal zone characterised by limpets, barnacles, mussels, fucoid algae and with red algae often abundant on the lower part.**
European marine site	**A European site (SAC or SPA) which consists of, or in so far as it consists of, marine areas.**
Eutrophication	**The over-enrichment of an aquatic environment with inorganic nutrients, especially nitrates and phosphates, often anthropogenic (e.g. sewage, fertiliser run-off), which may result in stimulation of growth of algae and bacteria, and can reduce the oxygen content of water.**
Exposure	**The relative extent and intensity of the effects of broad categories of human activities currently occurring on the site to which the interest features or their component sub-features on the site are subject.**
Fauna	**Animal life in an area.**
Favourable conservation status	**A range of conditions for a natural habitat or species at which the sum of the influences acting upon that habitat or species are not adversely affecting its distribution, abundance, structure or function throughout the biogeographic region in the long term. The condition in which the habitat or species is capable of sustaining itself on a long-term basis.**
Favourable condition	**A range of conditions for a natural habitat or species at which the sum of the influences acting upon that habitat or species are not adversely affecting its distribution, abundance, structure or function within an individual Natura 2000 site in the long term. The condition in which the habitat or species is capable of sustaining itself on a long-term basis.**
Geomorphology	**The description and interpretation of the structure, origin and development of land forms.**
Habitat	**The place in which a plant or animal lives.**
Habitats Directive	**The abbreviated term for *Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora*. It is the aim of this Directive to promote the conservation of certain habitats and species within the European Union.**
Halophytic	**Plants which thrive in, or tolerate the presence of saline conditions.**
Highest Astronomical Tide	**The highest tidal level which can be predicted to occur under average meteorological conditions and in any combination of astronomical conditions**

Hydrodynamic regime	**The particular conditions of water movement at one particular site, including wave action, tidal streams and residual currents.**
Infauna	**Benthic animals which live within the seabed.**
Infralittoral	**The subtidal zone in which upward facing rocks are dominated by erect algae, typically kelps.**
Interest feature	**A natural or semi-natural feature for which a European site has been selected. This includes any Habitats Directive Annex I habitat, or any Annex II species and any population of a bird species for which an SPA has been designated under the Birds Directive.**
Littoral	**The area of the shore that is occupied by marine organisms which are adapted to or need alternating exposure to air and wetting by submersion, splash or spray. Also called intertidal.**
Macrofauna/macroflora	**Animals/plants which are retained by a 2.0 - 0.5 mm sieve**
Maintain	**The action required for an interest feature when it is considered to be in favourable condition.**
Management group	**The body of relevant authorities formed to manage the European marine site.**
Management scheme	**The framework established by the relevant authorities at a European marine site under which their functions are exercised to secure, in relation to that site, compliance with the requirements of the Habitats Directive.**
Meiofauna/meioflora	**Animals/plants which are not retained in a 2.0 - 0.5 mm sieve, but are retained in a 0.04 - 0.1 mm sieve when the sediment is sieved through.**
Microfauna/microflora	**Animals/plants which pass through a 0.04 - 0.1 mm sieve.**
Molluscs	**Soft-bodied unsegmented invertebrate animals usually with shells which include cockles, whelks, limpets, oysters and snails.**
Nationally scarce/rare	**For marine purposes, these are regarded as species of limited national occurrence**
Natura 2000	**The European network of protected sites established under the Birds Directive and the Habitats Directive**
Natural change	**Changes in the condition of features that result wholly from natural causes.**
Non-synthetic contamination	**Non-synthetic compounds are those materials that occur naturally. They may have to be refined before they are useful to man and could occur in many**

	slightly different forms. Examples of non-synthetic materials are; heavy metals and hydrocarbons (oil and petrol).
Notable species	**A species that is considered to be notable due to its importance as an indicator, and may also be of nature conservation importance, and which is unlikely to be a 'characteristic species'.**
Operations which may cause deterioration or disturbance	**Any activity or operation taking place within, adjacent to, or remote from a European marine site that has the potential to cause deterioration to the natural habitats for which the site has been designated, or disturbance to the species and its habitats for which the site was designated**
Opportunistic species	**A species which is able to rapidly exploit changes in habitat conditions or circumstances to its own advantage.**
Plan or project	**Any proposed development that is within a relevant authority's function to control, or over which a competent authority has a statutory function to decide on applications for consents, authorisations, licences or permissions.**
Ramsar site	**A site listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat, which was agreed at Ramsar, Iran.**
Relevant authority	**The specific competent authority which has powers or functions which have, or could have, an impact on the marine environment, or adjacent to, a European marine site.**
Restore	**The action required for an interest feature when it is not considered to be in a favourable condition.**
Sensitivity	**The intolerance of a habitat, community or individual species to damage, or death, from an external force.**
Sub-feature	**An ecologically important sub-division of an interest feature.**
Sublittoral	**The zone of the shore below low water exposed to air only at its upper limit by the lowest spring tides.**
Synthetic contamination	**Synthetic compounds are those materials that have been manufactured artificially by chemical reaction. Examples of some synthetic compounds are; antifoulant paints, detergents, pesticides (Polychloronatedbiphenyls or PCBs) and biocides (tributyltin or TBT).**
Turbidity	**This is a measure of the attenuation of light in the water column and can be caused by the light adsorption properties of the water, plankton, suspended particulate organic and inorganic matter and dissolved colour.**
Typical species	**A species that is considered to be a typical component of a feature or sub-feature.**

Vulnerability	**The exposure of a habitat, community or individual of a species to an external factor to which it is sensitive.**
WeBs	**Wetland Bird Survey a collaborative national surveillance scheme of the UK's waterfowl based on counts undertaken once per month outside of the breeding season.**

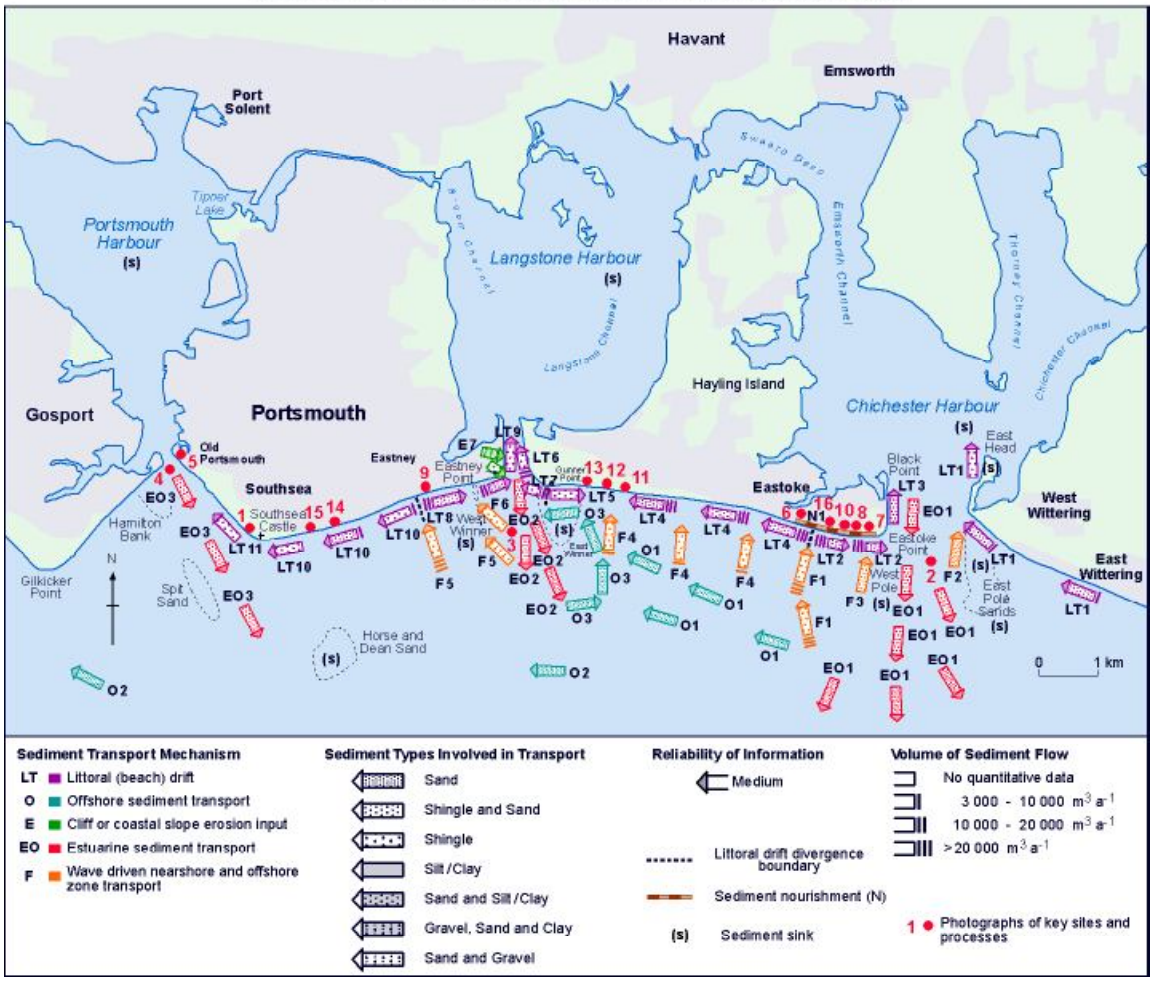
Appendix 2:

Extracts from Standing Conference on Problems Associated with the Coastline (SCOPAC) (2004), *"Sediment Transport Study"*

Appendix 2 – Extracts from the SCOPAC "Sediment Transport Study" 2004

http://www.scopac.org.uk/sedimenttransport.htm

Portsmouth Harbour Entrance to Chichester Harbour Entrance: Sediment Transport



4.2 Estuarine Outputs - EO1 EO2 EO3 References Map

The narrow entrances of Portsmouth, Langstone and Chichester harbours confine the tidal flow of large volumes of water into and out of the harbour, thereby setting up strong tidal currents which extend several kilometres offshore. Residual current speeds are in the order of 0.15-0.16m.s^{-1} Analysis of tidal currents at Portsmouth Harbour (Hydraulics Research, 1959; Harlow, 1980), Langstone Harbour (Grontmij, 1973; Portsmouth Polytechnic, 1976; Harlow, 1980) and Chichester Harbour (Webber, 1979; Harlow, 1980; Wallace, 1988; HR Wallingford, 1995) reveal that the ebb current at each entrance of shorter duration, but significantly greater velocity, than the flood current, resulting in the scour of channels to depths of up to 20m. Thus, net transport of sand and gravel entering the tidal currents is offshore and dispersal and deposition of these materials occurred as tidal currents weakened. Further details of tidal regime and current velocities are given in the separate unit covering the three harbours. Output of sediment by navigation dredging has a strong impact on the quantities moved both in and out of each entrance. This is discussed in detail in the unit on Portsmouth, Langstone and Chichester Harbour.

E01 Chichester Harbour Entrance (see Introduction to Estuarine Outputs)

Sediment supply to the main tidal channel is possible by either eastward or westward littoral drift at the harbour entrance. (See Section 3 and the unit covering East Head to Pagham

Harbour). Sediment is supplied at rates up to 70,000m^3a^{-1} from East Head via the Winner gravel bank or directly from the distal end of the spit (Webber, 1979; ABP Research and Consultancy Ltd, 2000). Supply from this source has reduced significantly with the progressive and comprehensive protection of the shoreline of Bracklesham Bay since 1874 (Harlow, 1980) and has probably now virtually ceased following extension and upgrading of the groynes at West Wittering in the mid 1980s. Eastward littoral drift at Eastoke Point supplies sediment to the tidal channel at a minimum rate of 5000m^3a^{-1} (Harlow, 1980). Beach replenishment at Hayling Island initially enhanced eastward drift to 45-50,000m^3a^{-1} (Hydraulics Research, 1988), later reducing to a mean of 11-15,000m^3a^{-1} (Whitcombe, 1995; Havant Borough Council, 1999). Although some of this material accumulated at Eastoke Point, significant quantities were lost to the entrance channel and flushed offshore to be deposited in the tidal delta. A rock groyne and rock armouring, designed to retain sediment on the updrift beach, were completed at Eastoke Point in 1991/2. Compared with the other harbours, the entrance channel to Chichester Harbour is deeper and has higher ebb and flood tidal current velocities. Sediments entering the tidal channel are flushed offshore and deposited at varying distances from the entrance depending upon sediment size, wave conditions and water depth. Gravel can be transported a maximum of 1 to 2km offshore and sand a maximum of 3.5km offshore (Webber, 1979). Dynamic change of the plan shape of West Pole Sand since the 1960s is a result of variations in the balance between erosion and deposition (Whitcombe, 1995). Sediment sampling by Harlow (1980) revealed a series of sedimentary zones related to current velocity and suggested that wave action could mobilise surficial sediments. The volume of sediment transported offshore by tidal currents was not calculated, but fresh supply could be estimated from littoral drift inputs at the entrance, as tidal current bedload movement of sediment from within the harbour is negligible. Contemporary supply to the tidal channel consists almost entirely of eastward drift of mostly fine gravel and sand from Eastoke Point. Virtually no fresh material is now introduced into the offshore transport pathway in the tidal channel; sediments transported will be those periodically pushed onshore from the tidal delta by storms from the south. The tidal delta is therefore a finite resource and any outputs -in particular, dredging- are likely to represent a net loss to the local sediment budget. It is significant that the Winner lowered by 0.5-1.0m between at least 1926 and the present time, contributing to an increase in the pivotal movement and erosion of East Head, and thus expansion of the cross-sectional area of harbour mouth (ABP Research and Consultancy, 2000). The main channel has deepened, partly in consequence of increased tidal current scour. Whitcombe (1995) calculated that the outer Chichester bar lost some 90,000m^3 of sand, 1989-1995. The Winner has also moved northwards in recent decades (Geosea Consulting, 2000). It is presumed that the progressive increase in the width and depth of the Chichester Harbour entrance reflects its adjustment to a more stable condition, in equilibrium with hydrodynamics and hydraulic regime. It is not clear if this has yet been fully attained (ABP Research and Consultancy, Ltd, 2000).

Further discussion, including details of dredging, is contained in the unit covering East Head to Pagham Harbour. See also the unit concerned with Chichester, Langstone and Portsmouth Harbours.

4.2 Dredging

Dredging across Chichester Bar, on the ebb tidal delta, is carried out routinely to maintain a channel for navigation; some of the material is used for beach renourishment on south-east Hayling Island. Dredging for aggregates, on a small scale on The Winner, was carried out between the early nineteenth century and about 1920. Dredging for navigation access, however, did not become significant until 1973.

A total of 600,00m^3 of gravel was thus removed over the period 1974-1982 (Harlow, 1985) and between 1988-1996 dredging was permitted up to an annual limit of 20,000 tonnes (12,500m^3a^{-1}). Analysis of hydrographic surveys indicated that water depths increased over the dredged area in the 1970s (Webber, 1979). Despite this, it was difficult to attribute this change solely to dredging because the Chichester tidal delta is a large sediment reservoir (25 million m^3) characterised by major natural internal fluctuations and sediment redistribution (ABP Research and Consultancy, 2000). From bathymetric information (Posford Duvivier,

2001) it can be concluded that the Chichester tidal delta has more recently lost material due to reduction of littoral supply from Bracklesham Bay in combination with outputs by dredging. For the period 1974 to 2000 this can be estimated at 1.4 million cubic metres. This quantity is quite significant in comparison to the total estimated volume of the delta, particularly when it is considered that the bulk of output comprises gravel from the inner bar whilst much of the estimated stored volume comprises sand on the outer bar. Continued dredging and onshore feed might therefore be expected to deplete reserves, such that natural onshore feed could reduce in the near future (or may already have done so).

F1 Gravel Feed from the Chichester Tidal Delta

At Chichester Harbour Entrance (Photo 2), the ebb tidal current is of shorter duration, but significantly greater velocity, than the flood current. Net transport direction of all sediment moving into the channel is therefore offshore, thereby creating a major sediment accumulation extending 3 km to 4 km offshore (Harlow, 1980; Wallace, 1988). Its sediment volume was established at 25 million cubic metres by Webber (1979) and water depths over the delta are relatively shallow, particularly the outer and inner bars (Webber, 1979; Harlow, 1980; Wallace, 1988). Significant sorting and transport of sediments occurs on the delta by combined action of waves and tidal streams. Sedimentological analysis of the delta deposits indicate that net transport of gravel is westward, resulting in accumulation offshore West Pole (Harlow, 1980, Geosea Consulting, 2000; Whitcombe, 1995). By contrast, sand is more widely distributed both eastward and westward forming the outer bar deposits (Webber, 1979; Harlow, 1980). It has been suggested by Hydraulics Research (1980) that sand could be transported onshore from this source to feed a wide frontage on Hayling Island, extending as far west as the East Winner (ABP Research and Consultancy, 2000/2001). Conclusive evidence to support this possibility, and the volume of feed, is uncertain. Further discussion is included in the unit on Portsmouth, Langstone and Chichester Harbours, including the possible impacts of dredging in Chichester Harbour entrance channel on beach morphodynamics.

Analysis of beach volumes on Hayling Island previous to 1985 revealed a transient littoral drift divergence at, or close to, the Beach Club (Harlow, 1980; Whitcombe, 1995). Despite loss of sediment by littoral drift eastward and westward, beach levels in this immediate vicinity did not fall as dramatically as might have been anticipated. Onshore gravel feed between 6 to 13,000m^3 .a^{-1}, sufficient to offset littoral drift losses, was therefore postulated by Harlow (1980). This figure probably conceals significant annual variations, for drift rates fluctuated markedly over this period. (See Section 3). Although beach levels at the Beach Club have a long history of decline, levels were particularly low over the period 1976 to 1985 and very little new material appeared to be supplied (Harlow, 1980; Hydraulics Research, 1988; Whitcombe, 1995). Thus, it appears that onshore feed declined significantly during this period (Hydraulics Research, 1988). In 1985, a 2.2km frontage between Eastoke and Sandy Point was artificially nourished with 530,000m^3 of gravel (Photo 7 and Photo 8) obtained from a source 15km, offshore Littlehampton. The recharged beach showed very variable patterns of post-project accretion/depletion (Whitcombe, 1995), but with an overall trend for depletion. These changes resulted from the lack of attainment of beach equilibrium and high initial losses due to the low permeability of recharge sediments. Some 55% of material added in 1985 had been lost offshore or downdrift by 1994 (HR Wallingford, 1993a and b;1995). It is difficult to employ volumetric analysis of the nourished beach to determine the present status of any onshore gravel feed. Initial depletion of the nourished beach in the vicinity of the Beach Club indicated that onshore feed was significantly less than loss by littoral drift, but net drift rates increased after recharge was complete (Hydraulics Research, 1988); Whitcombe, (1995) attempted to calculate a provisional beach budget for the eastern and central sectors of Hayling beach. He calculated that onshore improvement of some 12,000 m^3a^{-1} may substantially compensate for losses caused by longshore transport east and west of the drift divide.

Evidence for onshore gravel feed is indirect and relies largely upon beach volume analysis. Information is thus of medium reliability until confirmed by direct means e.g. tracer experiments. Analysis by Harlow, (1980) was for a representative time period (1842-1976) so

mean rates were accurately calculated. Because the analytical technique was indirect, short-term variations in supply and the exact path of transport were uncertain. Thus, when the hydraulic regime was altered in 1985 it became difficult to calculate the volume and spatial distribution of onshore transport. The post-nourishment beach profile record is now of sufficient length to allow this to be determined, though no reported research has been located.

F2 Sand Feed from the Chichester Tidal Delta to East Head

Sand deposited on the outer bar and East Pole Sands can be transported onshore by wave action to supply East Head (Webber, 1979; Harlow, 1987; ABP Research and Consultancy Ltd, 2000; HR Wallingford, 2000). The counter-clockwise circulation pattern involving material moving out of the estuary mouth along its western side and into it on the eastern margin (Photo 2) has been quantitatively demonstrated through sediment grain size trend analysis (Geosea Consulting, 2000; ABP Research and Consultancy, 2001). However, evidence remains indirect and is mostly based upon sampling of particle size variations over the tidal delta. As with the Winner, which is a sand and shingle bank at the harbour entrance, East Pole Sands has exhibited net erosional lowering since the late 1920s (ABP Research and Consultancy Ltd, 2000). Removal of sand by dredging from the East Winner was formerly a small scale activity, but is unlikely to be an explanation of erosional loss. The proximal sector of East Head has also diminished, with thinning and recession the dominant trend since the early 1960s (Searle, 1977; ABP Research and Consultancy Ltd, 2000,2001). Further details are given in the unit on East Head to Pagham Harbour.

3. LITTORAL TRANSPORT - LT1 LT2 LT3 LT4 LT5 LT6 LT7 LT8 LT9 LT10 LT11 References Map

The transport of sediments in the beach, breaker and nearshore zones is considered to be wholly wave induced. Tidal currents in the nearshore zone have insufficient velocities to entrain any significant quantities of material. Rectilinear tidal currents at each of the harbour inlets are much more significant (Section 4.2), but their contribution to littoral transport along the intervening sectors of shoreline is unlikely.

LT1 Westwards Drift towards Chichester Harbour Entrance

This is discussed in the unit on East Head to Pagham Harbour. It is not considered that littoral transport can directly move sediment across the harbour entrance.

LT2 Eastward Drift to Eastoke Point

The 1985 beach replenishment scheme has had significant effect on littoral drift on the southern coast of Hayling Island, so information is assessed for before and after its completion.

Pre-replenishment. Littoral drift was determined by measuring beach volume changes from Ordnance Survey 1:2500 plans covering the period 1842-1972 and thereby calculating the minimum drift rate (Harlow, 1980; 1985). This approach was effective in determining a representative long-term drift rates. Analysis indicated a transient littoral drift divide approximately 100m west of the Beach Club, confirmed by site observations of sediment distribution within groyne compartments (Harlow, 1980; Hydraulics Research, 1980). The precise location of this divide at any one time (or for short periods) is determined by variations in incident waves, with wave refraction under contrasting sets of prevailing wave directions being particularly important (W.S. Atkins, 1998; Whitcombe, 1995), and on net drift rates to east and west. Net potential eastward drift was the lesser volume, and varied between 2,000m^3a^{-1} and 12,000m^3a^{-1} over the study period, with a long-term mean of 5000m^3a^{-1} (Harlow, 1980). Drift increased at Eastoke Point due to changed coastal orientation; Hydraulics Research (1980) suggested a mean rate of 10,000m^3a^{-1} for this sector.

Post-replenishment. Littoral drift rates increased by several magnitudes after replenishment for the following reasons:

(i) Large quantities of gravel became available for transport on a beach that was previously severely depleted.
(ii) Replenishment completely buried some existing groynes (although others were increased in height shortly after completion of the programme. Subsequently, some groynes were extended back to the pre-existing sea wall).
(iii) The replenishment caused slight changes in beach alignment, especially at the western and eastern extremities.
(iv) The recharge material was relatively poorly sorted and the initial artificial profile was steeper than the natural equilibrium profile. This promoted enhanced sediment mobility due to the reflective nature of this profile, and its progressive adjustment to an equilibrium form.

The replenished beach has been routinely monitored, initially by an intensive series of monthly beach profiles. These were analysed by Hydraulics Research (1987 and 1988) and littoral drift was calculated by assuming that all beach volume changes were solely the result of longshore transfers. Information from this approach may be misleading where significant onshore/offshore transport operates. Analysis demonstrates that the littoral drift divide remained in approximately the same position as before replenishment, (Whitcombe, 1995) but that eastward drift increased to 53,000m^3 between February 1986 and February 1987 (Hydraulics Research 1987 and 1988). Further analysis of beach profiles and short-term deployment of tracing experiments using aluminium pebbles revealed that mean eastward drift over the period 1986-1990 was about 30,000m^3a^{-1} (Havant Borough Council, 1992b), declining to 11,500 m^3a^{-1}. between 1990 and 1991 (Whitcombe, 1995). Littoral drift was therefore initially very rapid on the replenished beach but declined as the beach approached an equilibrium. Wave refraction analysis suggests that net eastward movement is promoted by modified swell waves approaching from the south-west and, south-south west. South south-easterly and east south-easterly waves, which occur for less than 7% of the year, set up a net westward movement (W.S. Atkins, 1998). During these short periods, the littoral drift divide is probably inoperative. Groynes were constructed in between 1987 and 1991, to reduce the rate of eastwards drift and beach erosion (Hydraulics Research, 1988; Whitcombe, 1995). Havant Borough Council (1991) calculated that the prevailing drift was 13,300 m^3a^{-1}. W.S. Atkins (1998) proposed the lower rate, of 11,300 m^3a^{-1}. Thus, as expected, net eastward drift rates have declined as the beach has progressively attained morphodynamic stability.

Before implementation of the scheme, both Harlow (1980) and Hydraulics Research (1980) assessed previous experience with beach replenishment and anticipated initial losses from the nourished beach would be significantly greater than long-term rates. This was confirmed by H.R Wallingford (1995) and Whitcombe (1995) who reported that slightly more than 45% of the immediate post-replenishment volume was in place in 1994, i.e. an annual loss of 30-40,000m^3a^{-1}. Data from W.S. Atkins (1998) and Havant Borough Council (1999) indicate a loss of 27,100m^3a^{-1}, 1991-1998, declining from 46,000m^3a^{-1}, 1991-94 to 25,000m^3a^{-1}, 1996-98. This is based on regular beach topographic surveys and post-1992 data on recycling inputs. The proportion of this quantity which is lost directly offshore is not known, though there is circumstantial evidence (eg. from gravel - filled gutters across the sandy foreshore) to indicate that this process operates.

The result of rapid eastward drift since replenishment has been significant accretion at Eastoke Point, particularly of sand and fine gravel. Material has been artificially recycled from this accumulation area and replaced over the replenished beach. In January 1991, a terminal rock reinforced groyne was completed at Eastoke Point, designed to restrict littoral drift into the Chichester Harbour entrance channel, thereby facilitating retention of sediment for recycling. A rock revetment was added to the frontage of Eastoke Point in 1992 to provide further beach stability.

The Eastoke Peninsula Beach Management Strategy Plan (Havant Borough Council, 1999, 2000) proposes: (i) a continuing programme of annual gravel recycling, taking accretion excesses to areas of deficit over the existing beach; and (ii) quinquennial recharge, using material obtained by dredging the approach channel to Chichester Harbour. The initial quantity will be 50,000m^3, followed thereafter by inputs of approximately 25,000m^3. The major advantage of this approach is that it retains material in the local sediment transport sub-cell. Without recycling, rates of loss would probably slowly but progressively increase, to at least 30,000m^3a^{-1} by 2005 (Havant Borough Council, 1999, 2000).

LT3 Eastoke Point to Black Point (Sandy Point Spit)

Site observations indicate northward drift from Eastoke Point to Black Point (Harlow, 1980). The volume of sediment involved is probably small because wave action in the harbour entrance is relatively weak and net drift (particularly on the upper beach) is interrupted by groynes. Prior to the recharge scheme to the west, depletion at a rate of almost 8000m^3a^{-1} was indicated by beach volume analysis (Hydraulics Research, 1980; Beard, 1984) but littoral drift was probably less rapid, for some of this material was probably diverted to the tidal channel. Studies by Harlow (1980) revealed depletion of the Black Point Spit, at 1000 to 2000m^3a^{-1} between 1932 and 1967, which was preceded by accretion at 1000-5000m^3a^{-1} between 1842 and 1932. Thus it appears that potential littoral drift may be between 1000m^3a^{-1} and 8000m^3a^{-1}, although transport may be effectively prevented by coast protection structures when beaches are depleted. It is unlikely that the beach replenishment scheme has had a significant effect on this coastal segment as the major area of accretion is at Eastoke Point; further downdrift transport is more likely to enter Chichester Channel, rather than along this south to north shore (Hydraulics Research, 1988). Sediment supply has been further regulated with the completion of the terminal rock groyne and rock revetment at Eastoke Point (1990-1992). Quinquennial dredging of the approach channel to Chichester Harbour will provide a small quantity of sediment for periodic replenishment, if required (Havant Borough Council, 2000). Alternatively, any surplus will be removed to Eastoke Beach. A mix of coast protection structures between Black Point Spit and the western limit of the Sandy Point Nature Reserve currently maintain beach levels, but they remain vulnerable to extreme wave conditions. Sediment stored here might therefore rapidly increase littoral drift throughput in the event of any breakdown of stability, and increased erosion.

LT4 Westward Drift to Gunner Point

The presence of the East Winner banks, eastward of the Langstone Harbour Channel, is evidence of the long-term operation of westwards drift, particularly when waves from the east-south-east and south-east operate.

Pre-replenishment. Net westward drift from the Beach Club drift divide to Gunner Point was determined by Harlow (1979; 1980) from field observations of sediment distribution in groyne compartments, combined with map and air photo evidence. Detailed assessment of littoral transport was undertaken by volumetric beach analysis using Ordnance Survey plans. Drift rates were was calculated for nine separate periods between 1842 and 1976, which revealed significant spatial and temporal variability. Generally, the drift rate increased westward, sustained by progressive eastward beach erosion; most transport was considered to take place during high-energy waves approaching from the south-east or east-south-east. Further west towards Gunner Point, drift declined due to reduced wave energy resulting from shelter from the Isle of Wight. Maximum drift of over 80,000m^3a^{-1} was recorded for the period 1931-1940, but rates fell subsequently due to sediment shortage as supply beaches became depleted. Immediately west of the Beach Club, a mean potential westward drift of 17,000m^3a^{-1} was calculated. This increased to 20,000m^3a^{-1} one kilometre to the west and declined to 19,000m^3a^{-1} at the Beachlands surface water outfall (constructed in 1973 (Webber, 1974b)). Further west, it declined to 13,000 m^3 at Beachcot (in part due to the obstructing effect of the outfall) and increased to 15,000m^3 at Gunner Point (Harlow, 1980; Hydraulics Research, 1980). These figures were long-term means, the period 1842-1976 and therefore likely to be representative. Other calculations of drift over limited time periods revealed rates of 14,000m^3a^{-1} (1967-1976) and 14,000m^3a^{-1} (1976-1978) at Beachcot. Only the figure for

Beachcot was probably unrepresentative of drift immediately before replenishment because coast protection structures at this site interrupted transport of medium to coarse gravel on the upper beach, so that drift was restricted to fine gravel and sand on the mid/lower beach (Harlow, 1980). A modest increase in drift rate probably occurred west of Beachlands after 1979, with the installation of a piped outfall. However, the protection of the 'Inn on the Beach' in 1976 added a limited impediment to westwards drift (Photo 11), necessitating the subsequent construction of a revetment (Photo 12) and groynes (Photo 13) to modify downdrift beach recession. Gunner Point has a long history of fine gravel and sand accretion extending back about 380 years; Harlow (1980) suggests that, since about 1850, the average accretion rate has been about 5,000 m^3a^{-1}. Mean High Water Mark at Gunner Point has moved 195m seawards since approximately 1880 (Havant Borough Council, 2000). HR Wallingford (1995) suggest progradation of 0.8m^3a^{-1} since 1910 (90,000m^3, 1976-1992 or 5,000 m^3a^{-1}). A total of between 10-15,000m^3a^{-1} of sediment either passed around Gunner Point, or was transported directly into the Langstone tidal channel, between approximately 1880 and 1980. (Harlow, 1980). The north-trending, sandy gravel ridge that defines the eastern boundary of the Kench may be a remnant spit pre-dating the development of the Gunner Point foreland.

Post-replenishment. Volumetric analysis using measured beach profile data revealed that drift was 37,000m^3a^{-1} (February 1986 to February 1987) and between 6,000 and 13,000m^3a^{-1} (1987-97) immediately westward of the Beach Club on the replenished beach (Hydraulics Research, 1987, 1988; HR Wallingford, Whitcombe, 1995). Initially, the replenished segment was not groyned and Harlow (1985) reported significant accretion in the old groyne field and revetment to the west. Whitcombe (1995) and W.S. Atkins (1998) note this frontage subsequently steadily lost material, (see section 5.4). Hydraulics Research (1988) reported that accretion resulting from westward movement of replenished material was not apparent very far west, at that time, suggesting that drift was much less rapid in the groyned coastal segments. A peak drift rate was recorded at the western extremity of the replenished beach immediately following its construction, where the change in alignment (caused by replenishment) was greatest. Volumetric analysis derived from beach profiles for the periods 1986-1990 and 1993-97 indicated that westwards littoral drift declined to between 9,500m^3a^{-1} (Whitcombe, 1995) and 4,800m^3a^{-1} (W.S. Atkins, 1998). Whitcombe (1995, 1996) identified the transfer of a "wedge" of gravel west of the replenished beach. Since 1990, the beach westwards to the Fun Fair and Norfolk Crescent has shown net accretion (W.S. Atkins, 1998), thus representing a potential source for future re-cycling operations to maintain the Eastoke replenished beach. Havant Borough Council (1999) estimate that net westwards drift along this entire sector, west to the Inn by the Sea, is approximately 20,000 m^3a^{-1}

Appendix 3:

Eastoke Point Groynes 1 to 12 Variations in Length 1979 to 2005



Groyne 12	Groyne 11	Groyne 10	Groyne 9	Groyne 8	`Groyne 7	Groyne 6	Groyne 5	Groyne 4	Groyne 3 Rock	Groyne 3 Timber	Groyne 2	Groyne 1
1 - Groyne extended by approx 5m between 2001 & 2004	No changes to groyne length	1 - Groyne extended by approx 5m between 2001 & 2004	No changes to groyne length	No changes to groyne length	1 - Groyne shortened by approx 5m between 1986 & 1992	1 - Groyne shortened by approx 30m between 1994 & 2001	1 - Groyne extended by approx 10m between 1980 & 1983 2 - Groyne shortened by approx 10m between 1986 & 1992 3 - Groyne shortened by approx 7m between 1994 & 2001	1 - Groyne shortened by approx 45m between 1992 & 1994	1 - Rock groyne built approx 40m to West of Timber Groyne in 1992	1 - Timber groyne removed 1992	1 - Timber groyne removed between 1992 & 1994, replaced by rock revetment with stub groynes	1 - Groyne extended by approx 10m between 1983 & 1985 2 - Timber groyne removed after 1986, replaced by rock revetment with stub groynes

NOTE

Due to method of the positioning of photographs onto GIS (from where groyne end points were obtained) - the positions and hence lengths of groynes are only approximate.

REV	DESCRIPTION	DATE	INITIALS

Portsmouth City Council
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Telephone: (023) 9283 4839
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Gosport Borough Council
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Telephone: (023) 9258 4242
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Internet: www.gosport.gov.uk

TITLE

EASTOKE POINT GROYNES 1 TO 12 VARIATIONS IN LENGTH 1979 TO 2005

DRAWN BY: BJR	CHECKED BY:	ISSUE NO:
DATE: MAR 2011		DRAWING NO: PSTROMPEEPRFIG000009
SCALE: 1:1250 @ A1		DRAWING: Eastoke-Point-Groyne-Survey

Appendix 4:

Natural England Letter of Support

Dated 24th August 2011

Havant BOROUGH COUNCIL

GOSPORT BOROUGH COUNCIL

Portsmouth CITY COUNCIL

Date: 24 August 2011
Our ref: 31611

Caroline Timlett
Development and Technical Services
Havant Borough Council
Southmoor Depot
2 Penner Road
Havant
PO9 1QH

Cromwell House
2nd Floor,
15 Andover Road
WINCHESTER
Hampshire
SO23 7BT

Dear Caroline

EASTOKE POINT COASTAL DEFENCE WORKS: SOUTHERN FRONTAGE – GUIDANCE FOR AN APPROPRIATE ASSESSMENT (AUGUST 2011)

Chichester and Langstone Harbour Special Protection Area/Ramsar (SPA/Ramsar)
Solent Maritime Special Area of Conservation (SAC)

Following the information received from the Havant Borough Council for the Eastoke Point Coastal Defence Works scheme, we write to confirm that **Natural England agrees with the outcomes in the Appropriate Assessment.** However, we would like to emphasise the requirement to compensate for any internationally designated habitat or interest feature, which may be lost or affected as a result of the Strategy. Natural England would expect this loss or damage to any interest feature to be addressed through the Regional Habitat Creation Programme and Natural England will continue to work with the Environment Agency to achieve this.

Natural England expects to be formally consultant with regards to planning permission. It is at this stage that Natural England will also provide any necessary assent or advice for the purposes of s28H of the Wildlife and Countryside Act 1981 (as amended). Before undertaking any proposed works, the operating authority, having considered its general duty under section 28G(2) of The Wildlife and Countryside Act 1981 (as amended), is required to give notice to Natural England and is required to carry out the works in accordance with the provisions of section 28H of the Wildlife and Countryside Act 1981 (as amended). This is because the proposed works will be within or adjacent to the SSSIs found within the designated sites listed above.

Finally, we would like to congratulate you for progressing the scheme forward and to thank you for working closely with Natural England.

Please do not hesitate to contact Natural England if you need any further advice or help.

Yours sincerely



On behalf of
Dr Chris McMullon
SE Senior Coastal Specialist
Ph: 0300 060 4085
chris.mcmullon@naturalengland.org.uk

Summary of Natural England's advice at the option choice stage	Answer only yes or no
Is the proposal likely to lead to an environmentally acceptable solution?	Yes

Appendix 5:

Southern Regional Habitat Creation Programme

Letter confirming 0.4ha for the Eastoke Coastal Defence Works

Dated 9th September 2011

Havant BOROUGH COUNCIL

GOSPORT BOROUGH COUNCIL

Portsmouth CITY COUNCIL

creating a better place

Environment Agency

HAVANT BOROUGH COUNCIL
SOUTHMOOR DEPOT
14 SEP 2011
RECEIVED

Ms C Timlett
Development and Technical Services
Havant Borough Council
Southmoor Depot
2 Penner Road
Havant
PO9 1QH

Your ref:

Our ref:

Date: 9 September 2011

Dear Caroline,

Eastoke Coastal Defence Works – Habitat Provisions

The aim of the Regional Habitat Creation Programme (RHCP) is to provide an overview and delivery mechanism of the habitat required to offset losses caused by flood and coastal risk management schemes, including those delivered by Local Authorities. This approach to meeting the requirements of strategies and schemes through the RHCP has been agreed with Defra.

The South East RHCP has included the requirement of 0.4 hectares of inter tidal habitat to compensate for losses to Natura 2000 sites caused by the Eastoke Coastal Defence works within the overall requirements for approximately 600 hectares of inter-tidal habitat required across the Solent identified by the North Solent SMP to compensate for coastal squeeze on Natura 2000 sites. The RHCP will identify habitat creation sites and maintain a balance sheet of habitat created and habitat required. Delivery of habitat creation sites will be carried out by the party best placed to do so, which could be the Environment Agency or the Local Authority.

The first inter-tidal habitat creation which will be suitable for compensation for the losses at Eastoke will take place at Medmerry. Natural England have confirmed that Medmerry is a suitable site for compensation for losses at Eastoke. This project is being delivered by the Environment Agency, with habitat creation expected to start in 2013. As coastal squeeze losses will occur gradually over time, only a portion of the habitat required for Eastoke will be allocated at the beginning. The RHCP will deliver further areas of inter-tidal habitat over the next 100 years to keep pace with losses. This avoids excessive investment in habitat well in advance of need, or other schemes being delayed because habitat has been 'allocated' to a scheme where the losses have not all yet occurred. This approach has been agreed regionally with Natural England.

Yours sincerely

pp J. Nortcliff

Ruth Jolley
Regional Habitat Creation Programme Manager

Environment Agency, Guildbourne House, Chatsworth Road, Worthing, West Sussex BN11 1LD
Email: ruth.jolley@environment-agency.gov.uk DD: 01903 832113

INVESTOR IN PEOPLE

Annex 6:

of

Appendix K: Environmental Statement:

Natural England Letter of Support

Blank Page

Date: 24 August 2011
Our ref: 31611

Caroline Timlett
Development and Technical Services
Havant Borough Council
Southmoor Depot
2 Penner Road
Havant
PO9 1QH

Cromwell House
2nd Floor,
15 Andover Road
WINCHESTER
Hampshire
SO23 7BT

Dear Caroline

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Chichester and Langstone Harbour Special Protection Area/Ramsar (SPA/Ramsar)
Solent Maritime Special Area of Conservation (SAC)

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Natural England expects to be formally consultant with regards to planning permission. It is at this stage that Natural England will also provide any necessary assent or advice for the purposes of s28H of the Wildlife and Countryside Act 1981 (as amended). Before undertaking any proposed works, the operating authority, having considered its general duty under section 28G(2) of The Wildlife and Countryside Act 1981 (as amended), is required to give notice to Natural England and is required to carry out the works in accordance with the provisions of section 28H of the Wildlife and Countryside Act 1981 (as amended). This is because the proposed works will be within or adjacent to the SSSIs found within the designated sites listed above.

Finally, we would like to congratulate you for progressing the scheme forward and to thank you for working closely with Natural England.

Please do not hesitate to contact Natural England if you need any further advice or help.

Yours sincerely



On behalf of
Dr Chris McMullon
SE Senior Coastal Specialist
Ph: 0300 060 4085
chris.mcmullon@naturalengland.org.uk

Summary of Natural England's advice at the option choice stage	Answer only yes or no
Is the proposal likely to lead to an environmentally acceptable solution?	Yes

Annex 7:

of

Appendix K: Environmental Statement:

Water Framework Directive Water Body Data Sheets

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Waterbody Category and Map Code.:	Coastal - C13	**Surveillance site:** No
Waterbody ID and Name:	GB680705210000	Chichester Harbour
National Grid Reference:	SU 77070 02814	
Current Overall Potential	Moderate	
Status Objective (Overall):	Good by 2027	(For Protected Area Objectives see Annex D)
Status Objective(s):	Good Ecological Potential by 2027, Good Chemical Status by 2015	
Justification if overall objective is not good status by 2015:	Disproportionately expensive, Technically infeasible	
Protected Area Designation:	Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Shellfish Water Directive, Urban Waste Water Treatment Directive	
SSSI (Non-N2K) related:	No	
Hydromorphological Designation:	Heavily Modified	
Reason for Designation:	Coastal Protection, Navigation, ShellFisheries	
Downstream Waterbody ID:		

Ecological Potential

Current Status (and certainty that status is less than good)	Moderate (Uncertain)

Biological elements

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Phytoplankton	High	High	

Supporting elements

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Dissolved Inorganic Nitrogen	Moderate (Uncertain)	Moderate	Disproportionately expensive (N1c)
Dissolved Oxygen	High	High	
Copper	High	High	

Ecological Potential Assessment

Element	Current status	Predicted Status by 2015	Justification for not achieving good status by 2015
Mitigation Measures Assessment	Moderate	Moderate	Disproportionately expensive (M2b), Technically infeasible (M3f)

Current Status (and certainty that status is less than good)	Predicted Status by 2015
	High

Waterbody Category and Map Code.:	Coastal - C4	**Surveillance site:** Yes
Waterbody ID and Name:	GB650705150000	Solent
National Grid Reference:	SZ 62536 94364	
Current Overall Potential	Moderate	
Status Objective (Overall):	Good by 2027	(For Protected Area Objectives see Annex D)
Status Objective(s):	Good Ecological Potential by 2027, Good Chemical Status by 2027	
Justification if overall objective is not good status by 2015:	Technically infeasible	
Protected Area Designation:	Bathing Water Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Shellfish Water Directive, Urban Waste Water Treatment Directive	
SSSI (Non-N2K) related:	No	
Hydromorphological Designation:	Heavily Modified	
Reason for Designation:	Coastal Protection, Flood Protection	
Downstream Waterbody ID:		

Ecological Potential

Current Status (and certainty that status is less than good)	Moderate

Biological elements

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Invertebrates	Good	Good	
Phytoplankton	High	High	

Supporting elements

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Dissolved Inorganic Nitrogen	Good	Good	
Dissolved Oxygen	High	High	
2,4-dichlorophenol	High	High	
2,4-dichlorophenoxyacetic acid	High	High	
Arsenic	High	High	
Copper	High	High	
Dimethoate	High	High	
Iron	High	High	
Linuron	High	High	
Mecoprop	High	High	
Permethrin	High	High	
Toluene	High	High	
Zinc	High	High	

Ecological Potential Assessment

Element	Current status	Predicted Status by 2015	Justification for not achieving good status by 2015
Mitigation Measures Assessment	Moderate	Moderate	Technically infeasible (M3f)

	Status
	In Place
	In Place
	In Place
	Not In Place
	Not In Place
	Not In Place
	Not In Place

	Current status (and certainty of less than good)		
		High	
I			
Nickel And Its Compounds			
Pentachlorophenol			
Simazine			
Tributyltin Compounds			Technically infeasible (C2a)
Trichlorobenzenes			
	High	High	
	High	High	
i	High	High	
	Hıgh		
para - para DDT	High		
Tetrachloroethylene			
Trichloroethylene			

Waterbody Category and Map Code.:	Coastal - C5	**Surveillance site:** No
Waterbody ID and Name:	GB650705530000	Isle of Wight East
National Grid Reference:	SZ 70788 85933	
Current Overall Potential	Good	
Status Objective (Overall):	Good by 2015	(For Protected Area Objectives see Annex D)
Status Objective(s):	Good Ecological Potential by 2015, Good Chemical Status by 2015	
Justification if overall objective is not good status by 2015:		
Protected Area Designation:	Bathing Water Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Shellfish Water Directive, Urban Waste Water Treatment Directive	
SSSI (Non-N2K) related:	No	
Hydromorphological Designation:	Heavily Modified	
Reason for Designation:	Coastal Protection, Flood Protection	
Downstream Waterbody ID:		

Ecological Potential

Current Status (and certainty that status is less than good) Good

Biological elements

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Invertebrates	Good	Good	
Macroalgae	High	High	
Phytoplankton	High	High	

Supporting elements

	dicted Status by 5	Justification for not achieving good status by 2015
	)d	
	)	
	)	
	)	

Ecological Potential Assessment

	dicted Status by 5	Justification for not achieving good status by 2015
	)d	

Mitigation Measures that have defined Ecological Potential

Mitigation Measure	Status
Manage disturbance	In Place
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	In Place
Sediment management	In Place
Bank rehabilitation / reprofiling	In Place
Remove obsolete structure	In Place

Good

Chemical elements

	Current status (and certainty of less than good)
	High

Annex 8:

of

Appendix K: Environmental Statement:

Regional Habitat Creation Programme Letter

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creating a better place

Environment Agency

HAVANT BOROUGH COUNCIL
SOUTHMOOR DEPOT
14 SEP 2011
RECEIVED

Ms C Timlett
Development and Technical Services
Havant Borough Council
Southmoor Depot
2 Penner Road
Havant
PO9 1QH

Your ref:

Our ref:

Date: 9 September 2011

Dear Caroline,

Eastoke Coastal Defence Works – Habitat Provisions

The aim of the Regional Habitat Creation Programme (RHCP) is to provide an overview and delivery mechanism of the habitat required to offset losses caused by flood and coastal risk management schemes, including those delivered by Local Authorities. This approach to meeting the requirements of strategies and schemes through the RHCP has been agreed with Defra.

The South East RHCP has included the requirement of 0.4 hectares of inter tidal habitat to compensate for losses to Natura 2000 sites caused by the Eastoke Coastal Defence works within the overall requirements for approximately 600 hectares of inter-tidal habitat required across the Solent identified by the North Solent SMP to compensate for coastal squeeze on Natura 2000 sites. The RHCP will identify habitat creation sites and maintain a balance sheet of habitat created and habitat required. Delivery of habitat creation sites will be carried out by the party best placed to do so, which could be the Environment Agency or the Local Authority.

The first inter-tidal habitat creation which will be suitable for compensation for the losses at Eastoke will take place at Medmerry. Natural England have confirmed that Medmerry is a suitable site for compensation for losses at Eastoke. This project is being delivered by the Environment Agency, with habitat creation expected to start in 2013. As coastal squeeze losses will occur gradually over time, only a portion of the habitat required for Eastoke will be allocated at the beginning. The RHCP will deliver further areas of inter-tidal habitat over the next 100 years to keep pace with losses. This avoids excessive investment in habitat well in advance of need, or other schemes being delayed because habitat has been 'allocated' to a scheme where the losses have not all yet occurred. This approach has been agreed regionally with Natural England.

Yours sincerely

pp J. Nortcliff

Ruth Jolley
Regional Habitat Creation Programme Manager

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Email: ruth.jolley@environment-agency.gov.uk DD: 01903 832113

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