

**Appendix A3**

ES Non-Technical Summary for sea defences scheme (2005)

---



**The Beach, Carlyon Bay  
Proposed Beach  
Replenishment  
& Revision to Sea Defences**



**Environmental Impact  
Assessment**

**Non Technical Summary**

**January 2005**






**THE BEACH, CARLYON BAY  
PROPOSED BEACH REPLENISHMENT & REVISION TO SEA DEFENCES**

**ENVIRONMENTAL IMPACT ASSESSMENT**

**NON-TECHNICAL SUMMARY**

January 2005

**DOCUMENT CONTROL SHEET**

<b>AUTHOR:</b>	N Coppin		<b>DATE:</b> 04/01/05
<b>CHECKED BY:</b>	H Scholes		<b>DATE:</b> 04/01/05
<b>APPROVED BY:</b>	N Coppin		<b>DATE:</b> 04/01/05

**Contract Number: 44-0045**

**Report Number: REN/081**

**Prepared For: Ampersand Group Ltd**

*This report has been prepared by Wardell Armstrong International with all reasonable skill, care and diligence, within the terms of the Contract with the Client. The report is confidential to the Client and Wardell Armstrong International accept no responsibility of whatever nature to third parties to whom this report may be made known.*

*No part of this document may be reproduced without the prior written approval of  
Wardell Armstrong International Ltd.*

Wardell Armstrong International Limited  
Wheal Jane, Baldhu, Truro, Cornwall, TR3 6EH  
Tel: +44 1872 560738 Fax: +44 1872 561079  
Email: [enquiries@wardell-armstrong.com](mailto:enquiries@wardell-armstrong.com)  
Web site: <http://www.wardell-armstrong.com>

**THE BEACH, CARLYON BAY  
PROPOSED BEACH REPLENISHMENT & REVISION TO SEA DEFENCES**

**ENVIRONMENTAL IMPACT ASSESSMENT**

**NON-TECHNICAL SUMMARY**

**January 2005**

**Contact Details and Further Information**

Any technical questions or requests for clarification on any aspect of the EIA should be addressed to:

Mandy Wheeler  
Davis Langdon LLP  
MidCity Place  
71 High Holborn  
London WC1V 6QS

e-mail: [Mandy.Wheeler@davislangdon.com](mailto:Mandy.Wheeler@davislangdon.com)

All queries will be passed to the relevant technical expert and responded to as quickly as possible. Further information, copies of the full EIA and other supporting technical documentation is available at:

The Sales and Information Centre  
The Beach  
Carlyon Bay  
St Austell  
Cornwall PL25 3RG

Please note that any planning queries, representations, objections or support for the Planning Application should be addressed to:

Planning Control Section  
Restormel Borough Council  
39 Penwithick Road  
St Austell  
Cornwall PL25 5DR

## NON-TECHNICAL SUMMARY

The Environmental Impact Assessment (EIA) has been prepared by Wardell Armstrong International, independent consultants commissioned by Ampersand Group Ltd, for the proposed revisions to the Sea Defence works, which form part of the development at **The Beach, Carlyon Bay**. This is in support of a planning application to Restormel Borough Council for **Proposed Beach Replenishment and Revised Sea Defences**, described in the Planning Application as follows:

*Placement of Beach Replenishment material on Crinnis, Shorthorn and Polgaver Beaches; Revised Design of Seawall, as Approved under Extant Planning Permission 95/00966, dated 11 March 1996.*

The EIA is prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999.

The planning application for the beach replenishment and sea defences is to modify a previous proposal that has planning permission (the extant permission for the sea wall). This EIA therefore considers the impacts of the new revised proposals both against the existing conditions (ie. the total impacts of the revised proposals) and against the extant permission (ie. the net impacts associated with the modifications only).

In addition, because the sea defences form an integral part of a larger development at The Beach, also covered by the extant permission, the impacts are assessed within this context, ie. assuming that the rest of The Beach development is in place. The impacts are not considered for the sea defences alone, on an otherwise undeveloped beach site.

Similarly this EIA does not consider the impacts of the whole development of The Beach covered by the extant permission. For the purposes of the EIA this is assumed to be under construction concurrently with the sea defences works, and preliminary construction works are, in fact, already taking place.

The main EIA is presented in three main parts:

- A. The Project – description of the site and proposed development, including alternatives considered.
- B. Assessment of environmental impacts – scoping and detailed assessment under each relevant heading.
- C. Environmental management and sustainability – proposals for environmental management and monitoring of the development.

This Non-technical Summary of the EIA follows the same format. References to Figures are the same Figures as in the EIA.

## NON-TECHNICAL SUMMARY

### Part A. THE PROJECT

#### ***The site***

The Carlyon Bay site is located some 1.5km to the east of St Austell and is approximately 1.5km in length and 300m in width overall, covering some 20.5 Ha of land. It is bounded to the south by the sea and to the north by high cliffs with a golf course beyond the cliff line. The main Penzance-Paddington railway line is located a further 125m inland. The easterly and westerly extents are marked by small headlands that extend into the sea at both high and low tide. Par Docks are located 1km to the east of Polgaver Beach.

The Beach site comprises three main sections: Crinnis Beach, Shorthorn Beach and Polgaver Beach. Figure 1 shows the extent of the proposed sea defences, beach replenishment and the existing buildings.



*Figure 1 Aerial photo of Carlyon Bay with the proposed extent of the revised sea wall and beach recharge.*

The three beaches are a relatively recent phenomenon within Carlyon Bay. In its original state, the bay is understood to have been rocky with little or no beach material. Changes to this state began during the middle part of the 19<sup>th</sup> century. Prior to this the Sandy River discharged into St Austell Bay at Par, carrying a substantial sediment burden of eroded sand and waste materials arising from the china clay industry within the catchment. However, following construction of Par Harbour in 1829, an adit was engineered to divert the Sandy River away from Par, and to discharge into Carlyon Bay at what is now known as Shorthorn Beach. This caused the high water line to move some 200m seaward, creating the three beaches that occupy the present site. Records indicate that the maximum extent of deposition was reached in 1933, since when the deposition of new material via the Sandy River has diminished.

The site has a long history of use for leisure, entertainment and tourism, operating recently as Cornish Leisure World until its eventual decline in the 1990's, since when it has largely been commercially inactive. The development history of the site is summarised as follows:

- 1920's – Cornish Riviera Club established at Crinnis Beach;
- 1940's – site used as military storage facilities;
- 1952 – site re-opened for leisure use similar to pre-war;

## NON-TECHNICAL SUMMARY

- 1970's – site redeveloped, becoming the Cornwall Coliseum, used for entertainment and leisure centre;
- 1977 – ride-on railway extended through Shorthorn Bay and into Polgaver Bay, eventually dismantled in 1994;
- 1981 – planning permission granted for construction of 101 units, clubhouse and pool;
- 1988 – planning permission granted for erection of holiday village with self-catering and serviced hotel accommodation, with restaurant, supermarket, water park, office suite and staff residences;
- Music festivals were held on the site in 1987, 1988, 1989, 1993, 1997 and 1999, with main activities concentrated at Crinnis but camping and related activities extending over all of Shorthorn and Polgaver, causing extensive disturbance;
- 1990 – further planning permission for redevelopment, including a sea wall for flood protection, 511 holiday dwellings, refurbishment and extension of the central entertainment and leisure facilities;
- 1996 – planning permission granted to extend the 1990 permission.

The site is thus subject to an extant planning permission for development, based on the 1990 proposal.

At present only the Crinnis Beach (western section of the site) had any significant built development. This comprised a range of semi-derelict buildings, centred on the largest known as the Cornwall Coliseum. The footprint of existing buildings and parking areas extended to approximately 3.5ha.

The remaining two beaches, Shorthorn and Polgaver beaches, have a few small structures but have largely developed a semi-natural coastal vegetation with natural succession taking place. The main beach area, on which both the extant permission and revised sea defences and beach recharge are located, consists of mobile sand material with very limited vegetation. The sea defences intrude very little into the more stable and vegetated parts of the Carlyon Bay site.

Initial site works for The Beach development have recently been undertaken on both Crinnis and Shorthorn beaches, giving rise to changes in the ground conditions and soils. Much of the vegetation at Shorthorn has been removed though the area at the base of the cliff, and within the whole of Polgaver, has been retained and will be managed. All site clearance works have been supervised by professional ecologists to ensure that loss of habitat is minimised and protected species are conserved.

### ***Description of the proposed development***

The proposed holiday dwellings and related development are covered by the extant planning permission and are not the subject of this EIA. As part of the detailed design of the scheme an evaluation of the coastal flooding risk was undertaken (Flood Risk Assessment, Revision B, dated 2 February 2004, and Addendum, dated 30 June 2004). This concluded that the development of The Beach would be susceptible to coastal flooding during extreme storm conditions, as established by Environment Agency criteria.

Extensive modelling of the coastal conditions with various options has been undertaken by HR Wallingford, who are the UK's premier design and research organisation for coastal engineering and are world renowned. This includes computer simulations together with 2D and 3D physical modelling.

It is understood that at the time that the previous sea wall (the extant permission) was designed, guidance available from MAFF (now DEFRA) did not give indicative standards of flood protection that the design was required to provide. The present design has been developed to provide protection in accordance with the requirements of the latest DEFRA guidance and of PPG25 for protection for storm conditions up to the 1:200 year return period.

## NON-TECHNICAL SUMMARY

It is not clear what the design condition was for the extant permission design, however the more recent design studies suggest that it would have been significantly less than the 1:200 year condition that is now proposed.

The design standard of 1:200 year return period means the sea wall provides flood protection from a severe event that occurs on average once in 200 years, ie. that has a 1 in 200 (0.5%) chance of occurring each year. This does not mean 'failure' of the sea wall, just that there would be sufficient overtopping to result in minor damage to the property behind. Such an event could arise with a combination of wave conditions and extreme water levels (high tide and onshore winds). Because there are many possible combinations of waves and water levels that have this same return period, a range of these was considered during the design process, to identify the potential 'worst case' situation at this location.

It was considered that the most effective approach for the necessary defence and flood protection is one that maximises the use of the beach material as the primary form of protection. The existing beach will form a recognised component of this defence, and it is important that the beach is designed and maintained to ensure the structural integrity of the built defences. In addition, the preservation and enhancement of the beach itself will be a valuable recreational and amenity asset.

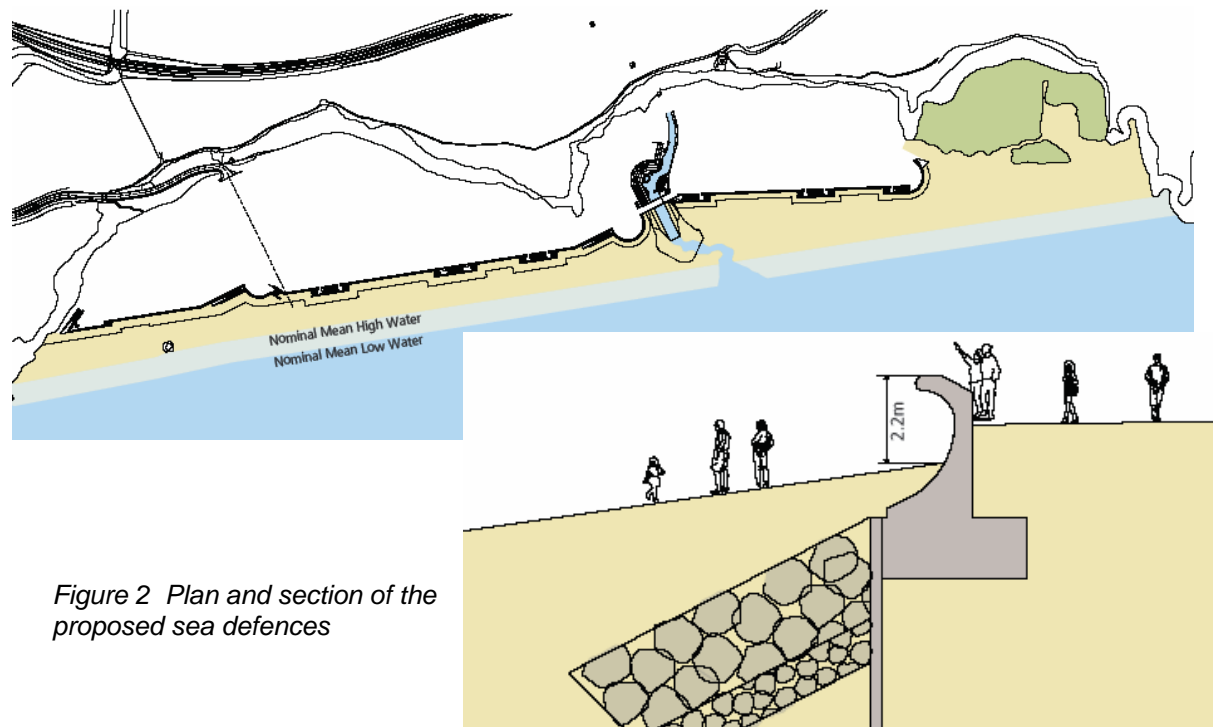


Figure 2 Plan and section of the proposed sea defences

Figure 2 shows the line of the revised sea wall together with a typical cross section of the beach and defences. The flood defence works are made up of three basic defences:

1. A **Primary** sea wall, which comprises 3 elements:
  - a) rock armour providing primary protection to the toe of the seawall;
  - b) a reinforced concrete recurved sea wall, at the rear of and above the rock armour, giving additional protection, with a promenade behind it;
  - c) additional sand placed on the beach as recharge/replenishment, to overlie the rock armour, extend the beach by 16m and to marginally raise the beach at the eastern end beyond the sea wall (ie. along Polgaver Beach).

Gaps at stairways allow free drainage of overtopping waters.

## NON-TECHNICAL SUMMARY

2. A **Secondary** wall, comprising a promenade and low wall 1.2m above the promenade, with gaps at walkways to allow drainage.
3. A **Tertiary** defence which for much of its length is part of the front wall of the buildings, with gate closures that will be managed.

The principal defence is the wave protection afforded by the new beach recharge, which forms an energy absorbing and dissipating structure. This ensures that the natural wave dynamics in the bay are not affected.

Management of the beach recharge activity forms part of the Beach Management Plan discussed in the EIA and detailed in full in the Flood Risk Assessment. Management includes for periodic recycling of beach material to maintain the beach profile over the rock armour and prevent sand from building up at either end of the Bay.

The sand material used for the beach will be matched to the existing beach material and will have a similar origin, viz. the china clay mining area. Graded and washed sand by-product from china clay production will be utilised, with a very low fines content (less than 1% smaller than 0.06mm particles) and no contaminating elements. The material used in the initial beach recharge and subsequent recharge (every 10 years or so) will be tested before delivery in order to confirm the absence of contaminating elements.

In order to confirm the behaviour of the sand material and dispersal of fines following placement, it is proposed to undertake a beach replenishment trial. A 40t sample of sand will be placed on the shoreline, and extensive measurements will be made in the surrounding seawater.

### **Environmental releases and effects**

The identified releases and effects of construction and development life of the sea defences, during normal conditions and activities are summarised below.

<b>Releases and effects of sea wall development - normal conditions and activity</b>		
<b>Component of development</b>	<b>Construction</b>	<b>Development life</b>
Sheet piling (temporary works)	Traffic – delivery of materials. Noise - driving of piles	Groundwater – flow interruption.
Rock armour (including filter rock)	Traffic – delivery of materials. Noise – placement of stone. Dust – construction & vehicle activity.	Collectively: Beach morphology and use – changes to beach dynamics. Visual – line of sea wall. Surface water – modifications to drainage.
Sea walls, including foundations	Traffic – delivery of reinforcement and concrete materials. Dust – construction activity. Noise – construction plant. Land take – of footprint.	
Fill behind sea wall	Traffic – delivery of fill material. Dust – vehicle activity. Noise – construction plant.	

## NON-TECHNICAL SUMMARY

Beach recharge / replenishment sand	Traffic – delivery of material. Noise – construction and vehicle activity. Land take – of footprint of recharge area. Sediment – increase in turbidity of coastal waters	Beach morphology & use – changes to beach dynamics. Sediment – increase in turbidity of coastal waters. Sand migration – movement of sand to surrounding areas. Traffic – delivery of additional replenishment material.
Sandy River discharge		Surface water – change to discharge and flooding risk.

The main sources of bulk materials are:

- a) Rock armour – Dean Quarry, Lizard and/or St Malo, France. These quarries are permitted existing operations and the supply of stone for the sea defences is well within the capacity of the quarry's average annual production. This has little impact on the overall resource of this material. The rock armour stone is now on site, having been delivered by sea onto the beach.
- b) Concrete materials – sand, aggregate and/or ready-mixed concrete will come from commercial sources including by-product from the nearby china clay industry.
- c) Beach recharge sand – the sand used is a by-product from the nearby china clay industry. This will be free of contamination.

It can be seen that most of the releases and effects identified above are associated with the construction phase, particularly the delivery and use of construction materials.

### **Scoping of potential environmental issues**

During the early stages of the EIA an Environmental Scoping exercise was undertaken, together with consultation with various agencies, including Restormel BC. As a result of this, the issues that are considered potentially most significant and require further and more detailed assessment in the EIA are:

- Potential changes to the beach morphology, which may impact on its amenity use and designated geological (RIGS) sites.
- Risk of coastal and fluvial flooding.
- Effects of sediment and sand on marine water quality and benthic ecology.
- Ecological aspects of the inter-tidal and beach area zones.
- Traffic impacts through adjacent residential areas.
- Noise and nuisance to local residents.

Other issues that are less significant, but which should still be considered further, are considered to be:

- Visual impact of the sea wall line itself, from the coast footpath, the beach and offshore in the bay.
- Air quality, notably dust from construction activities.

### **Alternatives and options considered**

During the design of the project a number of options were considered for the sea and flood defences. These are described in the EIA and the FRA, and are summarised as follows:

## NON-TECHNICAL SUMMARY

- four options for the sea defences, including the extant permission and the selected option subject of the planning application and EIA;
- zero option, without any additional sea defences;
- other options including offshore breakwater and rock groynes/structures.

It is concluded that the selected option gives the best combination of coastal flood defence to protect the onshore development, maintenance of the amenity of the beach and bathing waters, and environmental impact.

A number of options were also considered for transportation of the bulk construction materials to the site, utilising sea transportation wherever possible. Stone for the rock armour will be sourced from a coastal quarry, from which transportation by sea barge is feasible. This operation has in fact been completed.

For transportation of beach recharge material, sourced inland from the china clay mining area, 10 different options were examined in detail, illustrated in Figure 3. This included options for the delivery of the sand material by sea rather than road. Of the options available, road haulage via Par Moor Road, Cypress Avenue, Sea Road and the site access road is considered to be the most realistic. It also has a number of environmental advantages over other options, such as less haulage distance on public roads and avoiding disruption of land on the golf course or coastal routes. Transport of the sand by road to the sea loading facilities at Par and Fowey involves much longer haulage distance on public highways than going directly to the site.

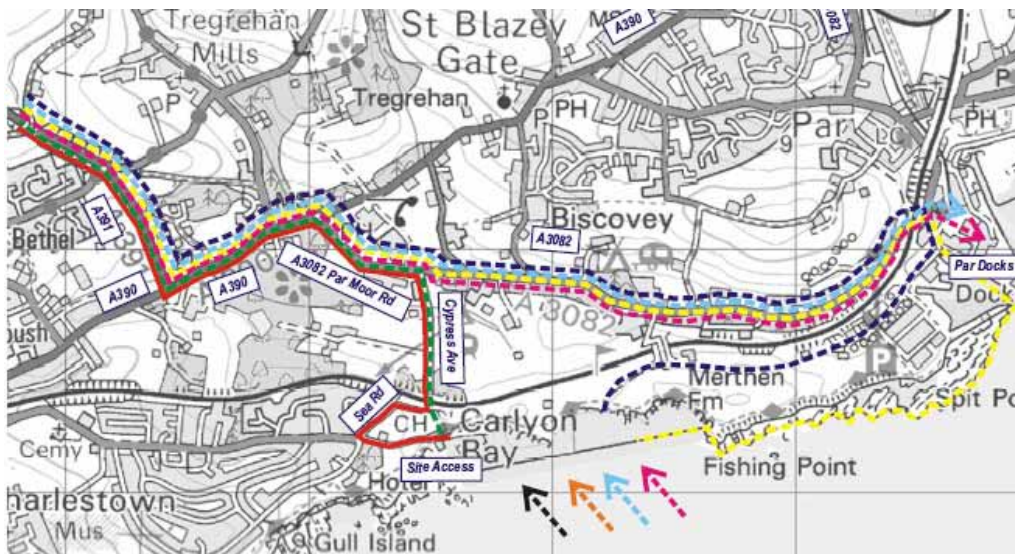


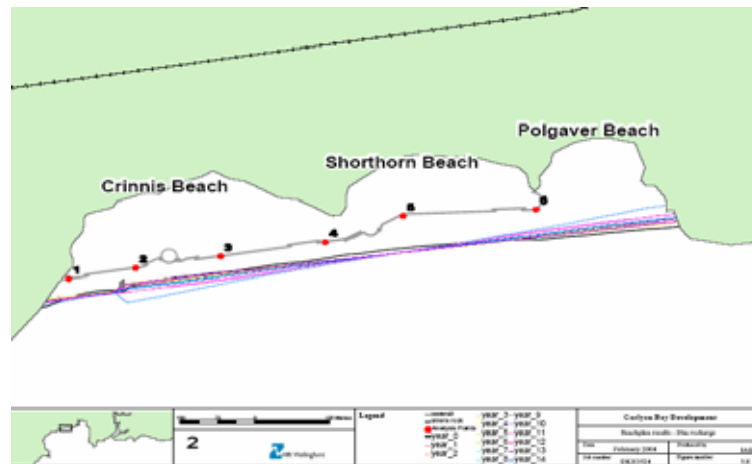
Figure 3 Options for transportation of beach recharge material

## NON-TECHNICAL SUMMARY

### Part B. ASSESSMENT OF ENVIRONMENTAL EFFECTS

#### ***Beach morphology and use***

The proposed sea defences involve a change to the current beach profile, and the addition beach recharge material. HR Wallingford has carried out extensive modelling (see Figure 4) to examine the potential changes and optimise the design of the sea wall, in order to mitigate potential adverse effects. This is described in detail in the FRA.



*Figure 4 Modelling of the beach behaviour at HR Wallingford: left - Computer model of the beach movement over 14 years; right - 3D physical model to test beach and sea wall behaviour*

The beach at Carlyon Bay has evolved over the past 150 years or so. Historical Ordnance Survey plans and aerial photographs shows how the mean high and low water lines have shifted over recent decades, illustrating that under the present (semi natural) regime the beach morphology is subject to continuous change, with periodic rotations in the beach orientation and marginal erosion losses. There is a natural tendency for the existing beach to migrate eastwards and accumulate at the Polgaver end, with periodic movement westwards again under certain weather conditions. Thus the beach is naturally a dynamic system, with regular changes. However, there is no net loss or migration of sand away from the beach.

Storm conditions reportedly lead to flooding and erosion of the beach area above the high water level, particularly on Crinnis and Shorthorn Beaches.

At present local residents and tourists make recreational use of the beach on an ad-hoc basis. Although it is understood that there are no specific public rights of way across the site to the intertidal zone, in recent times members of the public have enjoyed unauthorised and illegal access to all areas of the site.

## NON-TECHNICAL SUMMARY

### *Amenity of the beach*

Access restrictions on part of the beach for public amenity is inevitable during the construction phase, for health and safety reasons. Once completed, use of the beach by both residents and the public will be enhanced with the additional facilities. Reduction of the beach area on the landward side, due to the promenade, will be offset by the beach recharge that will extend the beach some 16m seaward.

### *Beach morphology and near-shore conditions*

The effect of introducing the sea wall and beach recharge associated with the proposed development is predicted to result in little change to the current situation regarding the beach morphology, other than to move the shoreline some 16m to seaward. This is not expected to significantly impact on the overall beach morphology.

There will be no significant change to the offshore seabed levels, as the beach material will be retained, as at present, within the near-shore environment in Carlyon Bay. Incident wave conditions should not be affected in St Austell Bay. With no significant changes to seabed levels and no alterations to the headlands (which have a large control on local tidal conditions) there should be no noticeable changes to tidal flows.

Great efforts have been made to identify sediments for the beach recharge that closely match those presently on the beach. Because of this the future changes in the beach morphology, and in the sediment transport processes that cause those morphological changes, will not be significantly different to those that presently occur naturally along this beach.

### *Migration of beach material*

Modelling indicates that there will not be any significant loss of material out of the Carlyon Bay system. Movement along the beach (longshore drift) will be cyclical and net drift rates within the bay are low, although there is a high degree of variability from year to year. Regular monitoring and intervention is planned to recycle beach material to ensure maintenance of the required standard of sea-defences.

Cyclical cross-shore movement (up and down the beach) is anticipated under storm conditions, but material drawn down the beach is likely to remain in the shallow water zone. Other more frequent wave conditions will act to return the material to the top of the beach. This is also confirmed by evidence of behaviour of the beach to date. The beach is essentially a pocket beach overlying bedrock and there is no evidence of sandbanks offshore created from material being lost from the beach.

There will not be any significant loss of material around the headlands and out of the bay (e.g. towards Par Harbour). Beach modelling has confirmed that the likelihood of any significant effect on the coastal sediment and hydrological processes in Carlyon Bay and the wider St Austell Bay can be effectively discounted. The proposed beach maintenance and recycling programme will remove any build-up of material from the east end of Carlyon Bay and return it to the west end to ensure the required standard of flood protection.

<b>Summary Environmental Impacts</b>					
<b>BEACH MORPHOLOGY AND USE</b>					
<b>Potential impact</b>	<b>Impact on</b>	<b>Magnitude</b>	<b>Extent (area)</b>	<b>Type</b>	<b>Reversibility</b>
Behaviour of the beach over time	Beach use and amenity	Small	Local	Development life Occasional (also exceptional)	Reversible with beach recycling intervention.

## NON-TECHNICAL SUMMARY

Migration of beach material out of the beach area	St Austell Bay, especially Par and Charlestown	Small	Local	Development life Occasional	Permanent
---	--	-------	-------	--------------------------------	-----------

### **Water environment**

There are interactions between the groundwater, fluvial and coastal processes that have been considered in the design of the sea defences and the EIA examines hydrological and hydrogeological issues relating to the proposed scheme. The effects of both the extant permission and the revised scheme are very similar, and there is very little difference in the environmental impacts, which are small and very localised in any case.

The sheet piling will interact with the groundwater flow beneath the beach but, because it does not extend to rock head or form a complete barrier to groundwater flow, the effects will be minimal. The impacts of the proposed sea defences on the surface hydrology, and on flooding of the Sandy River, are considered to be negligible.

Marine water quality may experience some short-term (only a few days) localised increase in turbidity, close to the beach, for a number of tidal cycles following construction and placement of the beach recharge. However, the incidence of this will decline rapidly over time. The implications of this localised increase in turbidity on marine and benthic ecology are considered in the section 'Ecology and Biodiversity'. The increase in turbidity will have no implications for health or safety of people (including children) in the bathing zone. Visually, this turbidity may have a short-term visibility for the first few tidal cycles.

For subsequent re-profiling of the beach, there should be no increase in turbidity. During the occasional (10-year) periods of importing further beach replenishment, the effects will be relatively small with very limited impact.

A significant fuel or oil spill on the beach during construction works would potentially have a significant short-term localised impact on marine water quality close to the shore in the bathing zone. This would necessitate closure of all or part of the beach for a few days, until the effects were dispersed. The small size of any likely spill of fuel means that the impacts, once dispersed into the bay, should be negligible. The construction contract, and the Contractor's environmental plan, will include measures for spill prevention, containment and cleanup, based on a site specific risk assessment. A Draft Construction Management Plan is appended to the EIA.

There will be no other effects on bathing water quality parameters off the beach as a result of the proposed development.

Summary Environmental Impacts					
WATER ENVIRONMENT					
Potential impact	Impact on	Magnitude	Extent (area)	Type	Reversibility
Changes in beach water quality, due to:					
➤ Surface drainage	Bathing waters	Nil	Local	Construction; development life Occasional	Temporary, reversible

## NON-TECHNICAL SUMMARY

➤ Sediment during recharge	Bathing waters	Small	Local	Construction Occasional /rare	Temporary, reversible
➤ Fuel or oil spillage	Bathing waters	Small	Local	Construction Accidental	Temporary, reversible
Reduction in Sandy River outflow	Upstream flooding	Nil	None	Development life Exceptional	Temporary, reversible
Interruption of groundwater flow beneath beach	None	Nil	Site	Development life Normal	Permanent

### **Geology and land use**

The sea defence works, along with the main development of The Beach, involves some land take and change in the present land surface and configuration. This has implications for the present use and quality of the land resource, both the surface and subsurface. The key impacts are therefore associated with the change in land use and possible reduction in the perceived 'quality', or other legitimate interest, of the land and geology.

The site as a whole is not, and never has been, in any sort of productive or agricultural use, and there are no known economic mineral resources beneath the site, so these aspects are not considered further. Much of the Carlyon Bay site is in fact considered as brownfield land, affected by the previous development. The area of the sea defences and beach recharge consists entirely of sandy beach.

The predicted effects on soils and ground stability are not deemed to be of significance, having a negligible or neutral impact on the environment.

There are two Regionally Important Geological Sites (RIGS) at the site, one at the eastern end and one at the western end, which includes Crinnis Rock. Only the western RIGS of the site is likely to be influenced by the proposed development. The extent of the effect is limited to Crinnis Rock, where the additional beach recharge material partly overlies the existing rocks, though there is no damage to the RIGS itself. Indeed the scheme may have a positive influence by reducing the process of erosion and thereby preserving the geological feature.

<b>Summary Environmental Impacts</b>					
<b>GEOLOGY AND LAND USE</b>					
<b>Potential impact</b>	<b>Impact on</b>	<b>Magnitude</b>	<b>Extent (area)</b>	<b>Type</b>	<b>Reversibility</b>
Change in land use	Land users and land quality	Large, though use is similar and users not affected	Site	Development life Normal	Permanent, reversible
Area of RIGS reduced	Geological conservation	Small	Part of site	Development life Normal	Permanent, reversible

## NON-TECHNICAL SUMMARY

### **Ecology and Biodiversity**

The assessment of the proposed scheme on the ecology of the Carlyon Bay consultations has been carried out with a range of statutory and other consultees including the Environment Agency, English Nature, Cornwall Wildlife Trust and Cornwall County Council. During these consultations the following ecological issues have been raised as requiring consideration within the EIA:

- potential impacts on sand eels;
- impacts on maritime and terrestrial habitats within the sea wall footprint and recharge areas;
- potential impacts on eel grass beds and associated species;
- impacts on small red damselfly, scarce blue tailed damselfly and other invertebrates, particularly moths;
- spread of the invasive species Japanese Knotweed;
- impact on Maerl beds;
- impacts on recreational used of the site e.g. fishing.

Although this assessment is related to the potential impact of the sea defence works, a comprehensive series of ecological surveys have been completed covering the whole of Crinnis, Shorthorn and Polgaver bays. This is to ensure that full consideration is given to secondary impacts that may affect terrestrial habitats and species away from the footprint of the works. Figure 5 shows the distribution of habitats together with the proposed sea defences overlaid (for full plan and habitat key see figure 12 of the EIA). Some areas have already been removed as a result of the implementation of the extant permission, which are shown greyed-out on the habitat plan.

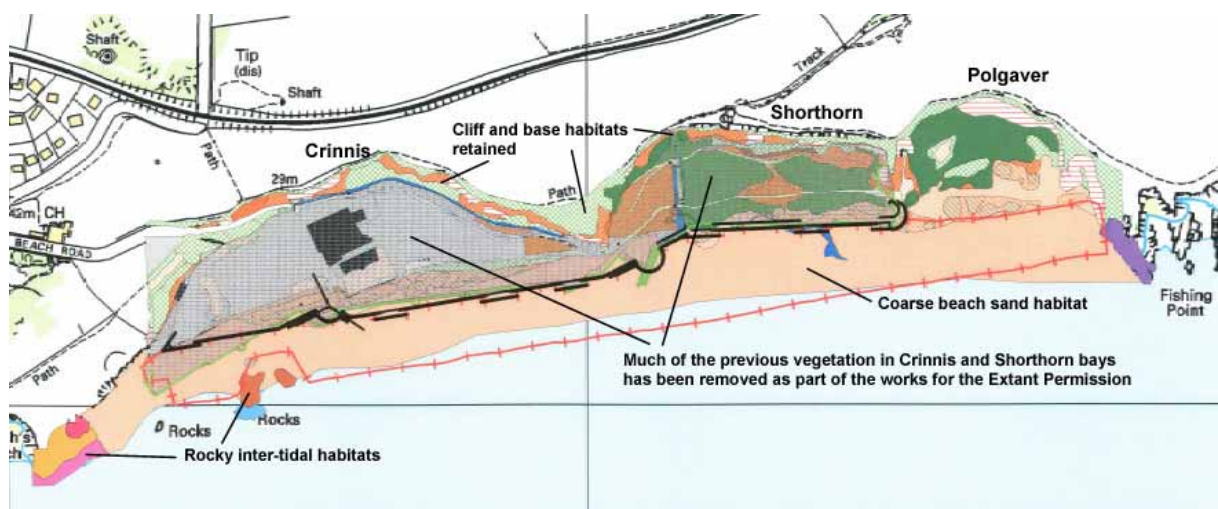


Figure 5 Habitat distribution overlain with proposed sea defences (see figure 12 of EIA for habitat key)

### **Marine biotopes**

Currently the site supports a range of marine biotopes, but these are of limited extent and considered to be of only local importance. The overall impact of the sea defence works is likely to be considered minor given the limited extent of the habitats recorded. The habitats that are considered to be scarce will not be affected by the proposals.

The construction works and initial recharge of the beach will result in the loss of some of the sandy habitats on the beach. This habitat is not considered to be rare and the overall impact

## NON-TECHNICAL SUMMARY

is considered to be minor. Much of this loss may also be short term and the recharge process will create new areas of coarse sand habitat.

Raising the beach levels will also result in the loss of some littoral and sub littoral habitats of the intertidal zone as the recharge will cover these. In the long term however, it is likely that the works will provide the opportunity for the habitats to re-colonise once construction is complete and lost habitats may be replaced naturally depending on the frequency of recharge required in the long term (see below). This impact is similar to that already experienced by these habitats as a result of natural changes to the beach morphology.

During construction the beach recharge activities may release fine material into the marine environment resulting in some localised increased turbidity. As the material will be of similar in size and structure to the existing beach sand, this impact is likely to be minimal as there are very few fines. Any impact from increased turbidity is likely to be short term as the beach becomes stable following restructuring.

The proposals will have no impacts on sand eels, eelgrass beds or other marine biota. While there may be a short term impact upon the fisheries immediately offshore this impact will only be short term as the new beach line will provide habitats similar to those already present.

### *Terrestrial habitats and species*

The terrestrial impacts are in the main associated with the loss of small areas of habitat and associated species. Surveys indicate that the dune areas do not support reptiles, so this impact is considered to be insignificant. The more compacted sandy soils have been found to be the main locations for Camomile. While some colonies of this species may be lost this species has been found to readily colonise newly disturbed areas within the site.

No significant areas of invertebrate habitat will be affected. No impacts on species of concern (such as damselflies or moths) are anticipated and habitats supporting these species will not be affected by the proposal.

Within the development of The Beach as a whole, areas of ecological interest along the base of the cliffs and in Polgaver bay will be retained and managed to maintain and enhance their wildlife value.

The main difference between the extant and new schemes is the placement of the recharge material upon the beach area. The proposed mitigation, of washing the recharge material to minimise the release of any sediment means that any impacts upon on any offshore habitats will be minor. While the new proposal requires more extensive disturbance of the mobile sand habitat the impact upon these habitats is considered to be minor as these sands are naturally disturbed by the action of the tides and storm events. Once in place it is anticipated that the new beach line will provide a similar habitat to the existing beach. It is therefore concluded that in the medium to long term the difference in the significance of the impact upon the marine environment will be minimal.

Regarding terrestrial habitats the impacts of the two schemes are almost identical and there is not significant difference separating the extant and proposed designs.

<b>Summary of Environmental Impacts</b>				
<b>ECOLOGY AND BIODIVERSITY</b>				
<b><i>Feature of Interest</i></b>	<b><i>Value of feature</i></b>	<b><i>Impact description</i></b>	<b><i>Mitigation</i></b>	<b><i>Impact significance</i></b>
Sand dunes and associated invertebrates	County	Reduction or loss of rare invertebrate species associated with sand dune areas	Implementation of the ecological management plan	Minor temporary negative

## NON-TECHNICAL SUMMARY

Fishery	Local	Short term disruption from recharge; recolonisation anticipated	None possible	Minor short term negative impact
Mobile coarse sand habitats (Area 1)	Local	Loss of habitat associated with construction and recharge	No mitigation possible	Minor temporary negative impact
Littoral and Sub-littoral habitats	Local	Loss of habitat associated with construction and recharge	Washing of recharge material	Minor permanent
Terrestrial Habitats	Local	Spread of Japanese Knotweed	Control Programme	Minor beneficial impact

The proposed and the extant schemes would have different ecological impacts. The extant scheme does not intruded as far into the coastal zone and does not involve on going recharge and recycling of beach material. The main ecological impact of the sea defence proposal will be on the littoral and sub-littoral habitats along Carlyon Bay. The analysis has shown that the habitats present within the footprint of the sea defences are limited in extent and/or are widespread and common within the area and of low ecological value. The overall impact of the proposal upon the ecology of the site it considered to be minor.

The results of this assessment on the specific biodiversity issues that were raised by the consultees are summarised below.

<b><i>Issue raised</i></b>	<b><i>Impact description</i></b>	<b><i>Mitigation</i></b>	<b><i>Impact significance</i></b>
sand eels	No impact anticipated	Recharge material to be washed to reduce likelihood of potential sedimentation.	-
impacts on maritime habitats	Short term loss of habitat re colonisation expected. Potential sedimentation.	Recharge material to be washed to reduce likelihood of potential sedimentation.	Minor, short term negative impact
Impact on terrestrial habitats	Loss of habitat, limited in extent	Implementation of the a ecological management plan	Minor, permanent
Impact small red damselfly, scarce blue tailed damselfly	Habitat suitable for these species will not be affected. No impact.	-	-
Japanese Knotweed	Potential spread of this highly invasive species	On going programme of control and appropriate treatment of contaminate soils	Minor beneficial impact
Maerl Beds	No impact anticipated.	Recharge material to be washed to reduce likelihood of potential sedimentation.	-
Recreation (Fishing)	Short term disruption of sea fishing	None possible. Rapid re-colonisation expected	Minor short term impact

NON-TECHNICAL SUMMARY

Eelgrass beds and associated species	No impact anticipated	Recharge material to be washed to reduce likelihood of potential sedimentation.	-
--------------------------------------	-----------------------	---	---

**Transport**

Impacts on traffic and the road network would only be associated with construction activity, and to a very limited extent subsequently during importation of additional beach recharge material. The transport routes to the site are shown on Figure 6. Most construction traffic (90% to 70%) will be required to use the preferred access route via Cypress Avenue and Sea Road, with only some traffic that is unable to negotiate the railway bridge using Beach Road.

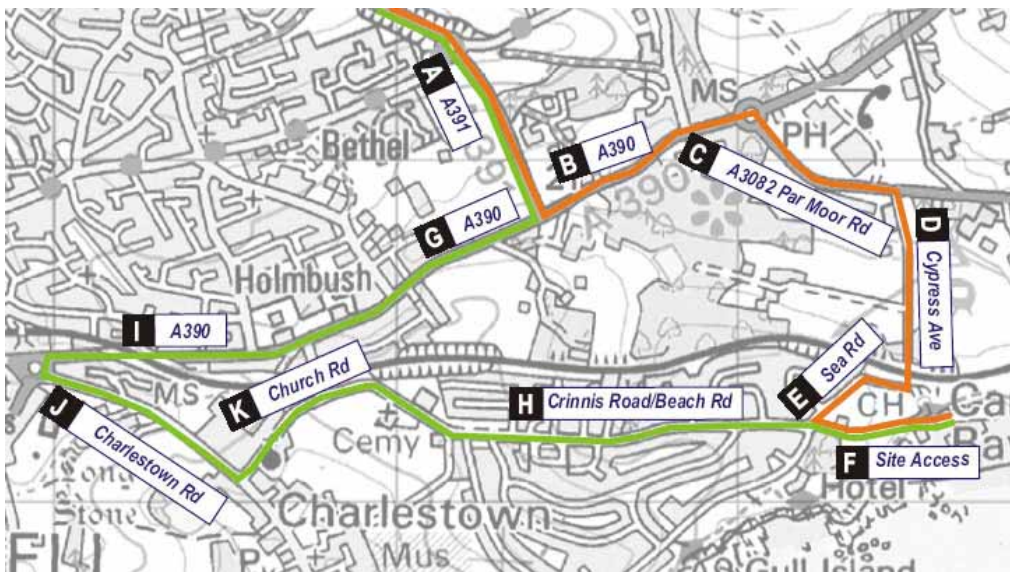


Figure 6 Transport routes to the site (preferred route shown brown)

The detailed assessment of the impacts shows that the majority of the impacts are considered negligible for most of the road sections. Nevertheless, the impacts on some road sections are considered slightly significant, though small and very short term. Key points regarding the results are outlined below (noise is considered elsewhere).

**Vibration**

Vibration will only be slightly significant on Sea Road and the access road as residential properties are located along these roads. Vibration is considered not significant on all the other road sections. The Cypress Avenue access route which will be taken by most construction vehicles reduces the number of residential properties on the access route, to the 8 dwellings situated on Sea Road. These dwellings are set back from the road by approximately 5 metres thereby reducing the potential vibration effects. It is proposed to introduce a 20mph speed limit along Sea Road to minimise the impact of vibration. In addition, any deterioration in the road surface resulting from HGV traffic will be repaired. This will ensure the impact of vibration does not increase during the construction period.

**Visual Impact**

The visual impact of the construction traffic is expected to be negligible on most road sections. The visual impact on Cypress Avenue, the site access road and more significantly Sea Road is likely to be more substantial in both scenarios as more construction traffic will

## NON-TECHNICAL SUMMARY

use these roads. Nevertheless, many of the residential properties on Sea Road who will experience the most significant impact are screened to a certain extent from the road by mature, dense vegetation. The temporary bollards to be erected along Beach Road will reduce the visual impact by ensuring that damage to grass verges and private driveways is prevented.

### *Community Severance*

The only potential severance impact on the Cypress Avenue route is the pedestrian route between the campsite and the golf course. However, the implementation of the traffic signal scheme prior to summer 2005 will ensure that pedestrian facilities are in place at the rail bridge during the peak holiday period thereby mitigating any negative effects and in fact improving the current situation for pedestrians in the area. Therefore, the impact of community severance is considered to be negligible for the Cypress Avenue route. Severance is negligible along the Beach Road route as the increase in traffic is much less than 30% which would constitute a slight impact.

### *Driver Delay*

Driver delay is considered 'slightly significant' on key road sections that form the Cypress Avenue route for both scenarios. This includes Cypress Avenue, Sea Road and the site access road and is due to the expected increase in heavy vehicles along these roads. Although these road sections will experience slight impacts to driver delay, they are not strategic roads within the network which suffer from congestion, particularly in the peak periods. These roads do not experience significant levels of congestion and therefore any increase in driver delay will be minimal. The delay to vehicles on the Beach Road route is considered negligible.

### *Pedestrian and Cyclist Amenity*

The impact on the amenity for pedestrians and cyclists is considered slight for Cypress Avenue, Sea Road and the site access road. Although traffic signals at the rail bridge on Cypress Avenue will provide better access for pedestrians and cyclists, there will still be some loss in amenity along this route while construction is taking place. Beach Road is expected to have a 'slightly significant' impact.

### *Accident Risk and Safety*

The safety of road users is not considered to be affected by the construction traffic generated by the sea defence works. In particular, the safety of the Cypress Avenue route will be greatly enhanced through the implementation of traffic signals at the railway tunnel giving each road user (vehicle, pedestrians, golf carts) a separate time period to negotiate the tunnel. This will substantially reduce the possibility of conflicts between vehicles, pedestrians, cyclists and golf carts.

### *Hazardous Loads*

The materials that will be transported to Carlyon Bay for construction of the sea defences are inert materials and are therefore not considered hazardous or dangerous. No further analysis is considered necessary.

### *Air Pollution, Dust and Dirt*

Air pollution, dust and dirt are considered 'slightly significant' on Sea Road and the site access road. There is a negligible impact on the Beach Road haul route as the increase in traffic is small. The mitigation measures such as wheel washing and sheeting of vehicles will minimise the effects of dust and dirt on the access routes.

## NON-TECHNICAL SUMMARY

In order to mitigate the effects of construction traffic, the following is proposed:

- Routing strategy using Cypress Avenue as the haul route for the majority of loads;
- External marshalling yard to enable large loads to be broken down and transported using Cypress Avenue;
- Restrictions to operating hours;
- Traffic signals at the Cypress Avenue rail bridge;
- Speed limit restrictions;
- Measures to prevent overrunning of grass verges;
- Maintenance of adequate road surface on haul routes.

In conclusion, transporting the materials for the sea defences will have little effect on many road sections that form access routes to the site. This includes the A390, A391 and A3082 that already carry a significant level of traffic and indeed heavy vehicle traffic. There will be a small impact on local roads that are considered to be more sensitive such as Beach Road, Church Road and Cypress Avenue. The sea defence construction traffic is expected to have the most significant, though still small, impact on Sea Road. This is mainly due to two factors:

- the majority of construction traffic will use the Cypress Avenue/Sea Road route; and
- eight residential properties are located adjacent to Sea Road.

These impacts will be transitory, confined to the construction period only and reversible. Most of the impacts are considered to be ‘normal’, meaning a day to day occurrence during the construction period.

Summary Environmental Impacts					
TRANSPORT					
<i>Potential impact</i>	<i>Impact on</i>	<i>Magnitude</i>	<i>Extent (area)</i>	<i>Type</i>	<i>Reversibility</i>
Increase in traffic flows in local road network	Vibration	Small	Local	Construction, Normal	Temporary, reversible
	Visual impact	Small	Local	Construction, Normal	Temporary, reversible
	Community severance	Small	Local	Construction, Normal	Temporary, reversible
	Driver delay	Small	Local	Construction, Normal	Temporary, reversible
	Pedestrian & cyclist amenity	Small	Local	Construction, Normal	Temporary, reversible
	Accident risk and safety	Nil	Local	Construction, Occasional	Temporary
	Air pollution, dust and dirt	Small	Local	Construction, Normal	Temporary, reversible

## NON-TECHNICAL SUMMARY

### **Landscape and visual impact**

This landscape impact assessment analyses the sensitivity of the identified landscape resources within the study area and the magnitude of landscape change, which allows objective judgement of the overall visual and landscape significance of the effects.

Both the extant permission and the revised proposals will have similar landscape and visual effects, with very limited physical change, a simple linear structure of limited size, all of which is substantially masked by the development of the apartment blocks. The visible extent of the extant sea wall and exposed rock armour is about 4m, whilst the revised proposals have a smaller visible profile of about 3.2m.

The site area is not within any landscape designation, though being a coastal landscape it is typically sensitive to development of any kind. However, the landscape character will not be significantly impacted by the development of the sea defences.

The visual impacts have been analysed from nearby settlements, public rights of way, the railway line, roads and offshore. In all cases the visibility is very limited, if any, though transitory and partial views from the coast path close to the development are evident. However, the resulting impacts are considered negligible.

<b>Summary Environmental Impacts</b>					
<b>LANDSCAPE AND VISUAL IMPACT</b>					
<b>Potential impact</b>	<b>Impact on</b>	<b>Magnitude</b>	<b>Extent (area)</b>	<b>Type</b>	<b>Reversibility</b>
Physical changes in character	Landscape character	Nil	Local	Development life	Permanent
Visual impact	Settlements	Nil	Local	Development life	Permanent
	Road network	Nil	Local	Development life	Permanent
	Offshore	Small	Local	Development life	Permanent
	Public rights of way	Nil	Local	Development life	Permanent
	Open space and landscape designations	Small	Local	Development life	Permanent

### **Air quality**

The proposed sea defences themselves clearly have no emissions to air, except those associated with construction activity that could result in emission of dust. The scoping exercise did not identify air pollution as a major area of concern so the assessment here is of a limited nature.

The construction activity is largely contained within the bay area screened by the cliffs, which will contain any dust that is emitted. The impact of the proposed sea defences on air quality will thus be very small and restricted to the immediate environs of the site. Such adverse impacts that could arise would relate to the construction phase and it will be important to ensure that good construction practices are maintained throughout.

## NON-TECHNICAL SUMMARY

Whilst the possibility of dust escaping and causing a nuisance at local residences cannot be ruled out, the likelihood of anything more than occasional and minor incidents is extremely low.

Summary Environmental Impacts					
AIR QUALITY					
Potential impact	Impact on	Magnitude	Extent (area)	Type	Reversibility
Dust emission	Nuisance to local residents	Nil / small	Local	Construction Occasional	Temporary, reversible
Vehicle exhaust emission	Air quality – health	Nil	Local	Construction Occasional	Temporary, reversible
Key:	Target or recipient	Nil, Small, Moderate, Large	Site (footprint), Local, Regional, National	Construction, Development life. Normal, Periodic /occasional, Exceptional, Accidental	Permanent, Temporary, Reversible

### Noise and vibration

This chapter considers the existing noise environment in and around the Carlyon Bay site and the likely impact of noise from sea wall construction and associated construction road traffic. The Assessment considers the impact of the new sea defence proposal against the baseline situation in the absence of any development works permitted by the extant planning permission. The current proposals are likely to be broadly similar to the existing permission in terms of noise impact, although the new proposal to bring rock armour in by sea could significantly reduce the amount of road traffic.

The construction of the sea wall will require the use of heavy plant to unload materials from barges, move the materials into position along the beach and to form the reinforced concrete sea wall. With the exception of the rock armour, all construction materials will be brought to the site by road.

Although noise nuisance is not considered to be a substantive issue for construction of the proposed sea defence works, an assessment has been carried out to confirm this for two situations:

1. Impact of noise from construction activities on site, on the nearest properties on Sea Road, Beach Road, Merthen Farm and Carlyon Bay Hotel.
2. Impact of noise from heavy goods traffic on Sea Road.

Baseline noise measurements were taken at locations on Sea Road, Beach Road, Merthen Farm and the hotel, covering normal daytime, evening and night periods. Measurements were also taken during a period of daytime construction activity when heavy vehicles were using Sea Road.

Worst-case scenarios for deployment of construction plant were modelled using standard noise calculation and prediction techniques. The predicted impacts associated with the construction phase broadly agree with the measured noise levels at the representative locations. A combination of distance separation and the natural screening provided by the cliff face provides effective mitigation and limits the impact of construction site noise.

Considering the government advice on construction noise criteria, the calculated worst-case construction noise levels fall well below the suggested limit value. It is likely that further

**NON-TECHNICAL SUMMARY**

refinement to the calculation procedure, to take account of actual plant on-times and ground attenuation, would reduce the levels even further.

The predicted increase in road traffic noise due to construction traffic would be variable but generally very small, for short periods of time. On this basis the impact would be classified as “slight” and temporary.

None of the noise sources are close enough to potential sensitive areas that vibration would be noticeable.

<b>Summary Environmental Impacts</b>					
<b>NOISE</b>					
<b>Potential impact</b>	<b>Impact on</b>	<b>Magnitude</b>	<b>Extent (area)</b>	<b>Type</b>	<b>Reversibility</b>
Construction noise	Nearby residents	Within AL 72 Guidelines	Local	Construction Occasional	Temporary, reversible
Road traffic noise	Residents adjacent to highways	Slight at all locations other than Beach Road	Local	Construction Occasional	Temporary, reversible
Key:	Target or recipient	Nil, slight, Moderate, substantial, severe	Site (footprint), Local, Regional, National	Construction, Development life. Normal, Periodic /occasional, Exceptional, Accidental	Permanent, Temporary, Reversible

---

## NON-TECHNICAL SUMMARY

### Part C. ENVIRONMENTAL MANAGEMENT

The EIA concludes that the environmental impacts associated with the sea defence works are generally small and localised. This is as a result of both the limited scale and extent of the works, and the extensive studies that have ensured that the necessary mitigation has been incorporated into the design.

The sea defence works are part of a larger construction exercise associated with the development of The Beach. The environmental management provisions detailed below are proposed for the whole development, and will thus apply to the sea defence works as well.

#### ***Beach management plan***

The beach will be a key component of the sea defence and coastal management for the Carlyon Bay development. Managed intervention will be required from time to time to ensure that the beach profile is kept within the design limits required to provide the necessary level of protection. To achieve this, a Beach Management Plan will be implemented. This has been prepared by HR Wallingford (Beach and Seawall Management Manual, Report EX4993, June 2004).

The beach and seawall management manual includes the following:

- summary of design assumptions;
- roles and responsibilities;
- recommended monitoring programme;
- maintenance options and responsive maintenance required when trigger levels are breached;
- beach safety issues;
- emergency response plans;
- review framework.

The manual describes a comprehensive monitoring programme covering the beach, sea wall and rock armour and river mouth and channel.

Initial monitoring (inspection and survey) will be conducted immediately after completion of the coastal civil engineering works in order to establish baseline parameters for the coastal defence database. Thereafter, regular and responsive monitoring will be carried out to ensure the condition and performance of the defences remains adequate.

In addition, a storm warning system to provide an increased level of security will be instigated. This will enable protective and mitigation measures to be put in place before a storm even occurs.

#### ***Construction management***

As part of the construction, the contractors will adopt a detailed Construction Management Plan for environmental performance and mitigation during construction (Appendix 3 of the EIA). This will include provision for:

- transport management;
- noise and air quality management and prevention of nuisance;
- safety of site operators and visitors;
- hazard management, spill prevention and response to environmental emergencies;

## NON-TECHNICAL SUMMARY

- handling of soil material contaminated with Japanese Knotweed.

### ***Water management***

In addition to the construction management plan, the project design team has identified specific measures to mitigate possible effects on water resources during construction and development life of The Beach development, of which the sea defences are a part. This includes:

- design of surface water drainage incorporating extensive Sustainable Drainage Systems (SUDS);
- subsoil drainage below the sea wall, which will intercept all site drainage and discharge it in a controlled manner into the Sandy River;
- extensive measures to intercept hydrocarbon pollution (petrol, diesel, oils) from hardstanding areas and construction areas where plant are operating or being maintained;
- contingency plans to protect marine water quality during construction;
- refuse and litter control to prevent wind-blown material entering the sea.

The design of the Sandy River channel works and interaction with the sea wall has been carefully considered to take account of a 1:200 year event (with allowance for sea level rise).

### ***Biodiversity***

It is proposed that site operations for the development as a whole will allow for biodiversity impact to be closely monitored on-site during the construction phases. Longer term monitoring of the marine habitats will assess the ongoing effects (if any) of the new beach structure and recharge works.

During construction of the development as a whole (including the sea defence works) a comprehensive set of site ecological protection measures have been put in place to ensure that any legally protected species such as nesting birds and reptiles are not disturbed or harmed during the construction process. Natural areas to be retained within the overall development area have been fenced off to ensure that these areas are not damaged unnecessarily.

An ecological Clerk of Works has been appointed to ensure that any essential works beyond the ecological protection fencing are checked for nesting birds and reptiles before works commence.

A programme of reptile translocation has been put in place to ensure that any reptiles are moved out of harms way before any site clearance works are completed. Reptile fencing will be installed to ensure that exclusion is maintained throughout the construction phase.

All retained habitats will be subject to an ecological management plan that will ensure appropriate long-term management.