

## 5. *Baseline Environmental Statement*

### 5.1 INTRODUCTION

The management of existing coastal defences and the choice of future defence policy and options for Hayling Island are and will continue to be influenced by consideration of the effects of such defences on the environment.

In the case of the natural environment, particular attention needs to be paid to the possible effects on designated conservation areas. In particular, the Eastoke frontage lies within the Chichester Harbour SPA/SSSI, whilst the inter-tidal areas fall within the boundaries of the Solent Maritime SAC. It is especially important to determine the likely environmental impacts in these areas as a result of either realignment of the coastline or the construction/modification of coastal defences.

A review of the baseline environmental conditions has been carried out in order to inform coastal defence option evaluation process. The review draws primarily on existing data but has been supplemented with information obtained through discussions with appropriate environmental authorities including Natural England. These discussions have also been used to establish ways in which the choice of coastal defences can enhance the extent and quality of priority habitats.

In addition to the environmentally sensitive areas that may be affected by any coastal protection works, the amenity and recreational value of the study frontage have also been considered. The information for this assessment has been derived primarily from existing reports, site visits and consultation with local stakeholders. Appendix 4 to this report describes the early stages of the consultation process that was undertaken and became an important influence on the consideration and choice of an appropriate coastal defence scheme for Eastoke Point.

### 5.2 NATURE CONSERVATION DESIGNATIONS

A variety of different designated areas are located in the vicinity of the study area. These are presented schematically in Figure 5.1 and may be differentiated as follows:

#### **Sites of Statutory International Importance**

##### Special Protection Area (SPA)

These areas are designated under the European Union Birds Directive (79/409/EEC) and are implemented in Britain by the 1981 Wildlife and Countryside Act.

##### Special Areas of Conservation (SAC)

These are designated under the European Union Habitats Directive (92/43/EEC) and are implemented in Britain by the 1994 Conservation Regulations.

##### Ramsar Sites

These are designated in accordance with the 1971 Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention).

**Statutory National Importance**

Sites of Special Scientific Interest (SSSI)

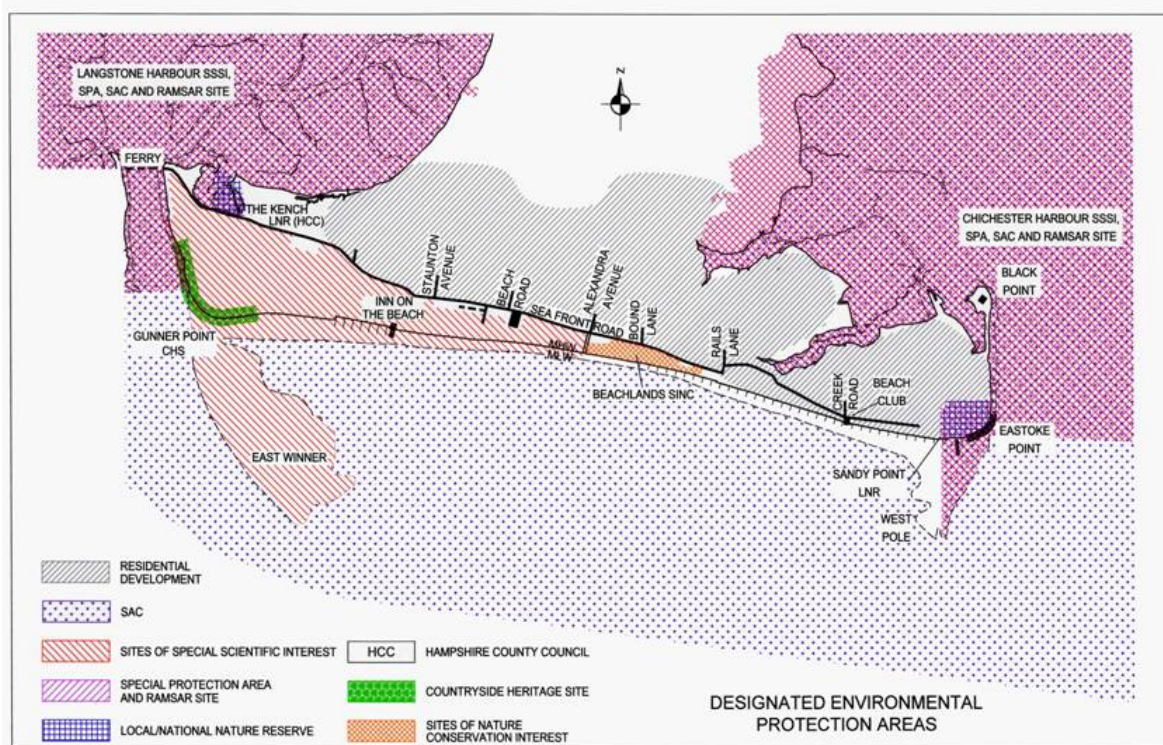
These sites are designated under Section 28 of the Wildlife and Countryside Act 1981. SSSIs are of national or regional nature conservation or geological importance. Their boundaries include terrestrial and marine inter-tidal areas to Mean Low Water (MLW). All SACs and SPAs are also designated as SSSIs.

**Statutory Regional or Local Importance**

Sites of Importance for Nature Conservation (SINC).

Local Nature Reserves (LNR).

The ecological value of the study area is reflected by the number of conservation designations (Figure 5.1) and it is therefore important to consider the impact of any proposed coastal protection works along the Eastoke frontage. In order to undertake an appropriate Environmental Impact Assessment, it is essential to understand the baseline characteristics of the various sites that may be adversely affected.



**Figure 5.1 Designated environmental protection areas**

**5.2.1 Special Protection Area (SPA)**

Chichester and Langstone Harbour SPA supports the following important bird populations:

- Internationally important assemblages of waterfowl;
- Internationally important populations of migratory species;

- Internationally important populations of regularly occurring Annex 1 species; and
- Nationally important populations of migratory species.

The key habitats for which Natural England has defined conservation objectives are:

- Saltmarsh;
- Inter-tidal mud and sand-flats;
- Sand and shingle;
- Shallow coastal waters; and
- Mixed sediment shores.

### 5.2.2 Special Area of Conservation (SAC)

The Solent Maritime SAC is designated in respect of the following:

- Estuaries (including saltmarsh communities, inter-tidal mud and sand-flat communities, inter-tidal mixed sediment communities, sub-tidal sediment communities);
- Atlantic salt meadow (including low marsh, mid marsh, upper marsh and transitional high marsh communities);
- *Salicornia* and other annuals colonising mud and sand (including *Salicornia* and *Sueda maritima* saltmarsh communities);
- Cordgrass swards (including *Spartina maritima*, *Spartina alterniflora* and *Spartina x townsendii* communities);
- Mud and sand-flats not covered by seawater at low tide (including inter-tidal mud, muddy sand, sand and mixed sediment communities); and
- Sandbanks that are permanently submerged (including sub-tidal sand, gravely sand, muddy sand and eelgrass (*Zostera marina* beds)).

Natural England has prepared a favourable condition table for the Solent Maritime SAC against which the impacts of any proposed schemes must be measured. The targets for the attributes of each interest feature supplement the Natural England conservation objectives.

Subject to natural change, maintain the estuaries in a favourable condition, with particular reference to:

- No decrease in extent from an established baseline;
- The intra and inter-estuarine TP/CS relationship;
- Average temperature and density;
- Average phytoplankton distribution; and
- Range and distribution of sub-tidal communities.

Subject to natural change, maintain the annual vegetation of drift lines in favourable condition including:

- 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 a minimum of anthropogenic disturbance; and
- Presence and broad distribution of stands of *Atriplex prostrate/ Beta vulgaris maritime* dominated community and other local variants

Subject to natural change, maintain the Atlantic Salt Meadows in a favourable condition including:

- Distribution and extent of low marsh, mid marsh and upper marsh communities; and
- Presence and abundance of constant species of characteristic low-marsh, mid-marsh, upper-marsh and upper transitional marsh species.

Subject to natural change, maintain the *Salicornia* and other annuals colonising mud and sand in a favourable condition with particular reference to:

- No increase in algal material cover;
- No increase in extent; and
- No change in distribution and extent of annual *Salicornia* saltmarsh communities.

Subject to natural change, maintain the Cordgrass swards in a favourable condition, in particular the distribution and extent of smooth and Townsend's Cordgrass communities.

Subject to natural change, maintain the inter-tidal mud and sand-flats in a favourable condition including:

- No decrease in extent;
- No change in shore profile;
- No increase in the average abundance of macro-algal mats;
- No significant deviation in the average PSA parameters, organic carbon content and anoxic layer depth; and
- No significant variation in range and distribution.

Subject to natural change, maintain the submerged sandbanks in a favourable condition, particularly:

- No decrease in extent;
- No significant deviation in grain size parameters, distribution and depth; and
- No deviation in the distribution and extent of characteristic biotopes.

### 5.2.3 Ramsar Sites

The study area lies within the Chichester Harbour Ramsar site and has been designated under Criterion 1a of the Ramsar Convention. The site is characterised by internationally important wetland habitats of the Atlantic bio-geographic region including:

- Estuaries;
- Saltmarshes; and
- Inter-tidal mud and sand-flats

The site is also designated under Criterion 3a of the Convention as the wetland regularly supports over 20,000 waterfowl and Criterion 3c of the Convention by supporting >1% of the individuals in a population of waterfowl species.

### 5.2.4 Sites of Special Scientific Interest (SSSI)

The Eastoke Peninsula lies within the Chichester Harbour SSSI. Extensive mud and sand-flats are exposed at low tide and there are significant areas of saltmarsh (Plate 5.1), 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. The site is also of particular significance for breeding birds, both within the harbour itself and the surrounding woods and fields. The inter-tidal areas are the feeding ground for internationally important populations of Redshank,

Plover, Dunlin, Curlew, Sanderling, Black Tailed Godwit and Greenshank. The numbers of Bar Tailed Godwit are of European importance whilst Shelduck and Teal populations are of international importance. Significantly, the numbers of Dark Bellied Brent Geese at the site are around 5% of the world's population.

Natural England was consulted and they considered that 91% of Chichester Harbour SSSI is in a favourable condition. However, within the study area, the foreshore around the Sandy Point Local Nature Reserve is considered to be in an unfavourable condition.



**Plate 5.1** Saltmarsh within Chichester Harbour SSSI

### 5.2.5 Local Nature Reserve (LNR)

Sandy Point Local Nature Reserve and Countryside Heritage Site lies immediately behind the beach at Eastoke. This site comprises an area of unfenced coastal heathland, sand dunes and scrub. The LNR is considered to be the best example of vegetated sand and shingle in Hampshire. The site is partially protected by a buried rock revetment and groynes. After many years of neglect, during which the area became almost overgrown with scrub, some restoration work has been carried out since the LNR designation (Sanderson, 1998). Any coastal protection works carried out along the Eastoke frontage are likely to have a direct impact on the LNR. In developing and evaluating any new defence options these impacts must be carefully considered as detrimental effects or loss of area must be avoided or appropriate compensation provided.

During discussions with Natural England, the point was made that any scheme to improve the coastal defences around Eastoke Point should include works designed to enhance the Eastoke LNR. In particular, it would be environmentally beneficial to improve the performance and appearance of the drainage culvert that runs across the LNR. This culvert serves to drain water from the adjacent residential area following overtopping or flooding events. At present,

the culvert is overgrown and inefficient as shown during the flooding event of November 2005 and, at the least, any defence scheme should provide advice and assistance in improving this channel.

### 5.2.6 Sites of Importance for Nature Conservation (SINC)

There is one SINC at Beachlands, which lies directly to the west of the study area. This SINC supports important communities of plants, birds, fungi, mosses, lichens and invertebrates. The plant life includes many rare grasses, sedges and mosses.

### 5.2.7 Sensitive Marine Areas (SMA)

SMAs are nationally important sites around the coast that receive a cautious and detailed management approach. The status aims to highlight areas that are important for marine nature conservation. The Solent and Isle of Wight SMA was established in 1994, and is a non-statutory designated area, which extends from Pagham Harbour in the East to Hurst Spit in the West. The SMA is characterised by strong tidal currents in the Solent channel, harbour entrances and around headlands and a wide range of wave exposures, varying salinity, water temperature and substrate types. This is combined with a diverse range of rich habitats and biological communities. Several biotopes that occur within this SMA are considered to be of national importance. These include communities with paddocks in soft chalk, clay or peat, *Zostera* beds, communities including the bivalve *Mya arenaria* and polychaetes in muds and muddy gravels in brackish water conditions. The SMA is also significant for the internationally important numbers of wildfowl and waders that are found primarily in the shallow harbours.



**Plate 5.2** Vegetated shingle at Sandy Point LNR

## Habitats

### Vegetated Shingle

Several small spits and beaches around Chichester Harbour support areas of both annual vegetation of drift lines and perennial vegetation of stony banks. Perennial vegetation has increased through continued coastal processes along the western margin of Hayling Island. Some of this habitat is found inside the Sandy Point LNR, but there is a significant area outside its boundaries, at the crest and rear of the barrier beach along the northern part of the Eastoke Point frontage. Preserving and if possible enhancing this habitat is one of the ways in which a new coastal defence scheme could bring environmental benefits to this area.

A vegetation survey was undertaken at Sandy Point LNR, (which supports vegetated sand and shingle) by Sanderson in 1998 for Hampshire Wildlife Trust. The vegetation communities present within the reserve were recorded and mapped. A total of 244 vascular plant taxa, 15 mosses, and 20 Terricolae have been recorded since 1980 from the Sandy Point area.

### Dune System

There is a relatively mature vegetated dune system of 14ha present at Sandy Point on Eastoke Beach. The dunes are dominated by marram grass *Ammophila*. In the absence of continued coastal protection, saline intrusion into this area is a distinct possibility.



**Plate 5.3 Dunes at Sandy Point**

### **Inter-tidal Habitats**

The predominant habitats within the study area include sand and shingle at Eastoke Beach. These support a limited flora and fauna. Mussels *Mytilus edulis* and green algae are found

growing abundantly on the timber groynes but the sand and shingle substrates are relatively barren due to their high mobility.

Exposure to wave action is the most important factor determining the variety and abundance of invertebrates along this frontage.

Adjacent to the study area, approximately 186ha of Atlantic salt meadows *Glauco puccinellietalia* have been recorded around Chichester Harbour. These are concentrated towards the head of the Chichester and Bosham channels behind East Head. These provide an important habitat for both marine and terrestrial fauna and serve as roosting and feeding grounds for internationally important wildfowl.

Sizeable areas of *Salicornia/Sueda* communities are also found in the eastern regions of Chichester Harbour. These are dominated by annual species of samphire (glasswort). Inter-tidal mud and sand-flats also cover extensive areas of Chichester Harbour. These support a highly diverse flora and fauna.

## Species

### Birds

Between November 1996 and January 1999, winter monthly bird counts were undertaken during low water along the Eastoke frontage. The count area encompassed inter-tidal areas between Mengham Salterns and Sparks Boatyard. Detailed count maps indicate that the Eastoke northern frontage is regularly used by significant bird populations. The number of birds observed along this stretch of the Peninsula is considerably higher than that observed along the southern frontage.

### Chichester Harbour

A regular count of waders and wildfowl in Chichester Harbour is carried out and the results are published annually in the Sussex Bird Report.

### Benthic Species

In 2002, Baldock et al undertook sub-tidal surveys in Chichester Harbour which recorded 127 species, which are typical of habitats that are sheltered from wave action but exposed to moderate to strong tidal currents. Of particular interest in the survey were a small sea anemone (*Halcapa drrysantellum*), an opisthobranch mollusc (*Harrinoea sp.*), a small nudibranch *Eubrandrus doriae*, an alien bryozoan species, *Tricellaria inopinata* and red algae *Callophyllis laciniata*.

### *Sabellaria spirulosa*

A sandy reef of the polychaete Ross worm *Sabellaria spirulosa* 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 and are listed under the UK BAP.

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 spirulosa* 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.

### *Eel grass*

Another significant shallow sub tidal and UK biodiversity species present in Chichester Harbour is sea-grass beds (*Zostera spp.*/eel grass). This species, which stabilises the substratum and provides an attachment for other species, is considered to be scarce, and is protected under the EC Habitats Directive.

### *Marine Mammals*

Twenty five cetacean species have been recorded in British waters, of which eleven are encountered regularly. Regular visitors to the Solent include the harbour porpoise, dolphin and seals.

### **Biodiversity Action Plan (BAP)**

Hampshire Biodiversity Information Centre (HBIC) has confirmed that there are no notable or protected species on HBIC's database within the study area.

Habitats included in the 1999 Hampshire/UK BAP and Chichester Harbour BAP include:

- Coastal and floodplain grazing marsh;
- Coastal vegetated shingle;
- Lowland heathland;
- Seagrass beds;
- Coastal sand dunes;
- Inter-tidal mud/sand ;
- Sabellaria spirulosa reefs; and
- Sublittoral sands and gravels.

### **Natural Area Profiles**

Natural Areas are tracts of countryside or coastline that are readily recognised by their characteristic land forms, wildlife and land use. They are intended to provide a framework to identify the priorities and objectives for nature conservation at a local level and have a key role in translation of national targets for habitats and species into action at the local level.

The study area falls within the South Coast Plain and Hampshire Lowlands and the 'Solent and Poole Bay' natural areas based on Natural England's natural area profile description. The South Coast Plain and Hampshire Lowlands natural area comprises generally open, often featureless landscapes. Many of the features that the natural area supports lie outside the study area but the Sandy Point Nature Reserve supports several key species for which the natural area is noted.

The Solent and Poole Bay natural area is of international importance for the range of marine, coastal and maritime habitats, communities and species present. Extensive areas of inter-tidal mudflats, saltmarshes, and shingle beaches support national and internationally important numbers of migratory wildfowl and resident seabird colonies. The area also supports the highest density of brackish lagoons in the country.

## **5.3 CULTURAL AND ARCHAEOLOGICAL HERITAGE**

### **Introduction**

The Eastern Solent coastline and adjoining harbours comprise historic landscapes which have been utilised from pre-historic periods to the present day. Successive phases of sea level rise have created the Solent and enabled archaeological deposits to be submerged and preserved.

As a flooded former river valley that was drowned during the Holocene marine transgression, Chichester Harbour is known to be an area of particularly high archaeological importance.

### **Prehistoric Period**

A prehistoric settlement has been identified at East Head and at Gutner Common on North Hayling. A thin layer of burnt material extending 23m along a low sea cliff and containing burnt flint pot boilers sealed by alluvium has been interpreted as representing prehistoric land clearance. The potential for exposing prehistoric archaeology is unknown.

### **Bronze Age (2000-600 BC)**

In the early Bronze Age, Chichester Harbour was used for seasonal grazing as well as butchering and tanning. There is extensive evidence of Middle to Late Bronze Age settlements including farming systems and enclosures. Round houses have been found on the coastal plain at Creek Field, Hayling Island and a rare, Late Bronze Age structure comprising timbers and wattle has been found on the northern frontage of the Island. Six Middle Bronze Age palstaves were located on the east coast of Hayling in 1985. These may be associated with an urn field.

The potential for recovery of Bronze Age artefacts is unclear but this possibility must be considered.

### **Iron Age (600BC – AD43)**

A small rise in sea levels in the Iron Age is likely to have had a significant impact on the study area. There are important links between salt workings and sites on Hayling Island including Tournebury hill fort which guarded the western part of the entrance to Chichester Harbour. There is little potential for exposing Iron Age artefacts.

### **Roman Period (AD43-410)**

The Roman invasion of AD43 resulted in major social and economic changes. There is evidence of an early Roman military presence in Chichester and many artefacts have been found in the area including a bronze helmet dredged from the Harbour and disparate pottery finds. The potential for the recovery of Roman artefacts is low.

### **Early Medieval Period (AD410-1066)**

During the Early Medieval Period, there may have been trade in Chichester Harbour. Chichester was one of the five fortified sites mentioned in the Burghal Hidage, that was probably compiled in around AD919. Chichester evolved into a major town in the 10<sup>th</sup> century and increasing trade is likely to have led to the creation of a port.

### **Later Medieval Period (AD1066 -1550)**

During this period, the landscape would have comprised villages centred on parish churches. The harbour industries would have included fishing, salt-working, boat building and oyster farming and trade would have formed a significant proportion of the Harbour's economy. Wool appears to have been an important commodity passing through Chichester Harbour during the 13<sup>th</sup> century. By the end of the 13<sup>th</sup> century, there seems to have been a period of increased flooding within the area that has been linked to growing storminess and a slight rise in mean sea level. A considerable area of land belonging to the Priory on Hayling Island was inundated during the 14<sup>th</sup> century.

In South Hayling, three salterns are known; one medieval and two post-medieval. The medieval was the largest, known as Menghams and recorded in the Domesday book. The salterns went out of use in the 1870s and by the 1950s there was no recognisable trace of them.

Due to the inundation of Chichester Harbour, the potential for exposing artefacts from this period is low.

#### **Post Medieval (AD1550-1800) and Modern Period (AD1800+)**

The area comprises a number of post Medieval and industrial features that include mills (e.g. Hayling Island Tide Mill), harbour piles, salterns in North Hayling and oyster beds.

The sexton map of 1575 is one of the earliest maps of the area and shows Hayling Island as detached from the mainland, with channels shown as extending to Chichester. Due to the inundation of Chichester Harbour, the potential for exposing artefacts from this period is low.

The geology of the study area comprises a mixed sand and shingle storm beach overlying Upper Eocene deposits of the Barton, Bracklesham and Bagshot beds. The ground within the study area is low-lying.

There is evidence to suggest (Hooke and Riley, 1991) that the inter-tidal area decreased by 50% between 1870 and 1965 and increased again between 1965 and 2000. These natural erosion and accretional fluctuations have had a significant impact on the evolution of the Eastoke frontage.

#### **Statutory/non statutory protected features: Scheduled Monuments**

English Heritage has confirmed that there are no Scheduled Monuments within the study area.

#### **Listed Buildings**

There are no listed buildings within the Eastoke Peninsula.

#### **Conservation Area**

There are no Conservation Areas (of special architectural or historic interest) within the study area.

#### **Non-designated Archaeology**

A gazetteer listing the cultural heritage features that fall within the study area and surrounding areas is presented in Table 5.1.

**Table 5.1 Gazetteer of cultural heritage features**

Ref	Period	Type	Description	HSMR/NMR
1	Early Medieval	Archaeological Site	Site of 3 Salterns; one mentioned in the Domesday Book. Probably disused by 1877. Not presented in Figure 5.2	NMR 462193
2	Modern	Wreck	English Ketch, stranded and wrecked, 1894	NMR 903387
3	Modern	Wreck	English brig lost in high winds 1879	NMR 1236842
4	Modern	Wreck	English barque, lost 1881	NMR 1240631
5	Modern	Wreck	English cutter, stranded and lost whilst fishing, 1881	NMR 1240643
6	Bronze Age	Archaeological Find	Middle Bronze Age palstaves which were discovered after the importation of dredged gravel	HSMR 41037
7	Early Medieval	Documentary Evidence	Name – early medieval settlement	HSMR 41283
8	Post Medieval	Wreck Site	Bee wreck, lost near Chichester Harbour	HSMR 55484
9	Post Medieval	Wreck Site	Fanny wreck, lost near Chichester Harbour	HSMR 55501
10	Post Medieval	Wreck Site	Renown wreck, lost near Chichester Harbour	HSMR 55511

**Key**

HSMR Hampshire SMR Reference Number

NMR National Monuments Record Unique Identifier

**National Monuments Record**

A search of the NMR identified five archaeological features that are contained within the study area of which four are shipwrecks. These are shown in Figure 5.2.

**Archaeology and Historic Buildings Record**

A search of the Archaeology and Historic Buildings Record identified a further five features within the study area of which three are shipwrecks. These are also shown in Figure 5.2.

The following noteworthy archaeological resources can be found within the study area:

1. Peat layers / buried land surfaces often outcropping on or close to the present coastline;
2. Terrestrial archaeological sites that are eroding from the present shoreline; and
3. Waterside structures, wharves and landing places.



**Figure 5.2** Locations of Archaeological Features

**Note:** Archaeological Sites – reference numbers refer to Table 5.1

## 5.4 TOURISM AND RECREATION

The Eastoke Peninsula is a densely populated residential area, which receives over 2 million visitors per year. This provides employment for about 2000 people. Tourism makes a significant contribution to the local economy as people spend money in shops, hotels, cafes etc. The estimated annual revenue from the tourist industry is around £45 million.

Holiday accommodation in the study area comprises caravan and camping sites and guest houses. Numerous properties along the frontage are used as holiday homes rather than primary residences.

At Eastoke, the beach and the sea are important tourist attractions. To the west of the study area, the beach is mainly backed by residential properties along with some cafes and restaurants. The beach is used extensively by both locals and tourists although the latter tend to be concentrated during the summer months. The beach along the main southern seafront at Eastoke is a repeated winner of a Rural Seaside Award flag. These awards are presented to well-managed rural beaches with clean shorelines and excellent facilities excluding first aid facilities, public telephones, drinking water, disabled facilities and dog bans. In fact Eastoke beach provides all the above facilities apart from dog bans and first aid.

Not surprisingly, the Sandy Point LNR also constitutes a tourist attraction, particularly for bird watching, as the area supports a number of protected and unusual bird species. However, in the main, visitors are not encouraged onto the site in order to preserve the interest features.

In addition to land based activities, there are a wide range of water based recreational activities available. These include angling, boating, jet skiing, sailing and wind surfing. Chichester Harbour, which is adjacent to the study area, is home to a thriving sailing community as shown in Plate 5.4.

#### *5.4.1 Rights of way and public open spaces*

There are no public rights of way across the study area. However, the ‘Sandy Point Road to Foreshore footpath’ runs from Sandy Point Road along a private residential road to the north east of the study area. The Hayling Promenade Cycleway runs in an east-west direction along the study area frontage (Plate 5.5).



**Plate 5.4 Recreation adjacent to Eastoke Point**



**Plate 5.5 Hayling Promenade Cycleway**

East of the end of the promenade, public access around Eastoke Point is essentially restricted to pedestrians along the crest of the barrier beach. This route is popular with holidaymakers, anglers and bird-watchers as well as local residents. It leads eventually to the lifeboat station and the access road along Black Point Spit to Hayling Island Sailing Club.

This access along this road to the Sailing Club is particularly important; the implications of its loss to the commercial as well as the amenity values of this part of Hayling Island would be very substantial.

The entrance channel to Chichester Harbour is also an important consideration in any proposal for coastal management and defence schemes at Eastoke Point. As can be gauged by Plate 5.4, this channel runs close inshore and is well used by a large number of both commercial and recreational craft using the Harbour, as well as the lifeboat. Any scheme that had an adverse effect on safe navigation through this channel would be regarded as unacceptable. This in turn means that substantial changes in the beach widths could cause problems. If they advanced too far, they could, as in the past, lead to siltation and alter the channel alignment to the east. However, if the beaches were allowed to retreat, this could also cause problems by allowing the channel to migrate west, increasing the danger of the groynes becoming a hazard to safe navigation.

## 5.5 FISHERIES

The information presented in this section has been collated from various sources. The Solent is a mixed sea fishery that is of both commercial and non commercial importance. The main

commercial fisheries are for pelagic and demersal species and shellfish cultivation. A number of inshore areas are designated as protected nursery grounds for bass.

### 5.5.1 Shellfish cultivation

The harbours of the Solent are one of the few areas in the UK that supports thriving oyster (*Ostrea edulis*) fisheries. In fact, this shellfishery represents Europe's largest self-sustaining stock and as such, its conservation is of international importance. Chichester Harbour supports public and private oyster fisheries, cultivating both native and Pacific oysters. The oyster fishery is managed through bye-laws and the majority of the Solent is designated as a regulated fishery with access restricted to licence holders. The whole of Chichester Harbour is a classified shellfish production area for the native oyster under the Food Safety (Fishery Products and live Shellfish) (Hygiene) Regulations 1988.

There are up to 6 full time and 18 part time boats based in Chichester Harbour that are licensed to dredge for oysters within the harbour and the Solent between November and April. The oyster industry within Chichester Harbour is relatively small, as is net trawling activity as there are only around 12 small trawlers currently in operation. These numbers increase during the winter months when boats from Selsey join in the oyster dredging. All oyster fisheries are closed from April to October. The shellfish harvesting area in Chichester Harbour is classified Grade B due to water quality problems resulting from effluent discharges.

The welfare of fish stocks such as lobster and oyster presents a major concern for the future survival of the industry in the region. Crab and lobster provide half the value of all landings, with other shellfish and finfish providing 25% each.

### 5.5.2 Commercial pelagic and demersal fishing

At present, there are fixed fishing pots offshore from Eastoke, and there are fixed nets on the beach itself at certain times of the year. Nets are set for a wide variety of fish species within the study area. These include spider crab, whelk, cuttlefish, mullet and bass.

As stated previously, Chichester Harbour has been designated a sea bass nursery area and boat based fishing for bass is prohibited between 1<sup>st</sup> May and 31<sup>st</sup> October. Bass fishing is extremely popular across the region and constitutes a major source of income for some part time fishermen. Bass are generally captured in gill and trammel nets, on hand and long lines or trawls.

Sole, Plaice, Turbot, Brill and several species of Ray are also fished within the region. Gill nets are used for Cod and Whiting during the winter months when the fish appear closer inshore. However, the region is not renowned for its cod industry. Gill nets and long lines are sometimes set around wreck sites to catch Ling, Pollack, Dogfish and Tope. Otter and beam trawls are used to catch flatfish during the spring and summer. Red Mullet and Black Bream are also caught during the warmer months using otter and pair trawls.

In addition to commercial fisheries, around 10,000 amateur anglers fish from the shoreline or from boats within Chichester Harbour.

### 5.5.3 Species abundance

A survey of fish species and abundance has been carried out by the University of Portsmouth in 1999 and 2004. This found that fewer fish species were recorded in 2004 compared to 1999. However, the majority of species that were not found during the later survey were those

that appeared only rarely in the 1999 report. Four additional species were recorded in the 2004 survey – the Lesser Weaver, two species of Dragonet and the Red Gurnard. A total of 40 species were recorded over the two surveys. The main difference between the two surveys was in two small pelagic fishes that were found to be abundant in 1999 but absent in 2004. Many other species appeared more abundant in the later survey and hence, the variability may be attributed to changes in fishing methods as well as natural population fluctuations.

## 5.6 LAND USE

The Eastoke Peninsula and surrounding area supports a diverse range of land usage. These uses can be categorised as follows:

### 5.6.1 *The Solent and Chichester Harbour*

The study area is bordered by the East Solent, which has a high environmental value that is reflected in extensive areas being designated for protection including coastal habitats and geological features such as those described in Sections 5.2 and 5.3 of this chapter.

Chichester Harbour is widely used for recreational (mainly boating) activities. The Harbour holds 3200 moorings, 2000 berths in 6 marinas and there are 14 sailing clubs.

### 5.6.2 *Public open spaces*

The mixed sand and shingle beach is widely used by both residents and tourists for recreational purposes, particularly during the summer months.

An area of land on the northern edge of Southwood Road has been allocated as a potential site for the ‘retention of open space in an urban area.

The beach at Eastoke is also used for access to the sea by the RNLI lifeboat.

### 5.6.3 *Urban*

Eastoke Peninsula is a densely populated urban area that comprises 1538 residential properties, 990 caravans and 86 commercial premises (HBC, 2004).

## 5.7 TRAFFIC AND TRANSPORT

### 5.7.1 *Road and rail transport*

Junction 5 of the A3 (M) joins the A27 at Langstone. This becomes the M27 at Portsmouth. The A3023 links South Hayling with the A27, which it joins at Brockhampton. Southwood Road runs along the length of the study frontage with various minor roads such as Creek Road, Bosmere Road and Eastoke Avenue leading to residential areas. The main existing source of traffic in the area is residential and recreational.

Beach nourishment works have been undertaken previously in the area and there are a number of recognized access points to the beach, which are large enough to accommodate heavy plant. The council owns a plot of land on Southwood Road, which has historically been used as a compound and beach access point for coastal construction works along the Eastoke frontage. There is currently a haul route along the top of the shingle ridge, which is used to transport shingle from east to west during the annual recycling operation. It is therefore unlikely that any proposed scheme will require the creation of access points to the beach. The closest

railway is around 8km north of the Eastoke Peninsula and will be unaffected by any coastal defence works.

### 5.7.2 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. 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 should be considered during the development of any scheme.

It has been proposed that shingle derived from the navigational dredging of the Chichester Harbour Approach Channel could be a suitable source of beach recharge material. This is supported by Chichester Harbour Conservancy as being mutually beneficial to both the Harbour and the adjacent beaches.

## 5.8 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.

Vehicles and plant on the beach are allowed between 0700 and 1900 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, 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 accommodate 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. However, the increased noise levels would be 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 data it was decided to use a pipeline to deliver such materials, this would reduce noise levels during such operations.

## 5.9 AIR QUALITY AND CLIMATE

### 5.9.1 Air quality

Background pollutant emissions for the study area have been estimated by the National Environmental Technology Centre for 2005 and are presented in Table 5.2.

**Table 5.2 Pollutant Emissions**

<b>Pollutant</b>	<b>Concentration</b>	<b>UK Standard</b>
Nitrogen Dioxide	15.9 ppb	21 ppb
PM10	18.2 ug/m3	40 ug/m3
Sulphur Dioxide	2.93 ppb	8 ppb
Benzene	0.21 ppb	5 ppb
Carbon Monoxide	0.24 ppm	N/A

It is evident that the estimated pollutant concentrations at the site fall below the recommended UK levels and that air quality is unlikely to be a significant issue at the site. It is also unlikely that any scheme recommended during the current study will have any impact on air quality.

### 5.9.2 *Climate change*

The climate in Hampshire is characterised by relatively low rainfall and a constant monthly mean. Average annual rainfall in the south east is around 750 mm.

There is increasing concern about climate change and global warming. In particular, sea level rise relative to the land is expected to increase dramatically in the 21<sup>st</sup> century. This will have implications for natural coastal processes and consequently coastal protection along the study frontage.

Wave modelling of the east Solent suggests that changes in offshore wave heights due to increased storminess and sea level rise will cause a linear change in onshore wave heights. Changes in the nearshore wave climate will also have significant impact on sediment transport and coastal protection.

The majority of climate change scenarios also indicate a reduction in the prevalence of southerly winds and an increase in northerly winds. At Eastoke, this could potentially reduce the alongshore sediment transport.

## 5.10 WATER

### 5.10.1 *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.

### 5.10.2 *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.

### 5.10.3 *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.

Water quality monitoring is carried out by the Environment Agency who report to Defra in order to assess compliance with the Directive. Havant Borough Council also undertakes a regular programme of water quality monitoring. The bathing season runs from 15<sup>th</sup> May to 30<sup>th</sup> September and sampling commences two weeks prior to the start of the season. Twenty samples are taken at regular intervals throughout the season at predetermined points off the beach where the daily average density of bathers is highest. These samples are analysed for total and faecal coliform bacteria and the mandatory standards used to assess compliance are described below.

In order to comply with the Directive, 95% of all samples must meet the following:

- A limit of 10,000 total coliforms per 100ml seawater; and
- No more than 2,000 faecal coliforms per 100ml seawater.

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.

### **Blue Flag Beaches**

The Blue Flag is awarded to more than 2800 beaches and marinas in 23 countries across Europe and South Africa. The initiative is owned and run by the non-profit organisation, Foundation for Environmental Education (FEE) and is a symbol of high environmental standards as well as good sanitary and safety facilities at beaches and marinas.

The Blue Flag is awarded annually and is only valid for one year. To be eligible for the award, a bathing beach has to fulfil all requirements of the EC Bathing Waters Directive. West Beachlands Central beach, which is located to the west of the study area, currently holds this award and also a Seaside Award. Additionally, the beach just to the west of the promenade at Eastoke holds a Rural Seaside Beach Award.

#### **5.10.4 Urban wastewater treatment**

The Environment Agency's Urban Waste Water Treatment Directive database contains details of designated sensitive areas throughout England and Wales, in order to protect the environment from the adverse effects of wastewater discharges. It also holds summary data concerning the treatment requirements at qualifying discharges upstream of these designations which make a contribution to the undesirable disturbance caused by nutrient enrichment.

The study area is classified as a sensitive area for urban wastewater treatment under the Urban Wastewater Treatment Directive.

#### **5.10.5 Flooding**

The study area and adjacent hinterland is considered to be under significant threat of inundation from the sea. The current defences along the study frontage fall below the required standard of protection. The main objective of the current study is to propose a scheme to improve these defences to improve and maintain flood defences to a higher standard, i.e. sufficient to protect the low-lying residential area of Eastoke against a storm event with a 1:200 year return period.

#### **5.10.6 Water levels**

The highest water level in recent times was recorded in December 1989 when a 1.2m surge and a peak water level at Chichester Harbour of 3.17m ODN were recorded.

## 5.11 LANDSCAPE AND VISUAL AMENITY

### 5.11.1 *Local landscape character*

The Havant Borough Landscape Assessment was completed in 1996 and identified eleven different landscape types within the borough. The study frontage lies within the South Hayling Landscape Area. This is characterised as a dune heath landscape that contrasts markedly with the agricultural landscape in the northern part of the Island.

The Eastoke frontage consists of an eroding mixed sand and shingle beach that is controlled by a series of rock and timber groynes in varying states of repair and a partially buried rock revetment. A vertical concrete splash wall runs along the length of the promenade, protecting adjacent properties from flooding. The western end of the study area is bordered by residential properties of varying styles and sizes and traditional seaside amenities such as wooden bench seats, litter bins and beach huts.

The eastern end of the study frontage is backed by the Sandy Point Nature Reserve. This was formerly part of Eastoke common and constitutes one of the last remaining areas of undeveloped land on the eastern part of the island. The nature reserve comprises areas of heathland, sand dunes and grassland. It is separated from the beach by a timber framed wire fence.

To the east of the study area is Chichester Harbour, part of which has been designated an Area of Outstanding Natural Beauty (AONB). The main characteristics of the landscape are described below.

- A unique blend of land and sea – especially the combination of large open water areas, narrow inlets and creeks;
- Frequently wooded shoreline;
- The flatness of the landscape accentuates the significance of the sea/land intersection and highlights distant landmarks across both land and water. This is an unusual feature of AONBs;
- The open water in the central area of the harbour is a microcosm of the open sea beyond the harbour mouth, reflecting the clouds and sky, the wind and rain;
- A sense of wilderness within the seascape;
- Particularly strong historic character and associations;
- Picturesque harbour-side settlements;
- A rich flora and fauna, notably flocks of wading birds, adds to the diversity of the landscape;
- Unspoilt character and unobtrusive beauty; and
- A harbour offering a very special sense of peace and tranquillity.

### 5.11.2 *Visual impact assessment*

In order to identify the potential impacts of any proposed works on the visual amenity of the area, the extent and nature of the views from a variety of representative viewpoints has been assessed, taking into account screening from existing vegetation, fencing and buildings. The principal visual impacts of the proposed works fall into two categories: impacts on the character of the landscape within the study area and, the visual impacts of the works on people living, working or travelling through the area. The viewpoints are assessed in the following order of sensitivity.

- **High sensitivity:** Private dwellings and gardens where viewers are likely to view the study area frequently;
- **Medium – high sensitivity:** Public rights of way, country parks and other informal recreational facilities where viewers gain a prolonged view due to a slower passage through the area and where the quality of the view forms part of the amenity;
- **Medium – low sensitivity:** commercial premises, public facilities and schools where the viewer may be familiar with the scene but holds it in lower regard than viewers from residential properties and the surroundings are secondary to the purpose to the visit; and
- **Low sensitivity:** Surrounding road and rail networks where the viewer gains brief glimpses of the view whilst in motion.

The magnitude of the visual impact of any proposed works will be assessed during the option evaluation according to established appraisal guidance. The visual impacts of any new coastal defences will be most apparent to those living behind the eastern end of the promenade just to the west of Eastoke Point, and to those walking along the beaches around Eastoke Point or travelling in boats into and out from Chichester Harbour. Because of this, the visual impacts of any defence scheme can be regarded as of medium-high or high sensitivity.

## 5.12 SUMMARY

This report task has identified the main environmental and anthropogenic features of the Eastoke Peninsula and surrounding area. The locality of the study area is shown to be very rich both in terms of habitats and biodiversity and it is essential that the environmental quality is not compromised by any future works. Furthermore, in areas where degradation has already taken place, every effort will be made to enhance both the environmental aspects and the amenity value of the Eastoke frontage through the coastal management options.

The overall coastal defence policy, as set out in the regional Shoreline Management Plan (HR Wallingford, 1997) is to Hold the Line around Eastoke Point. The subsequent strategy study (Atkins, 2006) for the Eastoke peninsula reinforces this policy, and anticipates that such defences will provide a high standard of protection, particularly against flooding, to prevent inundation of the low-lying and densely developed hinterland. As a consequence, all the coastal defence scheme options considered in this report will be designed to provide this level of protection, thus greatly reducing the risks of flooding of the Sandy Point Nature Reserve.

Similarly, any scheme adopted will be designed and implemented in a manner that does not adversely affect the water quality of the surrounding area, for example in the sense of avoiding pollution. However, the implementation of the Water Framework Directive in the UK also requires consideration of the hydro-geomorphology of the area around Eastoke Point, and in this context, substantial changes in currents and bed levels as a result of any scheme might be regarded as unwelcome from this viewpoint.

However, there are other aspects of the environment, both natural and human, that need to be taken into account, and later in this project, it is necessary to compare the effects on these of the various coastal defence options that are developed. To assist in this, the following main objectives have been selected, based on the above review of the environmental character of the Eastoke peninsula and surrounding areas.

- Preserving and if possible enhancing the annual vegetation of drift lines;
- Preserving and if possible enhancing areas of vegetated shingle;
- Avoiding coastal squeeze i.e. loss of inter-tidal habitat caused by rising sea levels;
- Avoiding damage to inter-tidal areas and their plants and animals, particularly within Chichester Harbour;

- Avoiding any worsening of navigational access into and out from Chichester Harbour;
- Preserving access along the whole Eastoke Point frontage at least for pedestrians;
- Preserving or enhancing the amenity / tourism value of the Eastoke Point shoreline;
- Preserving access to Black Point and Hayling Island Sailing Club, north of Eastoke Point; and
- Avoiding any unnecessary detrimental effects on the landscape value of the frontage.

As will become apparent later, the preservation / enhancement of the existing shingle beaches around Eastoke Point as foreseen in the Coastal Defence Strategy (Atkins, 2006) is an important step towards achieving all of the above environmental objectives, as well as being helpful in improving the present-day coastal defences to provide a satisfactory standard of protection.

## 6. *Assessment of Erosion Losses: Do Nothing Scenario*

### 6.1 INTRODUCTION

This chapter describes the prediction of future changes in the coastline at Eastoke Point if all current shoreline management activities were discontinued. The so called Do Nothing scenario is the first policy option to be considered in the strategic assessment of other coastal defence options for this frontage, and provides a baseline against which the benefits of maintaining or installing defences can be properly evaluated.

By predicting the future shoreline position, the potential loss of land, properties and infrastructure can be evaluated. Given this understanding, the economic consequences of the Do Nothing scenario can be determined. Predictions of shoreline position have been made at incremental time intervals from year zero to 100 years in order to complete the economic evaluation procedures as specified in the Defra guidelines.

#### 6.1.1 *Description of the Do Nothing scenario*

Under the so called Do Nothing option, no further coastal defence works would be undertaken at Eastoke Point and therefore no expenditure on them would be incurred. Not only would maintenance of the existing defence structures (i.e. groynes and seawalls) cease, but so too would the regular recycling of beach sediments that are carried into this frontage from the west.

In considering the impacts of this option, the main issues are the likely effects on the adjacent stretches of coastline, on the low-lying hinterland (particularly the housing development at the eastern end of the Eastoke peninsula), and on the study area itself (including the Sandy Point Local Nature Reserve).

### 6.2 METHOD OF CALCULATING ECONOMIC LOSSES

The methodology and calculations presented in this report are based on the Defra guidance published in 'FCDPAG3 – Flood and Coastal Defence Project Appraisal Guidance – Economic Appraisal' (MAFF, 1999) as subsequently re-interpreted (Defra, 2003 and 2006).

#### **Selected Base Date**

The study uses a base date of July 2006.