

## 17 INFRASTRUCTURE, LAND DRAINAGE AND COASTAL PROTECTION

### 17.1 EXISTING ENVIRONMENT

17.1.1 This section describes the main infrastructure, coast protection and flood defence features of the study area. In this context, 'infrastructure' relates to electricity supply, telephone cables, gas pipelines, sewerage pipes, etc. Land drainage structures are also considered in this section. Navigational infrastructure, such as the chains of the chain ferry, is considered in Section 11.

#### *Land drainage*

17.1.2 The main freshwater inputs to Poole Harbour are from the catchments of the River Frome, River Piddle, the Corfe River and the Sherford River. There are sewage inputs to Poole Harbour from Lytchett Minster, Poole and Wareham sewage treatment works. In addition, water enters the Harbour and Poole Bay from numerous other point sources, such as storm water discharges. The potential for the proposed scheme to affect water quality is addressed in Section 5.

#### *Coastal defences*

17.1.3 Coastal defences within Poole Harbour and Poole Bay constitute natural habitats (such as beaches, mudflats and saltmarsh), as well as by man-made structures (such as seawalls and groynes). The standard of coastal and flood defence varies within the study area and has been examined as part of the Shoreline Management Plan and subsequent Coastal Strategy (Halcrow, 2003).

17.1.4 Within Poole Harbour, there are extensive coastal defences along the Whitley Lake shoreline and around northern parts of the Harbour (Photograph 17.1). There are also seawalls/engineered shoreline around parts of Brownsea Island, notably around the eastern shore of the Island in the vicinity of Brownsea Castle and the lagoon (see Photographs 17.2 and 17.3)



**Photograph 17.1** Seawall adjacent to Shore Road in the Whitley Lake area



**Photograph 17.2** Coast protection on the eastern shore of Brownsea Island



**Photograph 17.3 Engineered shoreline around Brownsea Castle**

- 17.1.5 Within Poole Bay, between Sandbanks and the Point House Café to the east, the shoreline comprises a sandy beach and some shingle towards the eastern end with seawalls behind. Between Poole Head and the Point House Café the seawalls protect the toe of the cliffs from erosion due to wave action. From Sandbanks to Poole Head, the area behind the seawalls is low lying with some dunes. The beach in this area is controlled by a number of different structures, principally rock groynes (at Sandbanks), timber groynes and concrete groynes (west of Boscombe Pier).
- 17.1.6 Between the Point House Café and Warren Hill the shoreline comprises a sand and shingle beach backed by an open grassed amenity area, with car parks and low dunes along the seaward edge. At the east end of the management unit there are earth bunds which form Double Dykes, part of the Hengistbury Head Scheduled Monument. The beach along this frontage is controlled by seven groynes, two of which are of timber and gabion basket construction, two are simple timber construction and the other three are rock.
- 17.1.7 Between Warren Hill and the Hengistbury Long Groyne the shoreline comprises a mixed beach of sand and shingle, with cliffs of sands and muds behind. Hengistbury Head Long Groyne, which is constructed in concrete with rock reinforcement, is located at the eastern end of the frontage.

*Infrastructure*

- 17.1.8 The proposed channel deepening would take place within the existing dredged channel. There is no infrastructure in the vicinity of the proposed dredged area. The nearest

underwater electricity cables are in the Little Ship Channel immediately to the south of Poole Bridge across Brownsea Roads between North Haven Point and Brownsea Castle on Brownsea Island; this lies approximately 450m to the south of the proposed dredge area in the Middle Ship Channel. A water main also runs from the mainland to Brownsea Island, although this is drilled 11m below the Harbour bed.

- 17.1.9 A fuel barge is moored off the north-east corner of Brownsea Island. Away from the channels, a variety of infrastructure is present on the shoreline of Poole Harbour, including groynes, jetties, landing stages and pontoons. Within Poole Harbour, numerous pontoons and landing stages are present along the northern shore between Sandbanks and Rockley Point. The southern half of the Harbour is, in comparison, largely devoid of man-made infrastructure. There are, however, some slipways and jetties, for example at Furzey Island.
- 17.1.10 In Poole Bay, man-made infrastructure includes Bournemouth Pier, Boscombe Pier, the training bank and the numerous groynes on the foreshore. In Swanage Bay, groynes, slipways and a pier are also present.

## 17.2 POTENTIAL IMPACTS ASSOCIATED WITH THE APPROACH CHANNEL DEEPENING

### Construction phase

*Potential for damage to infrastructure during the proposed capital dredging*

- 17.2.1 There are no items of infrastructure that have the potential to be damaged during the course of the capital dredging, given that the electricity cable that runs to Brownsea Island is located approximately 450m away from the proposed dredge area and the water main is beneath the seabed, well beyond the proposed dredge depth. As a result, **no impact** would arise.

#### *Mitigation and residual impact*

The dredging contractor should be informed of the location of the water main and electricity cables. **No residual impact** on these features is predicted.

### Operational phase

*Potential effects on infrastructure during maintenance dredging*

- 17.2.2 Given that maintenance dredging would only take place within the dredged channels, there is no potential for electricity cables or the water main to be affected by the works and, therefore, **no impact** is predicted.

#### *Mitigation and residual impact*

No mitigation measures are required. There would be **no residual impact**.

*Potential effects on infrastructure through a change in the hydrodynamic and sedimentary regime*

- 17.2.3 The proposed channel deepening could potentially indirectly affect adjacent infrastructure through causing changes to the hydrodynamic and sedimentary regime, for example by causing the siltation of an outfall.
- 17.2.4 The changes in deposition predicted to occur during the operational phase of the deepening are shown in Figures 3.27 and 3.28. It can be seen that the deepening is predicted to cause slight changes in the pattern of accretion within the Harbour. However, on the whole, these changes are predicted to be of a very small magnitude and would not have a significant effect on infrastructure, especially given that background levels of erosion and accretion are significantly greater than those predicted to occur as a result of the proposed scheme. Furthermore, it is predicted that the proposed channel deepening would not affect the level of high water in the Harbour. As a result, the proposed scheme would not give rise to Harbour-wide effects on coastal protection structures or flood defences, and it is predicted that the risk of overtopping of seawalls would be unchanged from the present situation. In addition, the overall standard of coast protection within Poole Harbour and Poole Bay would not be adversely affected by the proposed channel deepening. The predicted slight reduction in current speeds in the East Looe Channel would result in this area becoming a less erosional environment and would reduce the problem of scour along the frontage to the east of the Haven Hotel. Specific localised effects around Brownsea Island are discussed below.
- 17.2.5 Overall, this potential impact is assessed as being of **negligible significance**.

*Mitigation and residual impact*

No mitigation measures are required and there would be a residual impact of **negligible significance**.

*Potential impacts on coastal protection structures around Brownsea Island due to changes in wave climate and current speeds*

- 17.2.6 The effect of the proposed channel deepening on wave climate would be to slightly increase wave heights along the shoreline of Brownsea Island closest to the Harbour entrance by the order of 1 to 2cm. However, waves from offshore are not the only source of wave energy in this area as waves would also be locally generated by wind blowing over the sea surface. Extreme wind-waves attain heights of the order of 0.6m for a 1/1year return period, but smaller waves will be much more frequently occurring in the Brownsea Island area. Such short period waves (of the order of 2 to 3s) are unaffected by the proposed deepening and hence the contribution to the total energy from locally generated waves will be unchanged.
- 17.2.7 Accordingly, whilst the shorter period swell wave activity is predicted to slightly increase, the increase in total wave energy at the site is predicted to be small. No change in wave conditions at Brownsea Island are shown for the longer period swell waves simulated.

- 17.2.8 The difference in the wave climate for shorter period waves prior to and following the channel deepening is shown in Figure 3.26. In addition, this area would experience a small increase in current speeds (less than 5cm/s) which are unlikely to be noticeable but would add to the existing trend of erosion in this area.
- 17.2.9 Overall, it is concluded that the predicted changes to the existing wave climate are of low magnitude and no widespread effects are expected. However, in areas where slight increases in wave energy are predicted (i.e. on the south-eastern shore of Brownsea Island between about Castle Pier and Harry Point located about 500m to the south-west of the Castle), it can be expected that the channel deepening would contribute towards conditions that could encourage erosion, although the changes predicted may only slightly add to an existing trend.
- 17.2.10 Around the south-eastern shore of Brownsea Island generally, the prevailing conditions are such that the shoreline of Brownsea Island would experience erosion if it were not protected by coast protection structures. This is demonstrated by the fact the shoreline from Castle Pier to the south-west is protected by a low gabion wall with a beach in front and this stretch of the foreshore appears to be stable. In contrast, beyond the protected stretch of the shoreline (in the area around Harry's Point) the shoreline can be seen to be eroding. The area that currently experiences the greatest problems of erosion is between Castle Pier and East Pier located about 100m to the north.
- 17.2.11 Given the above, the proposed scheme has the potential to exacerbate the existing long term coastal protection problems in this area, although the additional effect of the scheme is judged to be minor in the context of the existing situation. The scheme would be expected to marginally increase the risk of overtopping, but the changes predicted would not affect the integrity of the existing coastal defences and would have an insignificant effect on the standard of coast protection. Overall, an impact of **minor adverse significance** is predicted in the south-eastern part of Brownsea Island, to the south of Brownsea Castle.
- 17.2.12 No adverse impacts are predicted to the north of the pier adjacent to Brownsea Castle given that the tidal currents are predicted to decrease (i.e. in the area that currently experiences the greatest problem of erosion), with the result that this area would become less erosive and possibly accrete. In this area, the scheme is therefore predicted to cause an impact of **minor beneficial significance** for coast protection structures.

*Mitigation and residual impact*

It is not possible to alter the broad-scale changes in waves and currents resulting from the proposed scheme. Any works to mitigate the effects of these changes on the evolution of the shoreline of Brownsea Island, for example, the placement of dredged material on the eroding foreshore would need careful consideration. Such mitigation may not be effective as placed dredged material might not be retained on the foreshore given the prevailing conditions, and could conceivably cause extra impacts elsewhere. Such mitigation works have thus not been proposed as part of this scheme. In addition, there are already engineered works in place at the potentially affected area. Therefore, the residual impact would be of **minor adverse significance** in the south-eastern areas of Brownsea Island to the south of Brownsea Castle given that the proposed scheme would make a small additional contribution to an existing problem.

*Mitigation and residual impact (continued)*

In the future, the problem of erosion at this location should be addressed through an integrated strategy that encompasses the nature conservation, heritage and coastal protection interests that exist at this location.

To the north of the pier adjacent to Brownsea Castle, a residual impact of **minor beneficial significance** is predicted.

### 17.3 POTENTIAL IMPACTS ASSOCIATED WITH THE OFFSHORE DISPOSAL OF DREDGED MATERIAL

#### 17.3.1 Construction phase

*Potential effects of disposal on infrastructure*

- 17.3.2 The numerical modelling of the disposal of dredged material and its subsequent dispersion and deposition has shown that no effects are predicted along the coastline. Given that there is no infrastructure within the offshore disposal ground, **no impact** is predicted.

*Mitigation and residual impact*

No mitigation measures are required. There would be **no residual impact**.

#### 17.3.3 Operational phase

*Effects of maintenance dredgings disposal on infrastructure*

- 17.3.4 The existing disposal of maintenance dredgings does not have an adverse impact on infrastructure. Given that following the approach channel deepening the volume of material to be deposited offshore would decrease compared with the existing situation, **no impact** is predicted.

*Mitigation and residual impact*

No mitigation measures are required. There would be **no residual impact**.

## 17.4 POTENTIAL IMPACTS ASSOCIATED WITH BEACH NOURISHMENT

### Construction phase

*Potential effects of beach nourishment on coastal infrastructure*

- 17.4.1 The detailed design phase of each beach nourishment scheme would take account of the presence of infrastructure along the shoreline in order to ensure that the functioning of any outfalls would not be adversely affected. However, in the case of the frontages to be nourished, there are no items of infrastructure that are likely to be adversely affected by nourishment works. As a result, there would be **no impact** on coastal infrastructure.

*Mitigation and residual impact*

No further mitigation measures are considered to be required. **No residual impact** is predicted.

### Operational phase

*Increased standard of coastal defence*

- 17.4.2 The proposed beach nourishment schemes would enhance the standard of coastal defence at the beach nourishment sites within Poole Bay. During the operational phase, the standard of coastal defence would be 1:100 years at Poole (in conjunction with control structures) and Bournemouth and 1:300 years at Swanage. Such measures are identified as necessary in the Shoreline Management Plan and, therefore, this impact is considered to be of **major beneficial significance**.

*Mitigation and residual impact*

No mitigation measures are required. The residual impact would be of **major beneficial significance**.

*Potential effects of beach renourishment on coastal infrastructure*

- 17.4.3 During the operational phase, it is recognised that there is the potential for using appropriate material that arises from the maintenance dredging of the approach channel in a beneficial manner for beach renourishment within Poole Bay. The potential environmental impacts of such renourishment would be dependant on the location where

it is considered that nourishment is required, the volume of material that is to be placed on the beach and the nature of the material.

- 17.4.4 Given that there is no scheme for renourishment at present, this is outside the scope of this EIA which focuses on the potential impacts of the initial nourishment scheme. The potential environmental impacts associated with any renourishment scheme that may be required would need to be taken into account during the application for the Food and Environment Protection Act and Coast Protection Act consents that would be required.

