

## Applicant's Note – Geographical Coverage of Environmental Statement

The Environmental Statement completed for the sites subject to the three applications for Planning Permission on St Mary's at Porth Mellon, Porthloo and Porth Hellick also contains discussion of a site at South Dunes on the island of Tresco.

No application is being made for Planning Permission for any coastal protection works to be undertaken on Tresco.

Any parts of the Environmental Statement dealing with South Dunes on Tresco can be ignored for the purposes of the Planning Permission applications for St Mary's sites.

Stephen Swabey (Applicant for Council of the Isles of Scilly)

*23 July 2021*

# Isles of Scilly Sea Defences Environmental Statement

Volume 1: Main Text and Non-Technical Summary

**Final Report**

July 2019

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Council of the  
**ISLES OF SCILLY**



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## Contract

This report describes work commissioned by The Council of the Isles of Scilly. Ben Sullivan, David Revill and Mark Cope of JBA Consulting carried out this work.

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## Purpose

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## Non-Technical Summary

### Background

The Council of the Isles of Scilly is proposing to construct new coastal erosion and flood protection works at four sites on the Isles of Scilly. Three of these sites, at Porthloo, Porth Mellon and Porth Hellick, are on the island of St Mary's. The fourth site, South Dunes, is on the south coast of Tresco.

The Isles of Scilly are generally low lying and therefore many areas are vulnerable to flooding. This flood risk is likely to increase in the future as a result of the effects of climate change. The risks to the islands have been highlighted by storms in 1989, 2004 and 2014.

The aim of this project is to increase protection of homes and businesses on St Mary's, as well as key infrastructure, including the island's freshwater supplies, waste management site, emergency services and road network; on Tresco, the project will increase protection of the island's freshwater supply at Abbey Pool, its telecommunications cable infrastructure, and a locally important timber yard and wood store. In addition, erosion protection works at South Beach will protect internationally and nationally important wildlife habitats.

An Environmental Impact Assessment is required for some construction projects, when it is thought that they could create significant environmental effects. An Environmental Impact Assessment identifies, predicts and evaluates the possible environmental effects of a proposed development. The findings of the Environmental Impact Assessment are then presented in an Environmental Statement. This document is the non-technical summary of the Environmental Statement, which explains the findings of the longer Environmental Statement in non-technical language.

### Description of the sites

The Isles of Scilly are an archipelago of over 200 islands located approximately 40km south west of Lands' End, Cornwall (see Figure 1). Five islands are inhabited, including St Mary's and Tresco. The population of the islands is about 2,200 people. Tourism is the largest contributor to the islands' economy, and during the summer months the population increases to about 6,000 people. The whole archipelago is designated as an Area of Outstanding Natural Beauty, a Conservation Area and an area of Heritage Coast, which reflects the high quality of the environment there.

The coastline and adjacent low-lying land on St Mary's and Tresco are vulnerable to flooding and coastal erosion during storms. Due to climate change, these issues are expected to worsen in the future.

Construction of new coastal defences are proposed at four sites on St Mary's and Tresco. These are described below.



**Figure 1: Location of Scilly Isles and the islands of St Mary's and Tresco**

Construction of new coastal defences are proposed at the following four sites on St Mary's and Tresco:

***Porthloo***

Porthloo is located about 600m north-east of Hugh Town, the islands' main administrative centre. Porthloo is a natural bay, featuring a sand and pebble beach backed by a narrow band of sand dunes and an earth embankment. Landward of the dunes is a commercial boatyard and a small number of houses and businesses. Porthloo Lane, which links Porthloo to Hugh Town and the wider island, is also located in this area. At the northern end of Porthloo Bay is a low rocky cliff that is designated as a Site of Special Scientific Interest. To the south of Porthloo Bay is a freshwater lake at Lower Moors, which provides freshwater for the island.

Porthloo Bay is currently protected by existing coastal defences, which comprise a rock rubble revetment at the northern end of the bay and an engineered sand dune in the southern half of the bay.

***Porth Mellon***

Porth Mellon is located immediately to the north of Hugh Town. The bay consists of a sand and pebble beach backed by a narrow strip of sand dunes along most of its length; in the southern corner of the bay, these dunes are absent, and the back of the beach is a high earth bank covered by a variety of exotic plant species.

Behind the dunes and earth bank are several houses and commercial buildings and a small concrete slipway, that provides access to the beach for boats and other vehicles. Telegraph Road, which links Porth Mellon to Hugh Town and the wider island, is located immediately behind the dunes and

vegetated bank, and landward of this are the Porthmellon Industrial Estate and the islands' only waste and recycling centre. A short distance inland from the beach is Lower Moors Site of Special Scientific Interest, which is an important freshwater habitat for a range of plants and animals and provides freshwater for the island. Porth Mellon beach is popular with both locals and tourists, especially so during the period from May to September as the centre for water sports and associated activities.

### ***Porth Hellick***

Porth Hellick is located on St Mary's south east coast. The cove features a large sand and gravel beach, and extensive rockpool areas are exposed at low tide. High cliffs form its eastern and western edges. There is an informal access point for vehicles onto the beach at the eastern end of the bay. The surrounding land area is primarily agricultural, and the cove is used by a small number of commercial fishermen.

At the back of the beach is a low sand and gravel bank. It is heavily vegetated with dense clumps of a non-native shrub called *Fascicularia bicolor*; the bank and these shrubs effectively comprise the flood defence in this bay.

A short distance inland from the beach is Higher Moors and Porth Hellick Site of Special Scientific Interest, which is an important freshwater habitat for a range of plants and animals and provides freshwater for the island. St Mary's Airport is located 500m to the west. Porth Hellick is popular with both locals and tourists.

### ***South Dunes***

South Dunes is a wide sandy beach located on the south coast of Tresco backed by high sandy dunes. The island's telecommunications cable comes ashore on the beach and there is a large cable junction box on the beach, which is protected from waves by a row of large wooden stakes. Inland of the beach, is the island's timber yard and wood store and a large area of coastal grassland and heath, which is protected under international and national law to protect its important plants and animals.

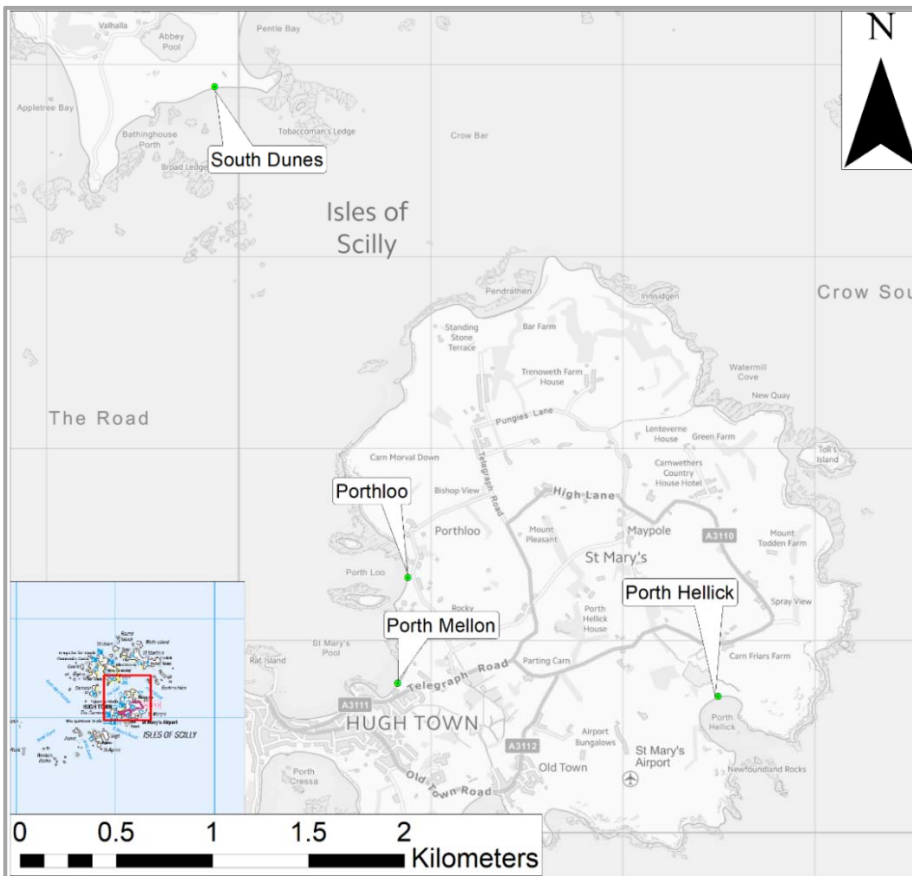


Figure 2: Location of the four development sites on St Mary's and Tresco

## Proposed developments

### ***Porthloo***

New flood defence is needed at Porthloo to reduce erosion of the coastline and to reduce the risk of flooding to homes and businesses, to Porthloo Lane and to the freshwater lake at Lower Moors.

The new defence at Porthloo will comprise a rock revetment, which is sloping bank of large rock boulders, positioned in the northern half of the bay in an area currently protected by an area of rock rubble. The rock revetment will protect the coastline from erosion by waves during storms also reduce the risk of waves flowing over the beach and into the nearby homes and businesses. The rock revetment will be 110m long and around 17m wide, with about a third of this revetment being buried below the current ground level.

### ***Porth Mellon***

At Porth Mellon, a new flood defence is needed to reduce erosion of the earth bank in the southern corner of the bay. This bank protects several houses and businesses as well as Telegraph Road from flooding and erosion during storms and protects the freshwater supply from Lower Moors.

The new defence will be rock revetment, positioned in front of the earth bank. The revetment would be made up of large rock boulders and would be 40m long and about 15m wide with about a third of this revetment being buried below the current ground level.

### ***Porth Hellick***

At Porth Hellick, there are a number of low spots in the sand and gravel bank. This is particularly so at the eastern end of the bay, where the bank is much lower in an area used by local fishermen to access the beach with their boats. Due to these low spots, there is a risk that seawater will wash



over the bank and into the Higher Moors area, affecting the sensitive plants and animals there, and also affecting the island's freshwater supply.

The new defence will involve raising the low spots in the bank using sand and gravel. At the eastern end of the bay, the bank will be raised and a new vehicle access ramp onto the beach will be constructed. To help stabilise the bank, *Fascicularia bicolor* plants will be planted in the areas to be raised, to match the other areas in the bay.

### **South Dunes**

At South Dunes, large waves during storms are eroding the dunes at the back of the beach. There is a risk that this could lead to a breach in the dunes, allowing seawater to flood the area behind the dunes; this could cut off the southern part of the island from the rest of the island and also prevent access to the Heliport and the island's only low tide boat access point at Carn Near, a short distance west of South Dunes. Flooding in this area could affect the sensitive plants and animals living there and the use of the timber yard. It could also risk saltwater getting into the island's freshwater supply at Abbey Pool.

To reduce erosion of the dunes, the bottom, or toe, of a 150m long section of the dunes will be protected with 'rock rolls'. These are rolls of gravel in a plastic mesh, which when stacked together, help stop waves from eroding away the dunes. The dunes would also be covered with planted matting to reduce the risk of wind erosion. This is a relatively new technique and is only designed to last up to 10 years. During this time, the Council will regularly check the beach to make sure the rock rolls are performing as intended and are not having a negative impact on the dunes or the beach.

## **Scheme construction**

Construction of the coastal defences at the four sites would take place between February and June 2020. The works have been timed to avoid the peak summer period when most tourists visit the islands and also to avoid storm events and periods where the sites are visited by migrating birds.

### **Porthloo**

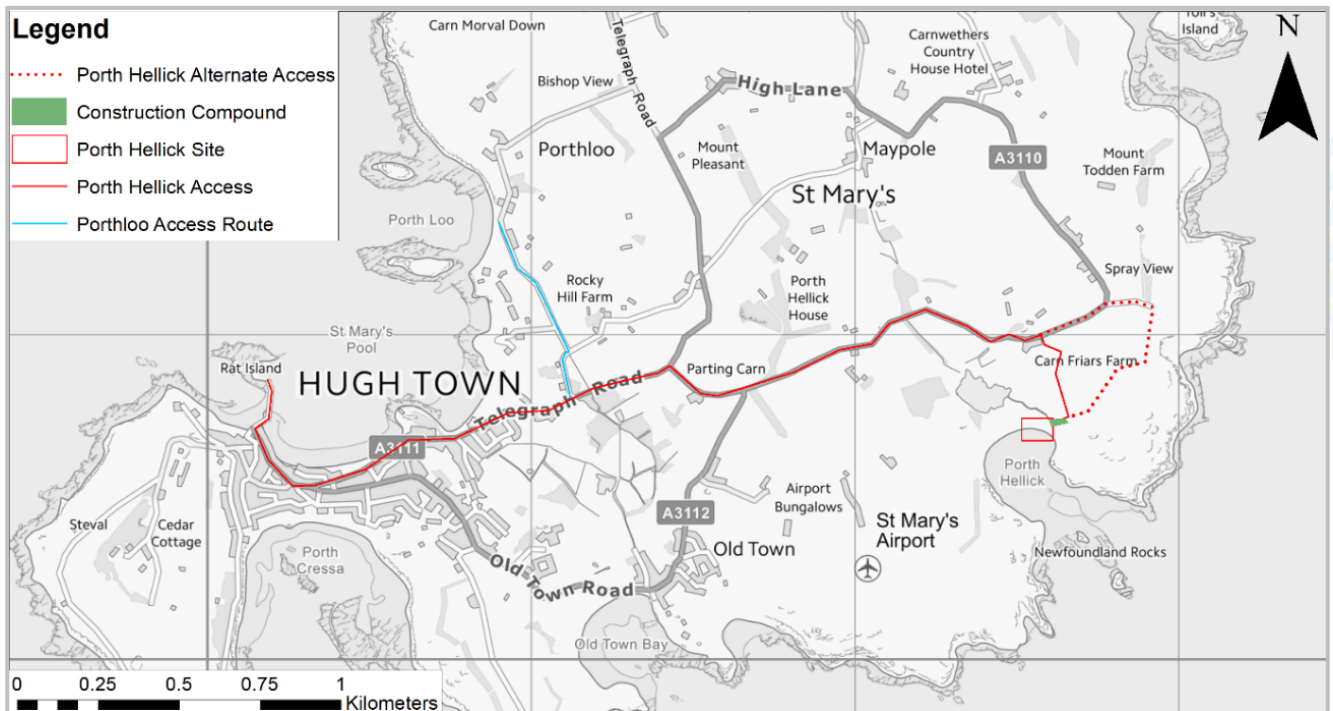
At Porthloo, a temporary construction compound will be located in the boatyard near the beach. All construction materials will be delivered to the beach using a large landing craft. A dump truck will unload materials from the landing craft and transport them across the beach to where the revetment is to be constructed, which will be done using an excavator.

### **Porth Mellon**

At Porth Mellon, the construction compound will be located off Telegraph Road, close to the construction site. All materials needed to construct the scheme will be delivered to site on a landing craft. A dump truck will unload materials from the landing craft and transport them across the beach to where the revetment is to be constructed, which will be done using an excavator.

### **Porth Hellick**

At Porth Hellick, the construction compound will be located in the field immediately to the north east of the beach. Construction materials will either be delivered by landing craft to Porthloo beach, or to St Mary's Harbour, and then transported to Porth Hellick beach via the road network and farm tracks (see Figure 3). The beach access ramp would be constructed first, followed by the adjacent section of artificial dune. Once complete, the dune system would be covered with a biodegradable matting to protect it from wind erosion and planted with a shrub, *Fascicularia bicolor*, which is already widespread in the bay.



**Figure 3: Proposed construction access routes to Porth Hellick from Porthloo and St Mary's harbour**

### ***South Dunes***

At South Dunes, the construction compound will be established immediately north of the jetty at Carn Near, to the south west of the construction site, in an existing hard standing storage area. The material will be delivered from St Mary's to the jetty using small boats and then transported between the compound and the construction site using a tractor and trailer. The rock rolls will be stacked at the bottom of the dunes using an excavator and biodegradable matting will then be laid over the face of the dune to protect it from erosion by the wind. This matting will then be planted with native Marram Grass to further protect it from erosion and to provide a new habitat for a range of animals.

## **Summary of Environmental Impacts**

### ***Coastal Processes***

The flow of seawater between the Scilly Isles is very complicated. As the islands are exposed to waves from the Atlantic Ocean, these waves can be very large and have a lot of energy. Sand is constantly being transported around the islands by wave action to a greater extent than in most other coastal areas.

Construction of new coastal defences can affect the existing coastal processes, which include waves, tides, sediment movement, and flooding. Impacts upon these physical processes can have wider environmental consequences, which can affect the amount of sand on a beach and also affect local wildlife.

An assessment has been undertaken to identify any impacts on these coastal processes as a result of the new flood defences. Where impacts have been identified, actions have been recommended to minimise the significance of these impacts.

This assessment has found that there will be only very minor impacts on waves and sand movement at the four sites and that these impacts will have only a very local affect. In addition, construction of the new defences will provide a range of positive impacts; these include reduced erosion of the

coastline and reduced flood risk to homes and businesses and a range of other vital community facilities.

### ***Biodiversity and Nature Conservation***

There are 12 protected sites within 2km of the four flood defence schemes. These sites are designated for a range of habitats and species, including bird species, marine invertebrates, important marine and freshwater habitats, rare plant species and features of geological interest.

At Porthloo and Porth Mellon, construction materials will be delivered to site using a landing craft; this could have a minor impact on beach habitats, although these effects would be temporary and are not likely to be significant. Construction of the rock revetments would also result in a loss of relatively small areas of beach habitat.

At Porth Hellick, construction of the new sections of dune/bank could disturb birds using the adjacent Higher Moors area, but this disturbance would be temporary and is not likely to have a significant impact. The new sections of dune/bank would cover the current sand and gravel present there, as well as a small area of coastal grassland, but this impact is also not likely to be significant. A robust construction method will need to be adopted when constructing these new sections of dune/bank as these areas are colonised by an invasive non-native species, Hottentot Fig, which is present throughout the Isles of Scilly, to prevent it from spreading to other areas in Porth Hellick.

At South Dunes, construction of the rock rolls would cause a small loss of sandy beach habitat and could cause disturbance to birds using the beach. However, these impacts are not likely to be significant – wind-blown sand would cover the rock rolls in the short term, recreating the habitat lost, whilst disturbance to any birds will be temporary whilst the defence is being built.

As the works at the four sites are quite small-scale, no impacts on any of the designated sites are predicted. The only significant risk to biodiversity would be if there was an accident during construction, e.g., a diesel spill or pollution event. The risk of this happening will be minimised through good construction practices; for example, refuelling and storing construction equipment far above the tide mark. Working areas and tracks would be clearly marked, to minimise the area affected during construction and to prevent the contractor from accidentally straying into any other areas. In addition, before construction works at the sites begin, a 'toolbox talk' will be given to all construction staff, which will explain to them the rules they must follow to avoid any negative impacts on local wildlife.

### ***Landscape and Visual***

An assessment has been undertaken to determine whether the proposed flood defences would have an impact on the local landscape.

All four sites lie within the Isles of Scilly National Character Area, which is characterised by low-lying granite islands, a sense of remoteness and tranquillity, sandy beaches and a strong influence from the ocean. The most recent Landscape Character Assessment of Cornwall and the Isles of Scilly described the Isles as rural, agricultural, isolated and influenced by the surrounding ocean.

The Isles of Scilly are also within Marine Character Area 47, described as complex, with a rich history, and a high diversity of habitats, species and archaeological remains. Views out to sea are unbroken.

The entirety of the Isles of Scilly is protected as an Area of Outstanding Natural Beauty.

In order to assess how the proposed sea defences would impact upon landscape character and views of the affected areas, viewpoints were selected for each site and the potential changes to the views from these viewpoints were carefully assessed.

At Porthloo and Porth Mellon, temporary impacts on landscape character and views of the beach would occur as a result of use of the area by construction equipment and the storage of construction materials. These impacts would affect local residents and people visiting the beaches.

Once the works are complete, it was concluded that the new defence at Porthloo would not significantly change the landscape character of the beach or views of the beach as there is already a rock rubble sea defence on the beach and the new rock revetment would not be any higher. At Porth Mellon, the rock revetment would have a minor impact on landscape character and views because the revetment would replace sandy beach and affect a vegetated bank. However, due to the small-scale of the revetment, the changes that will occur will not be significant.

At Porth Hellick, similar construction phase impacts will occur; construction of the new sections of dune/bank will affect local landscape character and views of the beach, affecting beach users. Once constructed, the new dune/bank will blend into the surroundings and will not significantly change the local landscape or the views of the beach.

At South Dunes, construction phase impacts would be the same as for the other sites; these would be temporary in nature and would affect visitors to the beach. Once constructed, it was concluded that the new rock rolls would have a relatively large impact on the landscape character of the beach and views of the beach at first. However, over a relatively short time, it is expected that sand will be blown over the rock rolls, burying them, and any impact on landscape character and views will diminish accordingly.

At all four sites, building the new defences outside of the peak tourist season will help to reduce the impacts on beach users.

### ***Cultural Heritage***

An assessment was undertaken to determine whether the proposed flood defences could impact on any heritage sites or archaeological remains.

At Porthloo, two designated Scheduled Monuments are located close to the proposed flood defence. However, it was concluded that the flood defence works would not impact upon the setting of these Scheduled Monuments, due to views from the site being blocked by intervening trees and rocks. It was also determined that the potential to encounter archaeological remains during construction of the defence was low.

At Porth Mellon, two Scheduled Monuments were identified in close proximity to the proposed flood defence. There are also eight Listed Buildings near to the site. The assessment concluded that there may be minor visual impacts upon the Scheduled Monuments during construction, but that the flood defence will not impact on the setting or fabric of these heritage sites or on any of the Listed Buildings. As materials will be delivered to site via sea, there is the potential for prehistoric remains on the beach to be disturbed. It is recommended that offloading takes place in the south of the beach, where remains are less likely to be discovered.

At Port Hellick, seven Scheduled Monuments were identified close to the scheme area. Most of these monuments are entrance graves, dating to either the late Neolithic or Bronze Age. Entrance graves are of national importance and most of the surviving examples of this monument in the UK are found on the Isles of Scilly. In addition to the Scheduled Monuments identified, another notable archaeological feature is the grave marker of Sir Cloudesley Shovell, who was a Royal Navy Admiral during the War of the Spanish Succession. The assessment concluded that there will be no impacts upon any of these Scheduled Monuments; however, the grave marker of Sir Cloudesley Shovell would need to be temporarily relocated during construction. This is only a grave marker and the Admiral is now buried at Westminster Abbey.

At South Dunes, five Scheduled Monuments were identified close to the construction site. However, none of these monuments are likely to be affected during construction of the dune protection works. The works would not be visible from the nearby Tresco Abbey Registered Park and Garden, which also contains a Scheduled Monument and four Listed Buildings.

### ***Land Use, Tourism and Public Access***

An assessment was carried out to determine whether the proposed flood defences would have an impact on land use, the tourism industry or access to areas by the public.

Land use around the four sites varies. At Porthloo, there is a small settlement (Porthloo hamlet) and farmland. At Porth Mellon, there is farmland to the north and east, industrial land (St Mary's only industrial park) to the south east and the urban area of Hugh Town to the south. Porth Hellick is surrounded by farmland and natural heathland, with St Mary's Airport located 500m to the west. Inland of South Dunes is a large area of heathland and Tresco Abbey, a historic site that includes two large freshwater pools, which provide freshwater for the island.

The economy of the Scilly Isles is small and relies on tourism. In recent years, the tourism economy has begun to shrink, and visitor numbers have fallen. The majority of visitors to the Isles of Scilly are British, and have visited before, often many times. A recent survey showed that visitors consider that scenery and peace and quiet are the best things about the Scilly Isles.

Access across the islands varies. Some areas are accessible by roads and others only by footpaths. There are many footpaths on the islands, which reach almost all areas, including the four flood defence locations. Walking is very popular with both tourists and local residents.

The geology of Scilly is granite, as it is in Cornwall and much of Devon. This has allowed Scilly to look the way it does – the large cliffs and sandy beaches are a result of this granite geology. The geology of Scilly is very important in the UK because it is unique – five sites on Scilly are protected for their geology – including a stretch of cliffs at Porthloo.

The assessment concluded that given the small-scale of the proposed flood defences, none of the defences will be large enough to create a significant change in land use at any of the sites.

In addition, the assessment determined that construction of the flood defences is not likely to have a significant impact upon the tourism industry. This is because the works will be taking place in winter and spring, avoiding the peak summer tourist season. Also, many visitors to the islands have visited before and know the area well. As a result, it is thought that small-scale construction would not discourage people from returning to the islands. However, there could be a small impact on local businesses at Porthloo and Porth Mellon that rely on tourists; these businesses could see a reduction in footfall during construction.

The Porthloo, Porth Mellon and South Dunes schemes are all quite close to footpaths. There may be some impacts on access to these footpaths during construction and they may have to be temporarily closed for safety reasons.

To ensure the local geological conditions on the Isles of Scilly are not impacted, only Cornish or Devonian granite will be used to create the flood defences. This is as close as possible to the local granite.

### ***Sustainability and Climate Change***

These proposed flood defences are designed to reduce the risk of flooding to local houses and businesses, roads and other important infrastructure. In doing so, they help build resilience for the local communities to some of the future effects of climate change. However, their construction will also emit greenhouse gases and therefore will contribute to climate change. These emissions will come from sourcing the materials, particularly the granite rock, transporting materials to site and using construction equipment.

The total amount of carbon dioxide that will be emitted into the atmosphere from these schemes has been estimated using carbon calculation tools designed by the Environment Agency. In Table 1, the total amount of emissions for each scheme is shown. The total emissions are shown in tonnes of equivalent CO<sub>2</sub>, which also accounts for all the other greenhouse gases emitted, and their contribution to climate change.

**Table 1: Emissions generated by construction of the flood defence schemes**

Scheme	Total emissions (tCO <sub>2e</sub> )
Porthloo	5,132.7
Porth Mellon	1,910.1
Porth Hellick	2,034.4
South Dunes	939.9
<b>Total of all schemes</b>	<b>10,017.1</b>

Of all local authority areas in the UK, the Isles of Scilly is responsible for producing one of the lowest amounts of emissions. As a result, these four schemes would make a very significant contribution to the island annual emissions. It is estimated that as a result of the schemes, annual emissions in 2020 would approximately double from 2017 levels.

It is difficult to try and reduce these emissions and it is very important that we protect homes and infrastructure on the Isles. However, one possible way could be to change the rock used for the defences from granite to limestone. Granite would be used because it is the same rock as the geology of the Isles. However, limestone is softer and lighter, so requires less energy to quarry. This would mean significantly less emissions to the atmosphere.

Whichever rock is used, it is important it is quarried as close as possible to the Isles of Scilly, so it does not have to be transported a long distance. There are quarries along the Lizard Coast in Cornwall that could be used to provide a reasonably local source of rock.

***Other construction related effects***

An assessment was undertaken to determine whether construction of the four schemes could cause other impacts on the environment, namely air pollution, traffic congestion, noise pollution and light pollution.

The Isles of Scilly are largely rural. As a result, their air quality is very high and traffic levels are low. They are mainly a low-noise environment, with background noise coming from the sea in most areas, or traffic and boats. The entire Isles of Scilly Local Authority Area is designated as an Area of Outstanding Natural Beauty and light pollution is very low.

Air quality, traffic, noise/vibration and light pollution have all been assessed for each construction process to assess whether these impacts might be significant or noticeable.

In relation to traffic, the only scheme that would have significant amounts of construction materials and equipment delivered by road is Porth Hellick. Based upon the amount of materials and equipment that would need to be delivered, it was estimated that during the construction phase, two extra lorry journeys per day would be needed between Hugh Town and Porth Hellick. This is not expected to cause a noticeable change in traffic levels.

There are residential properties close enough to the Porthloo and Porth Mellon schemes to potentially experience air quality impacts from the release of dust and noise impacts. There is also designated, protected habitat close to the Porth Hellick and South Dunes schemes that may experience adverse impacts from noise and dust. In order to prevent dust impacts, the contractors will follow mitigation described by the Institute of Air Quality Managers. This is available to read in the Construction Environmental Management Plan. To prevent noise impacts, the contractors will follow guidance provide by British Standard 5228, which includes not dropping dusty material from excessive height.

Whilst it is not anticipated that night-time working will be required, should it be necessary (to manage the unloading of construction materials within the tidal cycle), it would have to be lit. There will be impacts to local properties if the Porthloo and Porth Mellon sites need to be lit. These impacts can be minimised, by, for example, switching off lights when they are not needed.

It is not expected that there would be any pollution to the land or water due to construction of any of the schemes. However, it is always possible that this could happen because of poor construction practice. The likelihood of this happening will be made as small as possible, by employing actions such as storing and refuelling machinery as far away from the sea as possible.

We will aim to make any kind of pollution as unlikely as possible by applying robust construction practices and employing a range of environmental management actions, which will be documented in a Construction Environmental Management Plan. This will ensure that the contractor working on any of the schemes commits to best possible practice.

### ***Cumulative effects***

An assessment of potential cumulative effects has been undertaken. It has looked at whether the effects caused by the flood defence schemes could combine to cause a greater effect and whether other developments and operations on the Isles of Scilly could combine with effects caused by the proposed sea defences, to impact the environment in a greater or different way than any of these developments would do by themselves. However, a search for major planning applications or recent permissions did not identify any that would be likely to act cumulatively with the proposed flood defence schemes.

Residential properties in Porthloo and Porth Mellon could be subject to combined effects during construction: principally noise and traffic impacts from construction works taking place at the two sites. However, given the small-scale of construction works and associated traffic movements, any impacts are likely to be very small.

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## Abbreviations

AADF	Average Annual Daily Flow
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
BGL	Below Ground Level
BT	British Telecom
CCCAU	Cornwall County Council Archaeological Unit
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Innovation Association
CMS	Construction Method Statement
CPRE	Campaign to Protect Rural England
CRTN	Calculation of Road Traffic Noise
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EC	European Commission
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EMS	Environmental Management System
ERCCIS	Environmental Records Centre for Cornwall and The Isles of Scilly
EMODnet	European Marine Observation Data Network
ES	Environmental Statement
EU	European Union
GHG	Greenhouse Gas
FRA	Flood Risk Assessment
HER	Historic Environment Record
HGV	Heavy Goods Vehicles
HTL	Hold the Line
IAQM	Institute of Air Quality Management
IEMA	Institution of Environmental Management and Assessment
ILE	Institute of Lighting Engineers
ILP	Institute of Lighting Practitioners
CIoS	Isles of Scilly Council
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority

LULUCF	Land Use, Land Use Change and Forestry
LWS	Local Wildlife Site
MA	Management Area
MAGIC	Multi-Agency Geographical Information for the Countryside
MCA	Marine Character Area
MCZ	Marine Conservation Zone
MR	Managed Realignment
NAI	No Active Intervention
NERC	Natural Environment and Rural Communities Act
NMP	National Mapping Programme
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
NRHE	National Record of the Historic Environment
NTS	Non-Technical Summary
PDA	Proposed Development Areas
PDZ	Policy Development Zone
PEA	Preliminary Ecological Appraisal
PIA	Policy Intent Area
PPS	Planning Policy Statement
PU	Policy Unit
RC	Reinforced Concrete
SAC	Special Area of Conservation
SMP	Shoreline Management Plan
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UKCP09	United Kingdom Climate Projections 2009
UKCP18	United Kingdom Climate Projections 2018
WFD	Water Framework Directive

# 1 Introduction

## 1.1 Background to the development

The Council of the Isles of Scilly (CIoS) is proposing to construct coastal flood protection works at four sites on the Isles of Scilly. Three of these sites – Porthloo, Porth Mellon and Porth Hellick – are on the island of St Mary’s, with the fourth site – South Dunes – is on the neighbouring island of Tresco. These defences will encompass rock revetment structures and dune stabilisation works to protect residential and commercial properties and critical infrastructure on the two islands.

Environmental Impact Assessment (EIA) is a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects<sup>1</sup>, undertaken by the developer where the characteristics and/or location of a proposed development project would result in likely significant effects on the environment<sup>2</sup>.

The findings of the EIA process are documented in this Environmental Statement (ES), which forms part of the planning application and Marine Licence application for the development proposals. The circumstances under which the development project has been subject to the EIA process and the way in which the ES has been prepared, are a statutory requirement. A non-technical summary of the outcomes of the EIA is also included in this report.

## 1.2 Description of the sites

The Isles of Scilly are an archipelago of over 200 islands, located approximately 40km south west of Lands’ End, Cornwall (see Figure 1-1).

Of the islands, five are inhabited: St Mary’s, Bryher, St. Agnes, St Martin’s and Tresco. As of the most recent census (2011), the population of the islands was 2,203. Tourism is a significant component of the islands’ economy (approximately 85%) and the population of the islands increases to approximately 6,000 during the summer months, with the majority of visitors staying on St Mary’s. The largest settlement on the islands is Hugh Town, located on St Mary’s south east coast, which is also the islands administrative centre.

The Isles of Scilly form part of the ceremonial county of Cornwall and some public services are combined with those of Cornwall. However, the CIoS are the local authority for the islands and has the status of a county council.

The whole of the Isles of Scilly is an Area of Outstanding Natural Beauty (AONB), a Conservation Area and a Heritage Coast. Areas of the islands are also designated as Special Areas of Conservation (SACs) under the EU Habitats Directive, Special Protection Areas (SPAs) through the EC Birds Directive, Ramsar Sites through the 1971 UNESCO Ramsar Convention, a Marine Conservation Zone (MCZ), 26 Sites of Special Scientific Interest (SSSIs), 238 Scheduled Monuments, 129 Listed Buildings and one Grade I Registered Park and Garden. The distinctive landscapes encompass lowland heathland, enclosed pasture, hedged bulb strips, small harbours and quays and scattered rural settlements punctuated by micro-townscapes.

The islands are generally low lying (30% of the land area is below 5m in elevation) and the coastal margins and low-lying interior of St Mary’s and Tresco are vulnerable to flooding from coastal erosion, wave overtopping and storm surges. This risk of flooding could affect adjacent coastal residential and commercial properties and critical infrastructure, including main highways, sewerage network and the Islands’ freshwater supplies. This flood risk is likely to

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<sup>1</sup> Sadler B. & Fuller K. (2002). *UNEP Environmental Impact Assessment Training Resource Manual*. 2nd Edition.

<sup>2</sup> Ministry of Housing, Communities & Local Government (2019). *Environmental Impact Assessment Guidance*, 15 March 2019. Available online: <https://www.gov.uk/guidance/environmental-impact-assessment>. [Accessed 20/05/2019].

increase in the future as a result of sea level rise and increased extreme weather events due to climate change.

The risks to the islands have been highlighted by recent storm events, particularly those in 2014, 2004 and 1989. These events adversely impacted on freshwater supplies, housing, commercial property, roads, sewerage, electrical and telecommunications infrastructure (particularly on Tresco) and caused damage to quays on several of the islands.

The CIOs is proposing to undertake coastal protection works at four sites on St Mary's and Tresco (see Figure 1-2). Summary information on these four sites is provided in the following sections.



**Figure 1-1: Location of the Isles of Scilly**



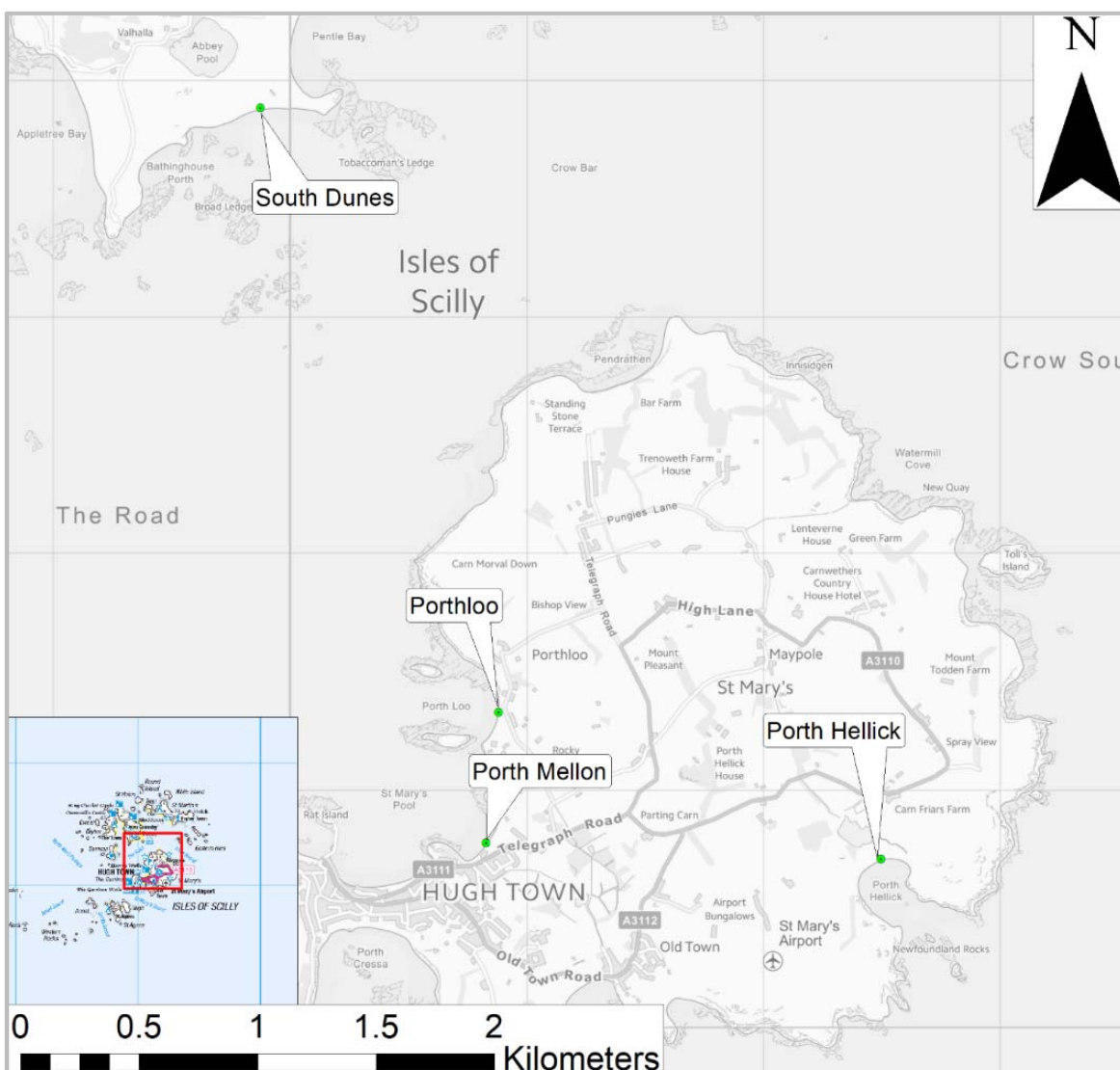


Figure 1-2: Site locations within the Isles of Scilly

### 1.2.1 Porthloo

Porthloo is a natural rocky bay located approximately 600m north-east of Hugh Town. The bay has a sand and pebble beach backed by a small embryo dune system in the southern half of the bay. Immediately landward of the dunes is the island's main commercial boat yard and boat launch/recovery area (via an existing concrete slipway), together with a small number of residential properties. Porthloo Lane, which connects the bay with urban areas to the south and more rural parts of the island to the north, is located immediately adjacent to these properties. This road is at risk of being undermined and washed away due to coastal erosion within the northern part of the bay.

At the northern end of the beach is a low-level cliff system, designated as Porthloo Site SSSI for its geological exposures of Quaternary sediments, which comprise (from the base upwards) a succession of raised beach deposits, organic silts and sands, head deposits and a capping layer of loess.

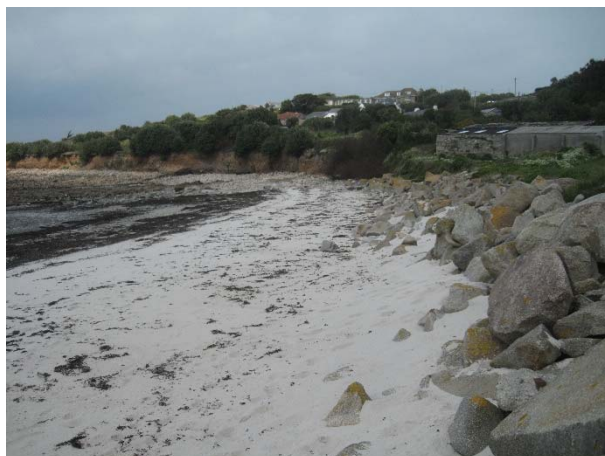
Approximately 400m to the south east of Porthloo is Lower Moors, a low-lying freshwater lake and associated aquatic habitats, which is designated as a SSSI and provides the freshwater supply to the island. Wave overtopping of the coastline at Porthloo has resulted in saline intrusion into this freshwater supply, adversely affecting the site's important ecology.



**Figure 1-3: Aerial image of Porthloo Bay identifying the extent of the permanent works**

The bay is protected from coastal erosion and flooding by existing defences. These comprise a combination of building material and local rocks and boulders in the northern end of the bay, which form an ad-hoc revetment, which is backed along part of its length by a low-level earth embankment retaining structure. In the southern half of the bay, new defences were constructed in 2014/2015, comprising dune stabilisation works and associated marram grass planting. Wave action on the seaward face of the dunes during Spring tides has exposed the underlying geotextile netting used to stabilise the dune and led to the development of a near vertical dune face.

In 2014, a new concrete slipway was constructed from the boat yard onto the beach, which forms an important site for loading and offloading materials to the island via landing craft.



**Plate 1: View of Porthloo beach looking north, with rock rubble defence in the foreground and designated (SSSI) cliff in the background**



**Plate 2: View of Porthloo beach looking south, with rock rubble defence in the foreground and exposed dune stabilisation works, concrete slipway and boat yard in the background**



**Plate 3: Boat yard at the southern end of Porthloo beach; the area in the foreground will be used as the compound/storage area during construction**



**Plate 4: Rear of dune stabilisation works adjacent to the boat yard showing greenheart timber clad retaining wall**

Anecdotal information provided by the CIoS indicates that Porthloo beach is used by residents of the area and relatively small numbers of tourists during the tourist season (outside of the winter period). However, it is not one of St Mary's most popular visitor beaches. Notwithstanding this, the beach does support a range of recreational activities during the tourist season, including pleasure boating and kayaking, and also provides the principal boat launch (via the concrete slipway) on the island.

### 1.2.2 Porth Mellon

Porth Mellon is a large, natural rocky bay, approximately 220m in length, located immediately to the north of Hugh Town on St Mary's. The bay contains a wide sand and pebble beach backed by a narrow dune system along much of its length. At its northern and southern ends, high rocky outcrops extend into the sea, separating the bay from adjacent beaches.

Positioned within the dune system, towards the southern end of the bay, are a number of commercial buildings that comprise a restaurant and several boat storage sheds. A small concrete slipway also passes through the dunes, providing boat and vehicular access to the beach. Immediately landward of the dunes is Telegraph Road, which is the principal highway connecting Hugh Town, the island's administrative centre, to the rest of the island. Adjacent to Telegraph Road are several residential and commercial properties, including Porthmellon Business Park, which contains the island's emergency response station (fire, ambulance and coastguard) and electricity sub-station, and the island's only waste and recycling facility. These areas have been identified as at risk of coastal flooding in the 1 in 200-year event.

At the southern end of the bay, south of the concrete slipway, Telegraph Road is protected by a vegetated rock and earth bank. This includes an informal pedestrian access off Telegraph Road onto the beach. The bank is vegetated with a diverse mix of native and non-native vegetation, including an array of ornamental plants.



**Figure 1-4: Aerial image of Porth Mellon bay identifying the extent of the permanent works**

Porth Mellon beach is a popular destination for the local community and tourists, particularly during the main spring/summer tourist season between May and September. The beach hosts a range of water sports activities, including the overflow from the annual World Pilot Gig Championships, held on Town Beach during the May Day Bank Holiday weekend, which is attended by approximately 3,000 participants and spectators. Porth Mellon Beach is routinely used as an overflow area during this event, hosting approximately 50 teams and their boats.



**Plate 5: View of Porth Mellon beach from Telegraph Road looking north, with the vegetated bank in the foreground and dune system and commercial and residential properties in the background**



**Plate 6: View of Porth Mellon beach looking towards the vegetated bank, with commercial and residential properties behind; this is the area of the proposed development**



**Plate 7: View of Porth Mellon beach from the rocky headland looking south showing the dune system and urban development in the background**



**Plate 8: View of Telegraph Road looking northwards showing vegetated bank in the foreground and commercial and residential properties in the background**

### 1.2.3 Porth Hellick

Porth Hellick is a large natural sandy cove, approximately 300m in length, located on the south-east coast of St Mary's, approximately 2km east of Hugh Town. The cove has an extensive sand and gravel beach, with extensive rocky/rockpool areas exposed at low tide. The cove is backed by a low dune/bank system along much of its length, with extensive, high rocky outcrops forming its eastern and western extents. At the eastern end of the bay is an informal access point onto the beach, providing vehicular access for fishermen and other beach users from Carn Friars Lane to the east. A small concrete shed is located in this area, which is also used to store small amounts of commercial fishing gear (ropes, crates, buoys, etc). In addition, a surface water outfall is located in this area, which extends approximately 20m onto the beach and is encased in concrete.

The dune/bank system is extensively vegetated with the large shrub species, *Fascicularia bicolor*, a non-native perennial plant species originally imported from Chile. The plant forms dense, rigid clumps that provide significant erosion protection for the dune/bank and adjacent hinterland and also reduces wave overtopping; in effect, it provides an ad-hoc flood and coastal erosion defence. Growing on the dune/bank and immediately seaward and landward of the dune/bank are extensive expanses of the non-native invasive plant species, Hottentot Fig *Carpobrotus edulis*.



**Figure 1-5: Aerial image of Porth Hellick bay identifying the extent of the permanent works**

To the north of the dune/bank is Higher Moors & Porth Hellick Pool (St Mary's) SSSI, which is designated for its diversity of aquatic habitats and rare and notable plant species. The pool and surrounding reed beds are important site for breeding birds. Land use in the surrounding area is primarily agricultural, with a small number of rural farmhouses located within 500m of the beach. St Mary's Airport is located on an elevated headland area approximately 500m to the west of the beach. Porth Hellick beach is popular with the local community and tourists, particularly during the spring/summer period between May and September. The cove is also used as a launch site by a small number of commercial fishermen.



**Plate 9: View of Porth Hellick beach looking west from the existing vehicular access, showing the concrete outfall in the mid-ground and the vegetated dune/bank in the background**



**Plate 10: View of Porth Hellick beach looking northwards from the rocky outcrop along its eastern side, showing the existing beach and rockpool habitat at low tide**



**Plate 11: Clumps of *Fascicularia bicolor* growing on the dune/bank across the back of the beach**



**Plate 12: View of Higher Moors & Porth Hellick Pool north of Porth Hellick beach, showing sensitive and protected habitats**

#### 1.2.4 South Dunes

South Dunes beach on Tresco is a wide sand and cobble beach, with rocky outcrops at its western extent that are exposed at low tide. The beach is backed by a high vegetated dune system along its length that are subject to wind and wave erosion during extreme high tides and storm events.

Towards the eastern end of the beach, the island's telecommunications cable, linking Tresco with St Mary's, comes ashore, whilst the associated cable junction box is located towards the toe of the dunes and is protected from erosion by short section of timber piles. At the western end of the beach is an existing concrete access ramp, which connects to the track network that cross-crosses the southern part of the island, including the island's only low tide boat access at Carn Near, a short distance further to the west.

Landward of the dunes is an expanse of grassland and heath habitat, which is designated as a SAC, SPA, Ramsar site and SSSI. It separates the coast from the Tresco Abbey and Gardens complex, which includes two large lakes – Abbey Pool, located approximately 100m from South Dunes beach, and Great Pool, which is located a short distance further to the north. Immediately landward of the dunes is the island's timber yard, which stores and processes the island's timber and wood fuel.

The dune system is extensively vegetated with Marram Grass *Ammophila arenaria*. However, growing close to the telecommunications cable junction box and on the crest of the dunes are extensive areas of the non-native invasive plant species, Hottentot Fig *Carpobrotus edulis*.

Anecdotal information provided by the CIoS indicates that the beach is used by relatively small numbers of tourists during the tourist season (outside of the winter period), mainly comprising walkers trekking the coastal path network. However, it is not one of the more popular or well-visited visitor beaches on the island.

The proposed development red line boundary drawings and general arrangement plans for each of the four schemes are provided in Appendix A.



**Figure 1-6: Aerial image of South Dunes Beach identifying the extent of the permanent works**



**Plate 13: View of South Dunes beach looking east, showing the dune system and associated wind/wave erosion in the foreground and the telecommunications cable junction box in the background**



**Plate 14: View of South Dunes beach looking westwards, showing the existing dune system and the telecommunications cable junction box, including timber erosion protection**





**Plate 15: Timber wood store and building located immediately landward of the dunes, next to the telecommunications junction box**



**Plate 16: Existing concrete access ramp at the western end of South Dunes beach**

### 1.3 Legislative basis of the Environmental Statement

The requirement for assessment of the effects of certain public and private projects on the environment is set out in European and UK law. European Council (EC) Directive No. 85/337/EEC<sup>3</sup> as amended by EC Directive No. 97/11/EC<sup>4</sup>, EC Directive No. 2011/92/EU<sup>5</sup> and EC No. Directive 2014/52/EU<sup>6</sup> (hereafter collectively referred to as 'the EIA Directive') under Article 5(1): *'Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report.'*

The EIA Directive is transposed into UK law through the EIA Regulations. These are a series of statutory instruments that set out regulations for implementing the EIA Directive through specific consenting regimes. The development proposals require consent under the Town & Country Planning Act 1990 and the Marine & Coastal Access Act 2009 and therefore fall within the requirements of [both] the Town & Country Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017/571) and the Marine Works (Environmental Impact Assessment) Regulations 2007 (SI 2007/1518) (as amended 2011, 2015, 2017). Regulation 5 of the 2017 Town & Country Planning EIA Regulations sets out the provisions relating to screening EIA Development and Regulations 7 and 8 of the 2007 Marine Works EIA Regulations set out in the requirement for screening of EIA Directive Annex I and Annex II Projects.

A combined Screening & Scoping Opinion request was made by CIOs to the CIOs Planning and Development Department on the 24<sup>th</sup> October 2017. This is available in Appendix B. A request was also made to the Environment Agency (EA) on the 26<sup>th</sup> October 2017. It was determined on 15<sup>th</sup> November 2017 by the EA, and on the 15<sup>th</sup> November 2018 by CIOs, that the proposed scheme would be EIA Development. Scoping requests were also made to Natural England and Historic England. Further detail on the outcomes of EIA Screening and Scoping are provided in section 3.2. The full EIA Screening and Scoping Opinion is also provided in Appendix C.

<sup>3</sup> EC Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment, *Official Journal of the European Union* No. L 175, 05/07/1985.

<sup>4</sup> EC Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment. *Official Journal of the European Union* No. L 073, 14/03/1997.

<sup>5</sup> EC Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of effects of certain public and private projects on the environment. *Official Journal of the European Union* L 26, 28/1/2012.

<sup>6</sup> EC Directive 2014/52/EU of 6 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, *Official Journal of the European Union* No. L 124/1, 25/4/2014.

## 1.4 Scope and content of the Environmental Statement

The EIA Screening and Scoping Opinion considered the scope of potential for likely significant effects associated with the emerging development proposals. On the basis of this and in accordance with the requirements placed upon the developer in the EIA Regulations, an appropriate content of the ES has been agreed between JBA Consulting and the CIOs and is presented herein.

In accordance with Regulation 18(3) of the Town & Country Planning EIA Regulations, and Regulation 12(2) of the Marine Works EIA Regulations the ES contains:

- *(a) a description of the proposed development comprising information on the site, design, size and other relevant features of the development;*
- *(b) a description of the likely significant effects of the proposed development on the environment;*
- *(c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
- *(d) a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;*
- *(e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and*
- *(f) any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.*

The non-technical summary (NTS) is intended to inform those who have an interest in the development but who are not concerned with the detail of the technical assessment provided in the ES. It summarises the proposals, its likely significant environmental effects and the proposed mitigating measures in non-technical language. The NTS provided in this document is also available as a stand-alone document and in an electronic format.

The ES is organised on an environmental topic basis as set out in Regulation 4 (2). For each environmental topic, a brief overview of the legislative and planning policy context is provided as required to set the context of the topic chapter. The topic-specific baseline conditions have been collected and used to inform the assessment, and the potential impacts and likely significant effects of the proposed development the environment have been determined for each of the scoped in environmental issues, plus any relevant additional information that has come to attention. Mitigation measures are proposed to reduce the significance of effects where possible, and the resulting residual effect is reported. The approach to EIA is iterative, whereby the assessment and ongoing consultation with stakeholders influence the design evolution of the development proposals. Further detail on the EIA process is provided in Section 3.1.

For consistency and ease of cross reference, each environmental topic chapter presented in the ES are structured with the following headings:

- 1 Introduction
- 2 Legislative and Planning Policy Context
- 3 Baseline Conditions
- 4 Assessment Methodology and Significance Criteria
- 5 Potential Impacts and Significant Effects
- 6 Mitigation Measures
- 7 Residual Effects

The structure of the ES is set out in Table 1-1.

**Table 1-1: Structure of the ES**

ES section	Section title
<b>Non-Technical Summary</b>	
<b>Chapter 1</b>	<b>Introduction</b>
1.1	Background to the development
1.2	Description of the sites
1.3	Legislative basis of the environmental statement
1.4	Scope and content of the environmental statement
<b>Chapter 2</b>	<b>Proposed development</b>
2.1	Strategic need for the proposed development
2.3	Planning policy context
1.1	Environmental constraints
2.6	Option selection and alternatives
2.5	Stakeholder engagement
2.6	Description of the proposed development
2.7	Construction methodology
2.8	Operational requirements and decommissioning
<b>Chapter 3</b>	<b>Environmental impact assessment methodology</b>
3.1	The EIA process
3.2	EIA screening and scoping
3.2.3	The environmental statement
3.3	EIA method of assessment
<b>Chapter 4</b>	<b>Coastal processes, geomorphology and flood risk</b>
<b>Chapter 5</b>	<b>Biodiversity and nature conservation</b>
<b>Chapter 6</b>	<b>Landscape</b>
<b>Chapter 7</b>	<b>Historic environment</b>
<b>Chapter 8</b>	<b>Land use, tourism and public amenity</b>
<b>Chapter 9</b>	<b>Sustainability and climate change</b>
<b>Chapter 10</b>	<b>Other construction related effects</b>
<b>Chapter 11</b>	<b>Cumulative and in-combination effects</b>
<b>Chapter 12</b>	<b>Conclusions</b>
12.1	EIA outcomes
12.2	Recommendations
12.3	Follow up on recommendations and monitoring

## 2 Proposed development

### 2.1 Strategic need for the proposed development

The proposed development comprises the construction of new flood defence and coastal erosion infrastructure at four sites on the Isles of Scilly; three sites on St Mary’s and one on Tresco. Together they form an overarching project for Sea Defence and Dune Management on the Isles of Scilly. The proposed works will strengthen the existing sea defences, which comprise a mix of manmade structures, natural dune systems and other natural features. Together these defences protect a range of critical economic, social and environmental infrastructure.

#### St Mary’s

The works at the three sites on St Mary’s will support the natural drainage systems at Lower Moors and Higher Moors, reducing the amount of sea water inundation and preserving the island’s freshwater supply whilst protecting residential properties at Porthloo and Porth Mellon, key road infrastructure into Hugh Town (the administrative centre of the islands), the only business park on the Isles of Scilly, and the islands’ waste management and recycling site at Porth Mellon.

#### Tresco

The proposed scheme at South Dunes will safeguard essential communication links for the island community, including the island’s only low tide access point (at Carn Near), the heliport and the telecommunications supply. The scheme will also support the protection of the freshwater supplies on the island.

In addition, the works on both islands will also support protection of approximately 20 hectares of coastal and terrestrial habitats to attain better conservation status; these include areas protected under a range of international and national nature conservation legislation. Table 2-1 identifies the critical infrastructure on the Isles of Scilly that will be protected by the proposed four schemes.

**Table 2-1: Infrastructure that would be protected by the proposed schemes**

Service	Location	Description
Water and sewerage	St Mary’s: Lower and Higher Moors	Groundwater abstraction wells.
	St Mary’s: Old Town, Porth Mellon, Porthloo	Mains water supply.
	St Mary’s: Old Town	Mains sewerage and bio-bubble treatment plant.
Waste	St Mary’s: Porth Mellon / Moorwell	Islands’ waste management and recycling site.
Communications	Tresco: South Dunes	Telecommunications link for the island.
Energy	St Mary’s: Porth Mellon, Trench Lane, Old Town	Electricity substations.
	Tresco: Carn Near Quay	For low tide diesel and bottled gas delivery and access by service engineers.
Emergency Services	St Mary’s: Porthmellon Business Park	Fire, Ambulance and Coastguard stations.
Transport – on island	St Mary’s: Porthloo	Only road access to Porthloo and site of the principal boat park and associated maritime businesses.
	St Mary’s: Porth Mellon (SW end).	Principal highway connecting the administrative centre of Hugh Town to the rest of the island.

	St Mary's: Old Town	Beachfront principal highway connecting Hugh Town to Old Town
	Tresco: Carn Near Road	For access to the low water quay at Carn Near.
Transport – off island and to the mainland	Tresco: Carn Near Road	For low tide access and delivery of supplies to, from and between the islands.
	Tresco: Heliport	The only direct access to Tresco from the mainland

Previous works on the management of the dunes and flood defences at Porthloo, Porth Mellon and Porth Hellick have highlighted how the issues of flood and coastal erosion risk management at discrete sites are interlinked across St Mary's. This was recognised in the 2016 review of the Cornwall and Isles of Scilly Shoreline Management Plan (SMP2), where greater connectivity across sections of the island, in terms of risk, use and impact, effectively linked Policy Units (PUs) – this was particularly the case at Porthloo and Porth Mellon; this led to the grouping of certain PUs into Policy Intent Areas (PIAs). The proposed works will combine risk management solutions at the sites into a single project, which will address a range of issues affecting the PIA at the same time.

The Isles of Scilly are vulnerable to the impact of climate change, rising sea level, inundation and coastal erosion. The islands experience Atlantic storms and storm surges, which presents a significant risk to much of the housing stock, critical infrastructure, freshwater resources and commercial property located on the narrow coastal strip. The risks to the islands have been highlighted by recent storms, particularly those of 2014, 2004 and 1989, and the impact these have had on key island infrastructure.

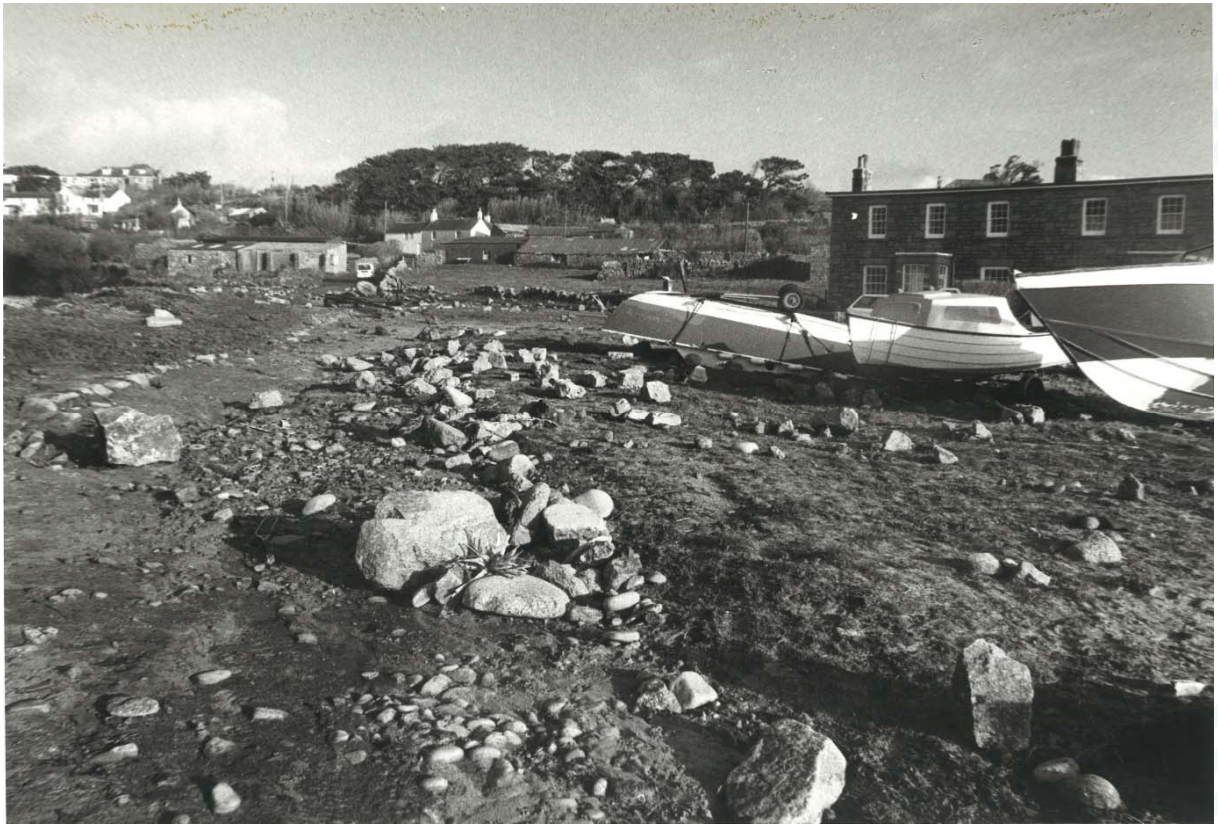
### 2.1.1 Porthloo

The principal objective of the Porthloo scheme is to reduce the vulnerability of the Lower Moors SSSI (one of only two freshwater sources on St Mary's) to saline intrusion. The scheme will also protect Porthloo Lane, the access road at the northern end of the bay linking Porthloo to Hugh Town and the wider island, from being undermined and washed away, and will also protect the island's only commercial boat park, located at the southern end of the bay.

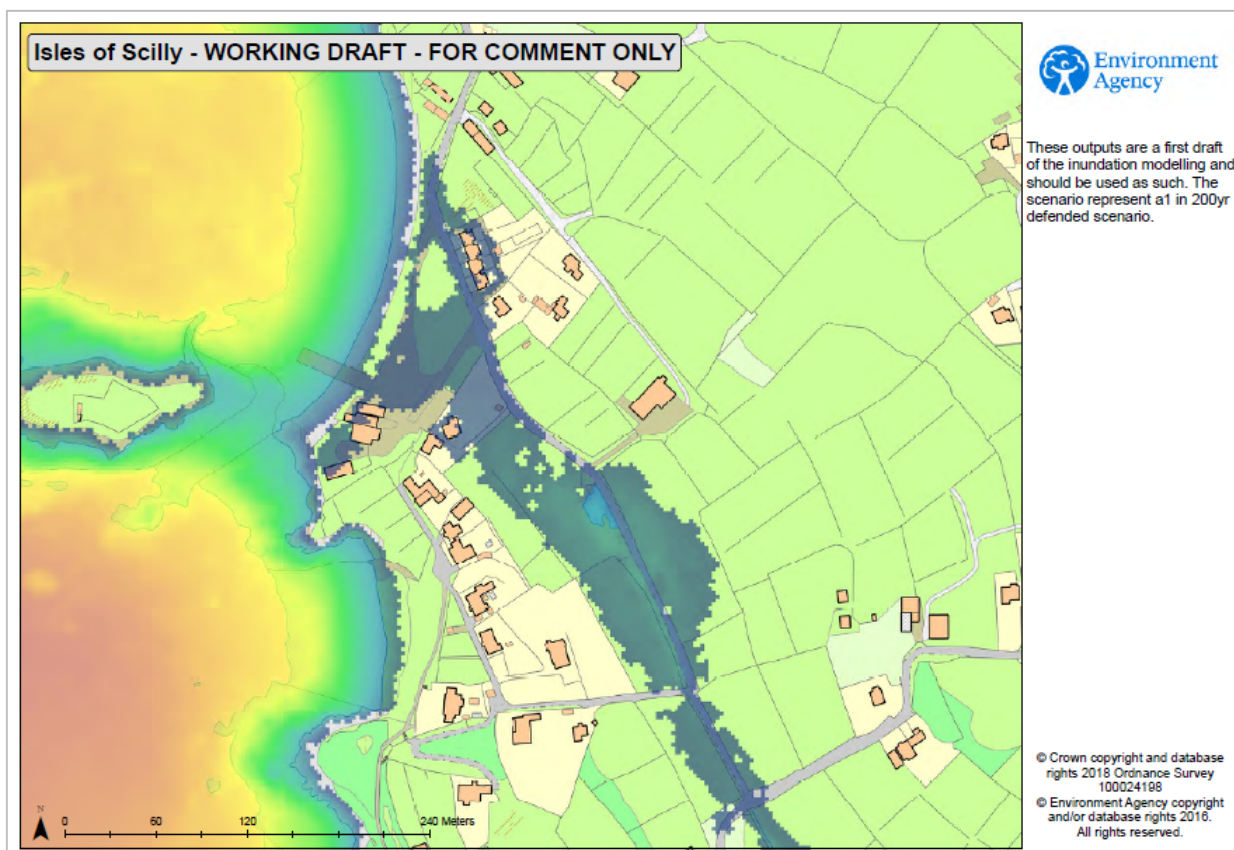
Porthloo Bay's westerly aspect makes it vulnerable to wave action and the area was subject to wave overtopping, breaching and erosion during storm conditions in 1989 and 2014 (see Figure 2-1). The SMP2 identifies the preferred policy for Porthloo as No Active Intervention (NAI). However, due to its westerly aspect, Porthloo Bay is vulnerable to wave action, and the SMP2 estimates that inland erosion could be as much as 30m by 2105.

Further topographical study to identify the risk to the Lower Moors SSSI (a recommendation of the SMP2), together with updated flood modelling undertaken by the Environment Agency (in 2018), confirms the flood water drainage link between Porthloo and the SSSI, as well as further highlighting the risk to neighbouring residential and commercial properties (see Figure 2-2).

There has been third party investment in the defences in this area, demonstrating that at a local level, there is more economic value associated with this frontage than allowed for in the SMP2. The boat park and marine workshops cannot be relocated as there is already pressure for land space on the island. This area is therefore integral to the economy of the Isles of Scilly and its viability as a community.



**Figure 2-1: Debris from wave overtopping at Porthloo following the 1989 storm event**



**Figure 2-2: Draft Flood Risk Map showing inundation at Porthloo during the 1-in-200-year event (Environment Agency, 2018)**

### 2.1.2 Porth Mellon

The objective of the Porth Mellon scheme is to formalise the present defence within the south west corner of the beach and provide increased protection to a range of assets. These include the Lower Moors SSSI, which is at risk from saline intrusion, several residential properties and the island's only industrial estate, which includes the Isles of Scilly's only waste and recycling facility. In addition, the scheme will protect Telegraph Road, the principal access route into Hugh Town and areas to the north.

The preferred coastal management approach for Porth Mellon identified in the SMP2 is Hold the Line (HTL) during the first epoch (to 2025) and Managed Realignment (MR) in epoch 2 (2025–2055) and 3 (2055–2105). Much of the bay is backed by a narrow dune system, which acts as the defence protecting the adjacent low-lying hinterland. Along much of its length, there is sufficient space for the dune to roll landwards and increase both its height and width, enabling it to adapt to changing coastal conditions as a result of climate change and sea level rise. However, in the south western corner, the dune is absent and the vegetated bank present there is subject to wave undercutting, which is affecting the adjacent Telegraph Road, and wave overtopping. During a storm event in 2014, the area suffered undercutting of the bank, and the slipway in this location was also breached.

### 2.1.3 Porth Hellick

The purpose of the Porth Hellick scheme is to reduce saline intrusion into the Higher Moors Pool and surrounding wetland area during storm events; this area is designated as the Higher Moors and Porth Hellick Pool SSSI and forms the predominant freshwater resource for St Mary's.

Porth Hellick is vulnerable to south-easterly storms, and significant saline inundation of the Higher Moors area could have significant implications for the sensitive freshwater ecology there and for the freshwater supply on the island. The SMP2 identifies the preferred coastal risk management policy as HTL in epoch 1 (to 2025) and MR in epoch 2 (2025–2055) and epoch 3 (2055–2105). The SMP2 also estimates up to 65m of coastal erosion by 2105, which would cut through the existing sand/gravel dune bank that forms a ridge at the back of the beach, protecting the sensitive hinterland. Therefore, the SMP2 identified the potential need to realign the defence line to provide a new, robust defence for the Higher Moors area.

#### **2.1.4 South Dunes**

The objective of the South Dunes scheme is to protect the adjacent important habitats (protected under a range of international and national legislation) and critical infrastructure (the island's freshwater supply, the main telecommunications infrastructure – cable and junction box – and the island's only timber yard and wood fuel store) from erosion and breaching during storm conditions; this would potentially threaten saline intrusion into Abbey Pool and Great pool, to the north of South Dunes, which are connected to the island's main aquifer and also cut off access to the existing jetty at Carn Near, the island's only low tide access point and the island's heliport.

The hinterland is currently protected by a dune system that extends the length of the beach. However, significant erosion at the toe of the dunes has taken place, leading to dune slumping. The SMP2 states that the preferred coastal management policy as NAI in all three epochs and identifies that coastal erosion may be in excess of 30m over the next 100 years, with erosion of up to 75m in areas along the western coast. The shoreline at South Dunes does not act like a typical linear beach frontage, as its coastal processes are complicated by being part of a wider archipelago. As a result, there has been up to 22% erosion of the cross-sectional beach from 2007–2017.

## **2.2 Planning policy context**

### **2.2.1 National Planning Policy Framework (NPPF), Ministry of Housing, Communities and Local Government, February 2019**

The National Planning Policy Framework (NPPF)<sup>7</sup> forms the basis of development plan making in England and is a material consideration in planning decisions. The NPPF details the Government requirements for the planning system, as well as providing a framework within which councils and local communities should produce planning documents, reflecting the priorities and needs and the relevant community.

A core theme of the NPPF is the delivery of sustainable development and it confirms the three dimensions of sustainable development as economic, social and environmental. The NPPF outlines UK Government policy relating to 16 key themes. Those that are applicable to the Isles of Scilly coastal protection schemes are summarised in Table 2-2.

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<sup>7</sup> Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework [Online] Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/779764/NPPF\\_Feb\\_2019\\_web.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf) [Accessed: 14 May 2019]



**Table 2-2: Themes within the NPPF of relevance to the proposed scheme**

Theme	Policy summary	Relationship to the proposed development
<b>Promoting healthy and safe communities</b>	Planning policies and decisions should aim to achieve healthy, inclusive and safe places which: c) enable and support healthy lifestyles, especially where this would address local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking or cycling.	The proposed developments would protect residential properties and community facilities including areas of green infrastructure (most notably the coastal hinterland) and coastal footpaths, thereby continuing to support a healthy and active lifestyle.
<b>Meeting the challenge of climate change, flooding and coastal change</b>	Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.	The proposed schemes would reduce coastal erosion and flood risk to the sites and surrounding areas, including residential and commercial properties and other key infrastructure, increasing future community resilience to the effects of climate change.
<b>Conserving and enhancing the natural environment</b>	Planning policies and decisions should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, recognising the intrinsic character and beauty of the countryside and maintaining the character of the undeveloped coast.	The proposed schemes would protect approximately 20ha of designated habitats. Any potentially significant effects on landscape quality or important or protected wildlife habitats will require effective mitigation through careful design and/or good construction practice so as to minimise the significance of any adverse effects.
<b>Conserving and enhancing the historic environment</b>	Local planning authorities should assess the significance of any effects on heritage assets (including effects on the setting of a heritage asset) taking account the available evidence. They should avoid or minimise any conflict between the heritage asset’s conservation and any aspect of a proposal. Any harm to a designated heritage asset should require clear and convincing justification. Where a proposed development will lead to substantial harm to a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm is necessary to achieve substantial public benefits that outweigh that harm.	The proposed schemes are located in close proximity to a range of designated heritage assets. The extent and nature of these assets and any setting requirements will need to be taken into account; appropriate mitigation through careful design and/or good construction practice will be necessary so as to minimise the significance of any adverse effects.

### 2.2.2 The UK Marine Policy Statement, HM Government, March 2011

The UK Marine Policy Statement is to be considered for marine development in the south west of England until the South West Marine Plan is adopted (it is currently in draft format and includes draft preferred policies).

The UK Marine Policy Statement sets out a UK vision for the marine environment. It states that:

*'The UK vision for the marine environment is for 'clean, healthy, safe, productive and biologically diverse oceans and seas.' The UK high level marine objectives published in April 2009 set out the broad outcomes for the marine area in achieving this vision and reflect the principles for sustainable development. The process of marine planning will contribute to the achievement and integration of sectoral/ activity specific policy objectives within a framework of economic, social and environmental considerations in order to deliver the high level marine objectives. This approach will help ensure the sustainable development of the UK marine area and deliver the UK vision'.*

The UK Marine Policy Statement also considers climate change adaptation and mitigation and coastal change and flooding, both of which are relevant to the proposed coastal protection schemes. The Policy Statement suggests the following;

Marine Plan authorities should consider the opportunities to increase the resilience of the marine environment to adapt to the impacts of climate change including by encouraging development that takes account of the impacts of climate change over their estimated lifetime, in particular taking account of risks such as increased land and sea temperatures and sea level rise and possible increase in risk from extreme events such as flooding and coastal erosion.

Account should be taken of the impacts of climate change throughout the operational life of a development including any de-commissioning period. Marine plan authorities should not consider development which may affect areas at high risk and probability of coastal change unless the impacts upon it can be managed. Marine plan authorities should seek to minimise and mitigate any geomorphological changes that a development will have on coastal processes, including sediment movement.

The proposed schemes explicitly seek to manage the environmental, social and economic risks to the Isles of Scilly both now and in the future due to climate change. The predicted impacts of climate change are therefore an inherent consideration in the design and operation of the schemes. Potential effects on coastal process have been a key consideration throughout the development of the schemes and a formal assessment of these effects is provided in this ES.

### **2.2.3 Cornwall and Isles of Scilly Shoreline Management Plan (SMP2), Cornwall and Isles of Scilly Coastal Advisory Group, February 2011**

Strategic policies guiding coastal flood and erosion protection on the Isles of Scilly are set out in the Cornwall and Isles of Scilly SMP (adopted in 2011)<sup>8</sup>, a non-statutory policy document developed by the Cornwall and Isles of Scilly Coastal Advisory Group.

Specifically, the Isles of Scilly is situated within SMP2 Policy Development Zone (PDZ) 17 (PDZ17). Each of the five inhabited islands is covered by a separate SMP2 Management Area; three of the proposed schemes lie within Management Unit MA42 (St Mary's), whilst the South Dunes scheme is located within Management Unit MA44 (Tresco). These Management Units are further divided into Policy Units (PUs), which comprise defined sections of coastline.

The SMP2 builds upon the first iteration of the SMP, SMP1, published in 1999, which defined the preferred strategic approach to flood risk management for each PU area for the subsequent 50-year period. The SMP2 reviewed and revised (where necessary) the policies contained in the SMP1 and extended the plan period to 100 years. In doing so, it set out the preferred policy option in each PU for three epochs (0-20 years, 20-50 years and 50-100 years). Table 2-3 provides a summary of the adopted policies for the relevant SMP1 and SMP2 PUs.

<sup>8</sup> <https://www.cornwall.gov.uk/environment-and-planning/countryside/estuaries-rivers-and-wetlands/flood-risk/coastal-erosion-and-shoreline-management/shoreline-management-plans/shoreline-management-plan-2011-smp2/>

**Table 2-3: Summary of specific SMP policies for the relevant Policy Units**

Policy Unit	SMP1 Policy		SMP2 Policy			Comment
	50 years	2025	2055	2105		
42.7	Porth Loo	Retreat the Line	No Active Intervention	Managed Realignment	Managed Realignment	Likely to be necessary to consider realignment of the road beyond epoch 1.
42.5	Porth Mellon	Hold the Line	Hold the Line	Managed Realignment	Managed Realignment	Realignment beyond epoch 1 needed to consider management of the increasing flood risk.
42.10	Porth Hellick	Hold the Line	Hold the Line	Managed Realignment	No Active Intervention	Consideration should be given to realignment of the embankment to provide improved, robust natural defence to the Higher Moors area.
44.6	South Beach / Pentle Bay	Advance the Line	No Active Intervention	No Active Intervention	No Active Intervention	Would satisfy objectives relating to the AONB and SPA / SAC designations.

The management policy for Porth Mellon and Porth Hellick is Hold the Line for the first epoch, after which Managed Realignment is proposed; at Porthloo, the adopted policy is No Active Intervention for epoch 1, followed by Managed Realignment; at South Beach, the policy is No Active Intervention for all three epochs. The proposed defence works are therefore potentially in conflict with the adopted policies for the relevant PUs, particularly in epoch 2 and 3.

The SMP2 identified significant coastal erosion rates for each of the PUs and at Porthloo and Porth Mellon recommended further topographic analysis and flood risk modelling to further assess the risk and impact of over-topping on the Lower Moors SSSI and associated impact on the freshwater supply for the island.

A mid-term review of the SMP2 policies for the Isles of Scilly was undertaken in 2016<sup>9</sup>. The purpose of the review was to reassess the most appropriate actions to manage the island’s changing coastline, taking into account new information.

The mid-term review identified how coastal flooding risks at apparently discrete sites around St Mary’s were sometimes inter-linked, which led to the grouping of certain PUs into Policy Intent Areas (PIAs). These PIAs share similar risks, uses and impacts, but are not necessarily contiguous areas.

The PUs for Porthloo and Porth Mellon were grouped into a single PIA (42b) and the mid-term review provided further assessment of the risks of coastal flooding and surface water flooding (caused by tidal locking) affecting key critical infrastructure in the PIA, including the island’s waste management site and principle source of freshwater (Lower Moors), as well as the landscape and ecological quality of the coastal areas, coastal land use and the island’s transport network. The mid-term review also contained further economic analysis of the assets at risk and recognised the greater economic value in the Porthloo and Porth Mellon frontages than determined by the high-level economic analysis undertaken through the SMP2.

At Porth Mellon, the mid-term review confirmed that the preferred approach over most of the frontage is to maintain the width of the existing dune system (to protect the adjacent road, buildings and flow link to the Lower Moors), but that there is a need for local residents and businesses to adapt to increasing future flood risk. The mid-term review also recognised that

<sup>9</sup> [https://www.scilly.gov.uk/sites/default/files/Isles%20of%20Scilly%20SMP2%20Mid%20Term%20Review\\_Cover%20Report%20FINAL.pdf](https://www.scilly.gov.uk/sites/default/files/Isles%20of%20Scilly%20SMP2%20Mid%20Term%20Review_Cover%20Report%20FINAL.pdf)

in the southern end of the bay, there may be a need to undertake works to protect the road. At Porthloo, the mid-term review highlighted the continuing coastal erosion and pressure on the existing defences due to increased exposure to wave action. However, it concluded that consideration should be given to setting back the existing defences in the southern part of the bay, whilst seeking to maintain protection of the boat yard, whilst in the northern part, there may be opportunities to realign the road.

At Porth Hellick, the review confirmed that the frontage protects the freshwater supply and important ecology at Higher Moors. However, it reiterated the SMP2 preferred approach of managed realignment in epoch 2, allowing the coastline and moor area to adapt naturally to future changes.

At Tresco, the review grouped South Beach into PIA44a, together with wider coastline in the southern part of the island. The review acknowledged wave and wind erosion of the dune system following the 2014 storms and the risk of erosion to the telecommunications cable that comes ashore on the beach and the potential for this to increase flood risk to the hinterland. Whilst the review concluded that hard defences would not be appropriate in this area due to the impact on the naturally developing shoreline, it did acknowledge that soft engineering works to stabilise the dunes may be acceptable and that this would provide adequate protection of the hinterland area.

#### **2.2.4 Isles of Scilly Pre-Submission Draft Local Plan, Council of the Isles of Scilly, 2019**

The Isles of Scilly Local Plan sets out the proposals and policies for future development and use of land on the Isles of Scilly. The Local Plan (2015–2030) is currently at Pre-Submission Draft stage. The Local Plan sets out planning policy for the county, which will be used to help determine planning decisions and also provides an indication of whether planning applications will be approved. It also sets out a vision for the county that states *The Isles of Scilly is a highly desirable place where people are able to live well, work productively, and move freely between islands and the mainland; they can also benefit from excellent education, leisure, health and social care facilities, within a world-class environment in harmony with nature. The distinctiveness and exceptional environment, with the influence of the sea, continue to provide a strong sense of community, identity and belonging; these remain vital assets for the islands' economy and well-being. The islands' infrastructure is a beacon of sustainability for the UK and beyond; it provides an affordable, innovative and low-carbon model for managing energy water and waste, with considerable benefits to the environment and residents' quality of life.*

Policies relevant to the proposed development include:

##### *Policy SS7 – Flood Avoidance*

- (1) Development proposals to build below the 5 metre contour (5 metres above Ordnance Datum, Newlyn) or in other areas shown to be at risk of flooding or coastal erosion, as set out in the policies map, will not be permitted unless an appropriate and proportionate Flood Risk Assessment (FRA) demonstrates how the flood risk will be managed, and that;
  - A) the development, taking climate change into account, does not create a flood risk over its lifetime to existing or proposed properties and/or surrounding land;
  - B) appropriate acceptable mitigation and recovery measures can be undertaken to ensure no significant adverse impact on human health or the natural environment as well as cultural heritage; and
  - C) if there is any doubt, the precautionary principle<sup>10</sup> will apply.
- (2) All major developments, regardless of location, should also be accompanied by a proportionate FRA and appropriate sustainable drainage system.

<sup>10</sup> The Precautionary Principle is risk assessment and avoidance.

*Policy OE1 – Protecting and enhancing the Landscape and Seascape*

- Development will only be permitted where it aligns with the statutory purpose of AONB, and therefore conserves, and where appropriate, enhances the island’s landscape, seascape and scenic beauty; unless the benefits of the proposal are demonstrated to clearly outweigh any harm. Development must take into account and respect:
  - A) The distinctive character, quality, scenic beauty and sensitivity of the landscape and seascape;
  - B) The undeveloped and special character of the Heritage Coast;
  - C) Other qualities, such as important features and views, dark skies and tranquillity, and having regard to the AONB Management Plan; and
  - D) The Isles of Scilly Landscape Character Study and any successor or associated documents.

**2.2.5 Local Flood Risk Management Strategy, Council of the Isles of Scilly, March 2017**

Under the Flood and Water Management Act 2010, CIOs is Lead Local Flood Authority (LLFA) for the islands. Section 9 of the Act places a duty for a LLFA to develop, maintain, apply and monitor a strategy for local flood risk management in its area. The purpose of the strategy is to help reduce the number of people at risk of flooding, increase the resilience of our local communities and reduce the social and economic impact of flooding.

The Local Flood Risk Management Strategy (LFRMS) states that the following areas of concern are vulnerable to flooding, and the reasons why:

- Porth Mellon: Undercutting of the bank and road along with breaching of the stop-log defence at the top of the slipway at the south western end of the beach. Vulnerability of the dune embankment at the back of the beach and the overtopping of the dunes and sea wall and the north eastern end of the beach.
- Porthloo: Erosion, breaching and overtopping of the embankment along the shoreline.
- Porth Hellick: Shingle bank protecting the Higher Moors SSSI and one of the island’s main freshwater sources, subject to overtopping and erosion.
- South Dunes Complex: A dynamic dune complex subject to considerable erosion and sand removal. There is a vulnerable low point at the entry of the BT communications cable into the island.

**2.2.6 Isles of Scilly Area of Outstanding Natural Beauty Management Plan 2015-2020**

Section 89 of the Countryside and Rights of Way Act 2000 places a statutory duty of local authorities with an Area of Outstanding Natural Beauty (AONB) in their area to produce a management plan and once adopted to review them at intervals of no more than 5 years. AONB Management Plans are intended to:

- Act as strategic guidance to assist the integration of other relevant plans and an integrated vision for the future of the AONB as a whole;
- Showcase the special qualities and significance of the AONB and the importance of its landscape features;
- Be a framework for action that has a positive influence on environmental quality, as well as on the vibrancy and sustainability of the local community, its economy, heritage and culture;
- To motivate and inspire action at the local level to encourage people to discover, appreciate, enjoy and understand the AONB landscape and its natural and cultural features; and
- Identify actions which will support economic and social activities that contribute to the conservation and enhancement of the AONB landscape and its special qualities.

The Isles of Scilly Area of Outstanding Natural Beauty Management Plan contains a vision for the designation, that it sets out to achieve through 18 objectives. The Vision states that *"The Isles of Scilly AONB will remain one of England's finest landscapes through the conservation and enhancement of its special features. The Islands will be valued and enjoyed by residents and visitors who will have an understanding of the AONB's special and unique qualities. The Islands will support a population with a strong sense of community, working together to achieve environmental, economic and community sustainability"*.

Applications for Planning Permission are primarily considered against these 18 objectives set out in the Management Plan. Those of relevance to the proposed sea defence schemes include:

- Objective 2: Ensure that conservation and enhancement of landscape, wildlife and geology underpin understanding and appreciation of the AONB environment whilst having regard to the conservation objectives of the Natura 2000 sites;
- Objective 5: Conserve and enhance Scilly's marine environment as an economic, cultural and social resource bringing benefit to the Island's communities;
- Objective 13: Conserve and enhance the AONB's natural and historic environment and ecosystem services as an economic, cultural and social resource bringing benefit to the Islands' communities;
- Objective 17: Ensure that development does not adversely affect the AONB designation and, wherever possible, enhances the special qualities of the AONB; and
- Objective 18: Ensure that all infrastructure and development contribute positive and sustainably to the AONB designation.

### 2.3 Environmental constraints

Environmental constraints have been identified within up to 5km of the development sites, on the basis of a review of readily available environmental information. This includes statutory and non-statutory designated sites and other environmental features. Table 2-4 to Table 2-7 provide a summary of the key statutory and non-statutory designated sites within 1km of each development site (also see constraints maps in Appendix A).

Where relevant, further consideration is given to environmental constraints within the baseline section of each of the EIA topic chapters.

**Table 2-4: Key statutory and non-statutory environmental designations identified within 1km of the Porthloo scheme**

EIA topic	Environmental designation	Within footprint of the permanent works	Within the construction footprint	Within 1km of the permanent works
<b>Biodiversity and nature conservation</b>	<b>Special Area of Conservation (SAC)</b>			Isles of Scilly Complex SAC: 35m to the E
	<b>Special Protection Area (SPA)</b>			
	<b>Ramsar Site</b>			
	<b>Site of Special Scientific Interest (SSSI)</b>			Porthloo SSSI: Adjacent to the north Lower Moors (St Mary's) SSSI: 470m to the SE.
	<b>Marine Conservation Zone (MCZ)</b>			
<b>Historic environment</b>	<b>Listed building</b>			Glasshouse and Packing Shed at Rocky Hill Farm (Grade II): 350m to the SE; Coastguard's Look Out Tower: 750m to the NE; Numerous listed buildings in Hugh Town: 650m-1km to the S/SW.
	<b>Scheduled monument</b>			World War II pillbox between Thomas' Porth and Porthloo, St Mary's: 150m to the S; Civil War breastwork and battery on Newford Island, St Mary's: 220m to the SW; Prehistoric linear boundary, cairn and post-medieval building on Taylor's Island, St Mary's: 300m to the NW; Numerous scheduled monuments >500m.
	<b>Registered Parks and Gardens</b>			
<b>Landscape</b>	<b>Area of Outstanding Natural Beauty (AONB)</b>	Isles of Scilly AONB		
	<b>Heritage Coast</b>	Isles of Scilly Heritage Coast		
<b>Water environment</b>	<b>Water Framework Directive (WFD) waterbody</b>	Isles of Scilly Groundwater Body (Ref: GB40802G081200): Overall status = Good (2016).	Scilly Isles Surface Waterbody (Ref: GB620807080000): Overall status = Good (2016).	

	<b>Source Protection Zone (SPZ)</b>			Zone II (Outer Protection Zone): 50m to the SE; Zone I (Inner Protection Zone): 250m to the SE.
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**Table 2-5: Key statutory and non-statutory environmental designations identified within 1km of the Porth Mellon scheme**

EIA topic	Environmental designation	Within footprint of the permanent works	Within the construction footprint	Within 1km of the permanent works
<b>Biodiversity and Nature Conservation</b>	<b>Special Area of Conservation (SAC)</b>			Isles of Scilly Complex SAC (50m to the NE)
	<b>Special Protection Area</b>			
	<b>Site of Special Scientific Interest (SSSI)</b>			Lower Moors (St Mary's) SSSI: 200m to the SE; Porthloo SSSI: 530m to the N; Peninnis Head (St Mary's) SSSI: 700m to the S.
	<b>Marine Conservation Zone</b>			
<b>Historic Environment</b>	<b>Listed Building</b>			Glasshouse and Packing Shed at Rocky Hill Farm (Grade II): 410m to the NE; Numerous listed buildings in Hugh Town: Approx. 150m to 1km to the SW; Numerous listed buildings around western side of Old Town Bay 700m to the S; Former Fish Salting Trough on East Side of Old Town Bay 770m to the south.
	<b>Scheduled Monument</b>			Post-medieval smugglers' cache at Porth Mellon, 110m west of Harry's Walls Battery, St Mary's: 200m to the N; Harry's Walls unfinished 16th century artillery castle and adjacent prehistoric standing stone at Mount Flagon, St Mary's: 250m to the NE; Civil War breastwork and battery on Newford Island, St Mary's: 450m to the N; World War II pillbox between St Thomas' Porth and Porthloo, St Mary's: 450m to the N; Numerous Scheduled Monuments >500m.
	<b>Registered Parks and Gardens</b>			
<b>Landscape</b>	<b>Area of Outstanding Natural Beauty (AONB)</b>	Isles of Scilly AONB		
	<b>Heritage Coast</b>	Isles of Scilly Heritage Coast		
<b>Water Environment</b>	<b>Water Framework Directive (WFD)</b>	Isles of Scilly Groundwater Body (Ref:	Scilly Isles Surface Waterbody (Ref:	



	<b>Waterbody</b>	GB40802G081200): Overall status = Good (2016).	GB620807080000): Overall status = Good (2016).	
	<b>Source Protection Zone (SPZ)</b>			Zone II (Outer Zone): 230m to the NE; Zone I (Inner Zone): 430m to the NE.

**Table 2-6: Key statutory and non-statutory environmental designations identified within 1km of the Porth Hellick scheme**

<b>EIA topic</b>	<b>Environmental designation</b>	<b>Within footprint of the permanent works</b>	<b>Within the construction footprint</b>	<b>Within 1km of the permanent works</b>
<b>Biodiversity and nature conservation</b>	<b>Special Area of Conservation (SAC)</b>			Isles of Scilly Complex SAC: 150m to the S.
	<b>Special Protection Area (SPA)</b>			
	<b>Ramsar Site</b>			
	<b>Site of Special Scientific Interest (SSSI)</b>	Higher Moors & Porth Hellick Pool (St. Mary's) SSSI		
	<b>Marine Conservation Zone (MCZ)</b>		Isles of Scilly Sites - Peninnis to Dry Ledge	
<b>Historic environment</b>	<b>Listed building</b>			
	<b>Scheduled monument</b>		Prehistoric entrance grave and regular field system on north western Porth Hellick Down, St Mary's	Numerous scheduled monuments >400m.
	<b>Registered Parks and Gardens</b>			
<b>Landscape</b>	<b>Area of Outstanding Natural Beauty (AONB)</b>	Isles of Scilly AONB		
	<b>Heritage Coast</b>	Isles of Scilly Heritage Coast		
<b>Water environment</b>	<b>Water Framework Directive (WFD) waterbody</b>	Isles of Scilly Groundwater Body (Ref: GB40802G081200): Overall status = Good (2016).	Scilly Isles Surface Waterbody (Ref: GB620807080000): Overall status = Good (2016).	
	<b>Source Protection Zone (SPZ)</b>			Zone II (Outer Protection Zone): 100m to the N;

				Zone I (Inner Protection Zone): 300m to the N.
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**Table 2-7: Key statutory and non-statutory environmental designations identified within 1km of the South Dunes scheme**

<b>EIA topic</b>	<b>Environmental designation</b>	<b>Within footprint of the permanent works</b>	<b>Within the construction footprint</b>	<b>Within 1km of the permanent works</b>
<b>Biodiversity and nature conservation</b>	<b>Special Area of Conservation (SAC)</b>	Isles of Scilly Complex SAC		
	<b>Special Protection Area (SPA)</b>	Isles of Scilly SPA		
	<b>Ramsar Site</b>	Isles of Scilly Ramsar		
	<b>Site of Special Scientific Interest (SSSI)</b>	Pentle Bay, Merrick and Round Islands SSSI		
	<b>Marine Conservation Zone</b>			
<b>Historic environment</b>	<b>Listed building</b>			Cresset from St Agnes Lighthouse in Tresco Abbey Gardens: 380m to the NW; Remains of Tresco Priory and Associated Monuments and Attached Walls: 440m to the NW; Tresco Abbey: 460m to the NW; Gatehouse and Attached Wall to North East of Tresco Abbey: 500m to the NW; The Smith Monument on Valley Hill: 740m to the NW.
	<b>Scheduled monument</b>			Prehistoric Field System in Southern Pentle Bay: 30m E; Prehistoric Field System and Hut Circle North of Crab's Ledge: 40m S; Prehistoric Field System and Settlement in Bathinghouse Porth: 80m SW; Oliver's Battery: 390m SW; Prehistoric Field System and Settlement in Southern Appletree Bay: 460m SW. Various Scheduled Monuments 500m-1km to the N
	<b>Registered Parks and Gardens</b>			Tresco: 50m to the N.
<b>Landscape</b>	<b>Area of Outstanding Natural Beauty (AONB)</b>	Isles of Scilly AONB		

	<b>Heritage Coast</b>	Isles of Scilly Heritage Coast		
<b>Water environment</b>	<b>Water Framework Directive (WFD) waterbody</b>	Isles of Scilly Groundwater Body (Ref: GB40802G081200): Overall status = Good (2016).	Scilly Isles Surface Waterbody (Ref: GB620807080000): Overall status = Good (2016).	
	<b>Source Protection Zone (SPZ)</b>			Zone II (Outer Protection Zone): 560m to the N; Zone I (Inner Protection Zone): 680m to the N.

## 2.4 Option selection and alternatives

A range of options were identified to manage the coastal erosion and flood risk at each of the four sites. These options were subject to formal review through the submission of a Business Case<sup>11</sup> to the Environment Agency in 2018 for funding approval, which confirmed the proposed schemes as the preferred option at each site.

### 2.4.1 Porthloo

A summary of the options considered to provide increased flood risk and coastal erosion protection at Porthloo is provided in Table 2-8.

**Table 2-8: Summary of options considered for the Porthloo scheme**

Option	Description	Key environmental risks
<b>1 Do nothing</b>	This option would provide no management or maintenance of the existing defences.	This option would not reduce flood risk to adjacent residential and commercial properties or critical infrastructure (Porthloo Lane and the commercial boat park/marine workshop), leading to significant flooding of properties and coastal pollution; in addition, there would be a risk of significant saline intrusion into the Lower Moors, adversely affecting a range of sensitive ecology and a key freshwater supply source for the island. These risks would increase in the future due to sea level rise and increased likelihood of storm conditions due to climate change.
<b>2 Do minimum – minimum required to maintain asset</b>	This option would involve minor works to the existing defences to replenish and raise the crest of the embankment to reduce the risk of overtopping.	This option would only provide a short term (<5 year) solution due to a lack of available suitable material (no local source; therefore, would need to import) and would not reduce flood risk to properties or critical infrastructure beyond this period. Maintaining the existing defences would not reduce wave energy, resulting in the continued loss of beach material, whilst raising the crest level would increase the reflected wave energy and further increase the loss of beach material, resulting in increased erosion at the site. Flooding of adjacent properties would lead to significant coastal pollution and loss of critical infrastructure, including saline intrusion into the Lower Moors and impacts on protected ecology.
<b>3 Do something – construct rock revetment (preferred option)</b>	This option would involve rock armour protection of northern section of the bay. The rock armour structure would tie into structure into recently constructed works (storm repair works and slipway strengthening in 2014–2015), increasing defence integrity along the frontage.	This option would extend and consolidate the existing hard engineering defence at the northern section of the bay, reducing the risk of wave overtopping, whilst the shallow profile of the revetment would dissipate wave energy and support the accretion of beach material – this would in turn provide increased protection for the adjacent geological SSSI through reduced wave deflection. This would reduce the erosion risk to the adjacent highway and reduce the flood risk affecting adjacent residential and commercial properties, and associated environmental pollution, as well as saline inundation into the Lower Moors. However, construction of a rock revetment on the

<sup>11</sup> Council of the Isles of Scilly (2016). Isles of Scilly Flood Defence and Dune Management Project, RMA Short Form Business Case, Version 4, 10 December 2016.

Option		Description	Key environmental risks
			beach would result in the permanent loss of existing beach habitat and could affect local landscape character (although accepting that the revetment would reflect the existing rocky character of this area and the adjacent northern section of beach).
4	<b>Do something – extend existing southern defence</b>	This option would extend the concrete trench and timber back dune defence that has been constructed at the southern section of the bay in 2014–2015.	This option would represent a continuation of the defence constructed in 2014–2015. This would reduce the erosion risk to Porthloo Lane and reduce the flood risk to residential and commercial properties, and associated environmental pollution, as well as saline inundation into the Lower Moors. However, the defence would alter local landscape character and visual amenity for residents and visitors; this was considered acceptable at the southern end of the bay in proximity to the slipway and marine businesses but may be less acceptable at the less developed northern end of the bay. The existing defence on the seaward side has had an adverse visual effect and has functioned poorly, whilst the static back wall of this defence does not allow any natural roll back of the embankment, which has caused a steepening of the seaward face, increasing loss of beach material and increased erosion of the area. This could lead to increased wave reflection leading to increased risk of erosion to the adjacent geological SSSI.

#### 2.4.2 Porth Mellon

Table 2-9: Summary of options considered for the Porth Mellon scheme

Option		Description	Key environmental risks
1	<b>Do nothing</b>	This option would provide no management or maintenance of the existing defences.	This option would not address the flood and erosion risk management issues at Porth Mellon. Undercutting of the vegetated bank in the south western corner would continue, threatening the stability of Telegraph Road, which in turn could lead to increased flood and erosion risk to the hinterland and a range of critical infrastructure. This flood and erosion risk would increase in the future due to climate change.
2	<b>Do minimum – install gabions</b>	This option would involve creation of a gabion line defence seaward of the vegetated bank in the southwestern corner to provide erosion protection.	Use of gabions will reduce the wave energy on the vegetated bank and reduce the amount of undercutting of the road. This reduces the risk of flooding and erosion of the road and adjacent residential and commercial properties and critical infrastructure. However, the gabions may not be strong enough to support the road or withstand storm conditions over the predicted lifespan. In addition, the creation of a vertical face on the defence may increase beach erosion and cause potential outflanking of the defence. Wire-mesh gabions would not be in-keeping with the natural landscape and there is potential for exposed steel mesh framework in sensitive coastal area when defence fails.
3	<b>Do something – construct</b>	This option would involve reinforcing the	This option would provide increased protection to the vegetated bank, reducing the risk of erosion and

Option	Description	Key environmental risks
	<b>rock revetment (preferred option)</b>	vegetated bank at the southwestern corner of the bay by creating a rock armour revetment where the road is currently at risk of being undermined.
		flooding affecting Telegraph Road. The shallow profile of the revetment would dissipate wave energy, reduce wave deflection and support the accretion of beach material. The revetment would reduce the flood risk affecting adjacent residential and commercial properties, and associated environmental pollution, as well as saline inundation into the Lower Moors. However, construction of a rock armour revetment on the beach would result in the permanent loss of existing beach habitat and could affect local landscape character (although accepting that the revetment would reflect the existing rocky character of this area and the adjacent southern section of beach).
4	<b>Do something – construct a sea wall</b>	This option would involve construction of a sea wall in the southwestern corner of the bay where the road is currently at risk of being undermined.
		This option would provide increased protection to the vegetated bank, reducing the risk of erosion and flooding affecting Telegraph Road and the adjacent hinterland, including residential and commercial properties and a range of critical infrastructure. However, ground conditions from trial pits indicate that significant foundations would be required, meaning the defence line would be advanced seaward of the vegetated bank to minimise the risk of an impact on the integrity of the road. The creation of a vertical face on the defence may increase wave energy and lead to greater beach erosion, whilst there is a risk that this would cause potential outflanking of the defence. Construction of a sea wall on the beach would result in the permanent loss of existing beach habitat and would be likely to have an adverse effect on local landscape character.

### 2.4.3 Porth Hellick

Table 2-10: Summary of options considered for the Porth Hellick scheme

Option	Description	Key environmental risks
1	<b>Do nothing</b>	This option would provide no management or maintenance of the existing defences.
2	<b>Do minimum – responsive approach to repair breaches in the bank</b>	This option would involve repairing any breaches in the existing sand/gravel dune bank. In addition, this would maintain the drainage leat from the Higher Moors, enabling surface water drainage back onto the beach following seawater flooding of the area.
3	<b>Do something – replenish and strengthen</b>	This option would replenish the existing sand/gravel dune bank – raising the crest level
		This option would not reduce flood risk to the Higher Moors area, which could adversely affect the island's freshwater supply; in addition, there would be a risk of significant saline intrusion into the Higher Moors SSSI, adversely affecting a range of sensitive ecology. These risks would increase in the future due to sea level rise and increased likelihood of storm conditions due to climate change.
		This option would reduce the risk of wave overtopping and breaching of vulnerable sections of the bank, whilst maintaining existing natural coastal processes. In doing so, it would provide greater

Option	Description	Key environmental risks
	<b>bank (preferred option)</b>	– and strengthen areas of weakness (low spots). In addition, it would create a defined access point to the beach at the eastern end for vehicular access.
		protection of the adjacent hinterland, including the Higher Moors area, it's freshwater supply and sensitive ecology. However, it proposes to use non-native vegetation ( <i>Fascicularia bicolor</i> ), already present across most of the bank, to provide structural support for the bank and reduce wave and wind erosion. Given the extensive areas of <i>Fascicularia bicolor</i> already present, this is not likely to adversely affect landscape character.
<b>4</b>	<b>Do something – hard engineering solutions</b>	This option considered a range of hard engineering solutions, including: (1) construct rock armour revetment on the sand/gravel dune bank; (2) construct a sea wall seaward of the bank; and (3) construct an offshore breakwater to reduce wave energy entering the bay.
		These options would reduce the risk of wave overtopping and breaching of vulnerable sections of the bank and provide increased protection for the Higher Moors area. However, these options were discounted on the basis of cost and the environmental impact and logistics of delivery of significant volumes of materials and appropriate plant to site (the site is only accessible of the landward side via a 500m farm track). The construction of a hard engineering solution would lead to a long-term adoption of an HTL approach, which conflicts with the intended approach of the SMP2. In addition, these options would result in the permanent loss of existing beach habitat and would be likely to have an adverse effect on local landscape character and could affect the recreation and amenity value of the beach.

#### 2.4.4 South Dunes

Table 2-11: Summary of options considered for the South Dunes scheme

Option	Description	Key environmental risks
<b>1</b>	<b>Do nothing</b>	This option would provide no management or maintenance of the existing dunes.
		The southern part of the island would remain vulnerable to separation from the rest of the island. Continued risk of loss of critical water, transport and telecommunication infrastructure. Lack of increased protection of ecologically sensitive area from marine inundation. However, this option would allow natural coastal processes to operate and is aligned with the NAI policy in the SMP2.
<b>2</b>	<b>Do minimum – responsive approach to repair breaches in the dunes</b>	This option would involve monitoring of the area and emergency repairs as necessary.
		The southern part of the island would remain vulnerable to separation from the rest of the island. Continued risk of loss of critical water, transport and telecommunication infrastructure. Lack of increased protection of ecologically sensitive area from marine inundation. There is also a significant risk that appropriate plant and materials are not available when emergency repairs are required. However, this option would allow natural coastal processes to operate and is closely aligned with the NAI policy in the SMP2.
<b>3</b>	<b>Do something – installation of rock rolls and dune</b>	This option would increase the protection of the toe of the south beach dune system at
		This option would reduce the risk of erosion of the dune system, increasing protection for the adjacent hinterland and associated critical infrastructure, including the telecommunications junction box,

Option	Description	Key environmental risks
	<b>matting to reduce dune erosion (preferred option)</b>	its most vulnerable area and would put in place a robust monitoring programme to assess dune development.  timber store and freshwater supply. In addition, it would protect the sensitive ecology of the coastline and support maintenance of a range of statutory designated sites. This option also provides a solution that enables longer term monitoring of the situation prior to development of a dune management plan for the area. No adverse impacts on inter-tidal ecology or local landscape character are anticipated.
<b>4</b>	<b>Do something – construct rock armour revetment</b>	This option would involve construction of a rock armour revetment to protect the seaward face of the dunes.  This option would reduce the risk of erosion of the dune system, increasing protection for the adjacent hinterland and associated critical infrastructure, including the telecommunications junction box, timber store and freshwater supply. In doing so, this option would also protect some of the sensitive ecology of the coastline and support maintenance of a range of statutory designated sites. However, this option would effectively constitute an HTL approach to the area and would be at odds with the SMP2. Such a fully engineered approach would have significant negative environmental impact on the south beach dune area – including loss of dune and inter-tidal habitats – and would prevent a natural development of the dune system. There is also potential for significant adverse impacts on local landscape character, and the recreation and amenity value of the dunes and beach.

## 2.5 Stakeholder engagement

Engagement has been undertaken with a range of stakeholders to inform the development of the four schemes. In particular, a series of site meetings were held in 2016 with several key stakeholders to discuss the project proposals and allow stakeholder input into their detailed design. The overall project, incorporating all four of the proposed schemes, has been discussed with all landowners, the local community, Members of the CIOs, Tresco Estate, the Duchy of Cornwall, the Isles of Scilly Wildlife Trust, the Isles of Scilly AONB Partnership, Natural England and the Environment Agency. Formal letters of support were subsequently provided by the Duchy of Cornwall, the Isles of Scilly Wildlife Trust and the Tresco Estate.

An Outline Business Case for the proposed schemes was prepared by the CIOs and submitted to the Environment Agency for approval in December 2016. Approval was subsequently granted in December 2018 to enable the project to progress to detailed design and preparation of a Full Business Case.

Consultation with the CIOs Planning Department has been undertaken and an EIA screening opinion request was submitted to the Department in October 2016, followed by an EIA scoping opinion request in October 2017. An EIA Scoping Opinion was received from the Council of the Isles of Scilly in November 2018 and this included the formal opinions of the statutory environmental consultees (Environment Agency, Natural England and Historic England). The EIA Scoping Opinion response is summarised in Section 3.2.3 and provided in Appendix C.

## 2.6 Description of the proposed development

### 2.6.1 Porthloo

Works are required at Porthloo Bay to improve the standard of flood risk protection and reduce the risk of coastal erosion. In doing so, the works will maintain the protection of people and



property, a range of critical infrastructure, and important designated wildlife areas supporting a range of protected and notable habitats and species.

A key aspect of the Porthloo scheme is to reduce the vulnerability of the Lower Moors SSSI, one of only two sources of freshwater on St Mary's and the location of the island's most productive freshwater extraction borehole, from saline intrusion caused by wave overtopping of the existing defences in the bay. The scheme will also protect the existing access road (Porthloo Lane), which is the only highway access to this area, from coastal erosion, whilst also protecting the island's main commercial boat park and marine workshops from flooding during storm events.

The proposed development comprises the following elements:

- Construction of a 110m long rock armour revetment between the existing engineered dune and the cliff face at the northern end of Porthloo Bay. The revetment will reduce erosion and scour along the existing low-level embankment with retains Porthloo Lane and will reduce the risk of wave overtopping affecting residential and commercial properties landward of the embankment.
- The revetment will have a crest level of 6.70mAOD, which will correspond with that of the adjacent engineered dune, and a minimum crest width of 4.50m. The revetment will have a width of 17.13m and a slope of between 1:2 and 1:1.5 for the majority of its length, increasing to a maximum of 1:3 at either end. The lower half of the revetment will be positioned below existing beach levels and will have a maximum 3.00m wide toe, with a maximum depth of 0.53mAOD.
- The rock armour will comprise a mix of 1 to 3 tonne standard heavy grading blocks of Cornish granite. Cornish granite will be used to match the geology of the Isles of Scilly. The islands form part of a larger granite batholith that extends across Cornwall and Devon and also occurs elsewhere across north west Europe.
- The rock armour will overlay a geotextile membrane (comprising GeoFabric HPS12 or equivalent) to reduce erosion at the toe and base of the revetment and to prevent leaching of underlying substrate.
- A 30m section of retaining wall will be constructed at the southern end of the revetment, to tie into the existing retaining timber wall that forms part of the existing engineered dune system to the immediate south. The retaining wall will comprise a pre-cast concrete L-unit laid on a 500mm mass concrete base and will have a crest level of 6.75mAOD. The retaining wall shall be faced with a greenheart timber façade on its landward side to match the existing retaining wall.
- The existing footpath along the landward side of the existing engineered dune and low-level embankment will be diverted onto Porthloo Lane prior to the rock revetment.

Details of the proposed development are shown on drawing UA008878-ARC-XX-XX-DR-CE-0200-P3 and cross-sections are shown on drawings UA008878-ARC-XX-XX-DR-CE-0221-P4 to 0223-P4, included in Appendix A.

### **2.6.2 Porth Mellon**

Works are required at Porth Mellon to formalise and strengthen the existing defence in the south-western corner of Porth Mellon Bay. The existing vegetated bank there has experienced wave undercutting, leading to a breach that caused flooding of the adjacent slipway and Telegraph Road. Breaching or overtopping of the defence could affect a range of strategically important assets including adjacent residential and commercial properties, including the island's waste and recycling facility, Telegraph Road, which is the principal highway connecting the area to Hugh Town and the rest of St Mary's, and could also result in saline intrusion into the Lower Moors SSSI to the south east, which is a major source of freshwater for the island.

The proposed development comprises the following elements:

- Construction of a 40m long rock armour revetment in the south west corner of Porth Mellon Bay. The revetment will reduce erosion and scour along the existing vegetated bank and will reduce the risk of wave overtopping affecting Telegraph Road and adjacent residential and commercial properties.
- The revetment will have a crest level of 6.19mAOD and a maximum crest width of 3.00m. The revetment will have a width of 14.95m and a slope varying between 1:2 and 1:1.5, which will increase to a 1:3 slope at each end of the revetment. The lower half of the revetment will be positioned below the existing beach levels and will have a maximum 3.00m wide toe, with a maximum depth of 0.50mAOD.
- The rock armour will comprise a mix of 1 to 3 tonne standard heavy grading blocks of Cornish granite.
- The rock armour will overlay a geotextile membrane (comprising GeoFabric HPS12 or equivalent) to reduce erosion at the toe and base of the revetment and to prevent leaching of underlying substrate.
- The revetment crest will tie into the vegetated bank along Telegraph Road.
- An existing cutting through the vegetated bank, connecting Telegraph Road with the beach and used informally by pedestrians to access the beach, will be infilled with earth material to the existing bank crest level.
- Small-scale vegetation clearance along the existing vegetated bank will be required to facilitate construction of the revetment.
- Site won rock will be positioned at the southwestern end of the revetment to tie the revetment into the existing rock cliff along the southern end of the bay.

Details of the proposed development are shown on drawing UA008878-ARC-XX-XX-DR-CE-0300-P3 and 0302-P2 and cross-sections are shown on drawings UA008878-ARC-XX-XX-DR-CE-0320-P3 and 0321-P3, included in Appendix A.

### **2.6.3 Porth Hellick**

The proposed scheme at Porth Hellick aims to reduce saline intrusion of the Higher Moors Pool SSSI due to wave overtopping. The pool and associated wetland form the main freshwater resource on St Mary's. The scheme involves construction of a new dune at the eastern end of Porth Hellick Bay and infilling and revegetation of low points across the existing low-level vegetated dune/bank in the bay.

The proposed development comprises the following elements:

- Raising of the existing sand/gravel dune bank at the eastern end of Porth Hellick Bay using crushed Cornish Granite stone overlaid with biodegradable coir matting (Salix Coconet 800 or similar). The crush granite stone will have a grading of 4-10mm and will be sourced from existing igneous batholith intrusions found in Cornwall or Devon, to match the existing rock type and colour found at Porth Hellick. The coir matting will be pinned in position using 500mm length Salix T-pegs at a spacing of 3 pegs per square metre. The matting will be overlaid with 50mm of topsoil and seeded with a grass mix.
- The raised section of dune will have a crest level of 5.0mAOD and a minimum crest width of 1.00m. The dune width will vary between 8.24m and 11.59m and will have a gradient of 1:6 to match the existing dune profile in other sections of the bay.
- A new vehicular access ramp will be constructed through the new section of dune onto the beach. The base of the ramp will be constructed of two layers of Strataweb 200 polyethylene cellular grid (three layers at the ramp crest) infilled with 4-10mm crushed Cornish Granite. Overlaying this will be an Ekotex 30 geotextile layer (or similar approved), over which will be laid a layer of Dycel 150 concrete blocks, threaded together using stainless steel cable. The concrete blocks will be infilled with soil and seeded with a grass mix.

- The edges of the ramp will be strengthened with a reinforced concrete anchor beam, which will be buried at its landward and seaward extents below existing ground and beach levels.
- The ramp will have a crest level of 5.00mAOD and crest width of 1.00m. It will have a slope of 1:6, which will increase to 1:3 towards the toe of the ramp, which will be buried below the existing beach level. The ramp will be approximately 22m in length and will have a width of 3.7m.
- The new section of dune will be vegetated with *Fascicularia bicolor*, which forms an almost continuous strip of vegetation on the dune system across the rest of the bay.
- Infilling of low points in the dune system elsewhere in the bay will be undertaken through planting of *Fascicularia bicolor*. Planting will be undertaken in five such low points, which comprise a total of 40m in length.

Details of the proposed development are shown on drawing UA008878-ARC-XX-XX-DR-CE-0500-S2-P3 and 0502-S2-P3 and cross-sections are shown on drawings UA008878-ARC-XX-XX-DR-CE-0520-S2-P3 to 0524-S2-P1, included in Appendix A.

#### 2.6.4 South Dunes

The proposed scheme at South Dunes seeks to protect critical infrastructure and important wildlife habitats in the south of Tresco from flooding as a result of breaching of the dunes at South Dunes beach. Continued erosion of the dunes by wave action during storm events presents the risk of saline intrusion into the freshwater lakes at Great Pool and Abbey Pool, located a short distance to the north of South Dunes, which feed water to the island's only freshwater aquifer. The dunes system and Great Pool are designated as SSSI, whilst the dune system is also designated as a SAC, SPA and Ramsar Site, highlighting their ecological sensitivity. Strengthening of the dune system through the installation of toe scour protection measures will reduce wave erosion and will also protect other critical infrastructure within and close to the dune system, including the island's telecommunications supply and a locally important timber yard, which provides heating fuel for the island. Breaching of the dunes would also risk reducing access to the island's only low tide jetty, located to the south west of South Dunes at Carn Near, and would also present a flood risk to the island's heliport site, which is an important transport link to the other islands and the UK mainland.

The proposed development comprises the following elements:

- Installation of prefabricated rock roll scour protection along the toe of a 200m long section of dunes on South Dunes beach, located either side of the existing telecommunications cable junction box.
- The rock rolls comprise 3mm synthetic polyethylene braided nets, measuring 2m long and 30cm in diameter, filled with 40–75mm Cornish Granite stone.
- The rock rolls will be laid at the toe of the dune in two layers of three rolls, which will be held in place by 200mm diameter, 2.25m long Chestnut timber stakes, inserted at 1m centres to a depth of 1.7m below beach level.
- The dune face will be covered with coir matting (Coconet 800 matting or similar approved) from the dune toe to the dune crest, to reduce wind induced erosion of the dune face and will be held in place with 200mm diameter, 2.25m long beech timber pegs. The coir matting will be covered with site won beach material and planted with Marram Grass *Ammophila arenaria*.

Details of the proposed development are shown on drawing UA008878-ARC-XX-XX-DR-CE-0630-S2-P1 and cross-sections are shown on drawings UA008878-ARC-XX-XX-DR-CE-0640-S2-P1 and 0641-S2-P1, included in Appendix A.

## 2.7 Construction methodology

Outline construction methodologies have been prepared for each of the schemes. These are included in Appendix D with summary details provided below. The outline construction programme for each scheme is provided in Table 2-4.

**Table 2-12: Outline construction programme**

Site	Start pre-commencement & mobilisation	Start of construction	Finish construction	Comment
Porthloo	February/March 2020; 8-12 weeks duration.	April/May 2020; 4 weeks duration.	June 2020	Works timed to avoid April and October due to boat use of existing slipway.
Porth Mellon	February 2020; 8-10 weeks duration.	April 2020; 2-3 weeks duration.	April 2020	Works timed to avoid period May to September inclusive to avoid main tourism use of the beach.
Porth Hellick	March 2020 -6 weeks.	April 2020; 3 weeks duration (excludes planting).	April/May 2020	Works timed to avoid period May to mid-November to avoid main tourism use of the beach and use by migrating birds.
South Dunes	May 2020; 3 weeks duration.	May/June 2020; 2 weeks duration (excludes planting).	June 2020	Works timed to avoid peak summer tourism period and period November to February inclusive when storm events most likely.

### 2.7.1 Porthloo

Construction of the scheme at Porthloo will be in-accordance with the following outline methodology:

- The construction compound and materials storage area will be established within the northern part of the boat yard, immediately adjacent to the working area. The working area will be demarcated and secured using perimeter security fencing (Heras fencing or similar) above the Mean High Water Spring (MHWS) level and with cones and tape or sand bunds below this level. See Drawing UA008878-ARC-XX-XX-DR-CE-0200-P3 in Appendix A for the working area and construction compound.
- All construction materials and welfare units shall be transported to site via a 60-tonne landing craft, which will be located immediately adjacent to the works area on Porthloo beach (see Drawing UA008878-ARC-XX-XX-DR-CE-0200-P3 in Appendix A). This mode of materials delivery is an established procedure on the island and has been used successfully to facilitate the construction of a new school on St Mary's in 2010, resurfacing of the airport runway in 2014 and extension works to St Mary's harbour in 2015.
- The welfare units shall be offloaded from the landing craft and set up in the site compound. These will be self-contained units and will not be connected to mains drainage. All waste collected will be transported to the existing sewage treatment facility at Old Town on St Mary's for disposal.
- The rock armour shall be transported to site using the 60-tonne landing craft. It is anticipated that the rock material will be sourced from an existing quarry in Cornwall, from where it will be delivered to Plymouth or Penzance harbour for transport to St Mary's. Periodic trips from Porthloo to the harbour of origin will be required to transport all of the required rock armour to site.
- The landing craft will moor on Porthloo beach at mid to high tide and the rock offloaded onto the foreshore in the working area where it will be stored temporarily prior to installation.

- The rock armour revetment will be constructed using a 360° excavator and dumper truck. The excavator will collect the rock armour from the foreshore and will load it onto the dumper, which will transport the rock across the beach to the revetment location ready for placing.
- The excavator will remove existing rock rubble along the length of the revetment and place this material in a designated area for temporary storage prior to reuse in the revetment or removal from site for disposal.
- The excavator will excavate a 10m section of the revetment toe trench and all arisings will be placed on a dumper truck. It is anticipated that all arisings, including any clay material encountered, will be reused on site as backfill along the revetment toe and elsewhere within the revetment footprint. However, any excess material will be transported from site to a licenced waste management facility for reuse or disposal.
- The existing beach bank will be regraded to the required revetment angle (typically 1:1.5 to 1:2) from bank crest to the toe trench.
- The geotextile membrane will then be installed by overlaying the regraded bank to form the base of the revetment and will be wrapped around the toe trench key stone to hold it in place.
- The excavator will then place individual rocks onto the geotextile membrane in the toe trench first before building up the revetment structure to the required dimensions as shown on the drawings in Appendix A.
- The revetment will be constructed from the toe to the crest in 10m sections along its length so that the toe excavation can be backfilled with site won sand within a single tidal window (before the next incoming tide) to minimise the potential for mobilisation of construction materials or excavated materials.
- Once the main revetment has been constructed, the roundheads at either end of the revetment, which will tie the structure into the adjacent engineered dune to the south and the existing cliff face to the north, will be constructed.
- An L-shaped precast reinforced concrete wall will be installed to retain the backfill material that will support the revetment crest rocks. The existing low-level embankment will be excavated to a depth of 1.5m below existing ground level, with all site won material stored in the works area prior to reuse. Reinforced concrete (RC20) shall be laid in the excavated trench to a depth of 500mm to provide the foundation for the precast units. The precast units will then be installed and aligned with the existing timber retaining wall along the landward side of the engineered dune. The precast units will then be faced with greenheart timber planks to match the timber retaining wall along the engineered dune. The foundation trench will then be backfilled to the existing ground level using the site won excavated material.
- Once complete, the construction site will be demobilised, all plant and construction materials will be removed from site via the landing craft, and all disturbed areas will be reinstated to their former condition.

### **2.7.2 Porth Mellon**

Construction of the scheme at Porth Mellon will be in-accordance with the following outline methodology:

- The construction compound and materials storage area will be established landward of Porth Mellon beach, immediately adjacent to the working area. The working area will be demarcated and secured using perimeter security fencing (Heras fencing or similar) above the MHWS level and with cones and tape or sand bunds below this level. See Drawing UA008878-ARC-XX-XX-DR-CE-0300-P3 in Appendix A for the working area and construction compound.

- All construction materials and welfare units shall be transported to site via a 60-tonne landing craft, which will be located immediately adjacent to the works area on Porth Mellon beach (see Drawing UA008878-ARC-XX-XX-DR-CE-0300-P3 in Appendix A).
- The welfare units shall be offloaded from the landing craft and set up in the site compound. These will be self-contained units and will not be connected to mains drainage. All waste collected will be transported to the existing sewage treatment facility at Old Town on St Mary's for disposal.
- The rock armour shall be delivered to site using the 60-tonne landing craft at mid to high tide and offloaded onto the foreshore in the working area where it will be stored temporarily prior to installation.
- The rock armour revetment will be constructed using a 360° excavator and dumper truck. The excavator will collect the rock armour from the foreshore and will load it onto the dumper, which will transport the rock across the beach to the revetment location ready for placing.
- The excavator will remove existing rock rubble along the length of the revetment and place this material in a designated area for temporary storage prior to reuse in the revetment or removal from site for disposal.
- The excavator will excavate a 10m section of the revetment toe trench and all arisings will be placed on a dumper truck. It is anticipated that all excavated material will be stored on site for reuse as backfill material.
- The existing beach bank will be regraded to the required revetment angle (typically 1:1.5 to 1:2) from bank crest to the toe trench.
- The geotextile membrane will then be installed by overlaying the regraded bank to form the base of the revetment and will be wrapped around the toe trench key stone to hold it in place.
- The excavator will then place individual rocks onto the geotextile membrane in the toe trench first before building up the revetment structure to the required dimensions as shown on the drawings in Appendix A.
- The revetment will be constructed from the toe to the crest in 10m sections along its length so that the toe excavation can be backfilled with site won sand within a single tidal window (before the next incoming tide) to minimise the potential for mobilisation of construction materials or excavated materials.
- Once the main revetment has been constructed, the roundheads at either end of the revetment, which will tie the structure into the adjacent vegetated bank to the north and the existing cliff face to the south, will be constructed. The area between the roundhead and the cliff face will be backfilled with site won rock.
- Once complete, the construction site will be demobilised, all plant and construction materials will be removed from site via the landing craft, and all disturbed areas will be reinstated to their former condition.

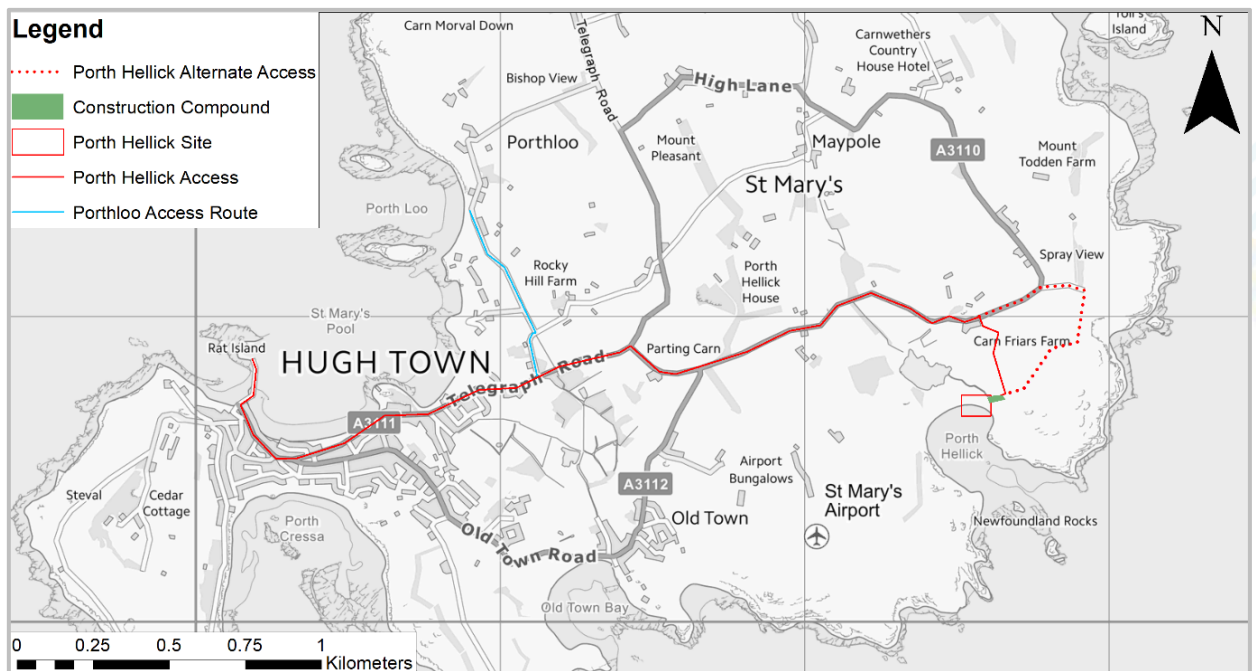
### **2.7.3 Porth Hellick**

Construction of the scheme at Porth Hellick will be in-accordance with the following outline methodology:

- The construction compound and materials storage area will be established landward of Porth Hellick beach, in the field immediately to the east of the working area. The working area will be demarcated and secured using perimeter security fencing (Heras fencing or similar) above the MHWS level and with cones and tape or sand bunds below this level. See Drawing UA008878-ARC-XX-XX-DR-CE-0500-S2-P3 in Appendix A for the working area and construction compound.
- All construction materials and welfare units shall be transported to St Mary's either via a 60-tonne landing craft, which will be located on Porthloo beach, or in pre-packed

bulk bags transported to the main quay at St Mary's harbour. All materials will then be transported by flatbed lorry and dumper truck to Porth Hellick following the routes shown on Figure 2-3. Access to the working area will be from Carn Friars Lane, to the east, and then via an unsurfaced track. However, the contractor may install a temporary haul track from Carn Friars Lane to the working area, which would be constructed of Type 1 stone (Clause 803 SHW), compacted in a 300mm layer and underlain by Tarram 1000 geotextile matting. It is anticipated that approximately 100 return trips will be required to transport materials to site. This is due to the small size flatbed lorry/dumper truck to be used, which is necessary due to the small minor roads to be used to facilitate access. A Traffic Management Plan will be prepared in-advance, to be approved by CIOs, to ensure safe movement of all plant between the two areas of the island.

- The welfare units shall be delivered to site and set up in the site compound. These will be self-contained units and will not be connected to mains drainage. All waste collected will be transported to the existing sewage treatment facility at Old Town on St Mary's for disposal.
- The beach access ramp will be constructed first. All debris within the footprint of the ramp will be cleared to the formation layer. This will then be overlain with an Ekotex 30 geotextile layer (or similar approved).
- The Strataweb geogrid shall then be installed over the geotextile layer and infilled with 4-10mm crushed Cornish Granite. At the crest of the dune, the Strataweb will be installed in two layers to provide structural support. The Strataweb layer will be enclosed in the geotextile membrane, which will provide the formation layer for the overlying Dycel blocks.
- The Dycel blocks will be hand laid and threaded together using stainless steel cables. The cable ends will be formed into loops and tied around a 20mm diameter stainless steel bar. The bar will then be set in a mass concrete trench.
- The adjacent sections of dune will then be recharged using 4-10mm crushed Cornish Granite. This will be brought to Porthloo beach via landing craft and then transported to site in 1m<sup>3</sup> bags using a flatbed truck where it will be offloaded and stored in the construction compound.
- During low tide conditions, an excavator will transport the crushed stone from the storage area to the dune recharge area for installation and grading to the required dune profile. The parts of the dune recharge area affected by the invasive species Hottentot Fig will not be disturbed and will be overlain with crushed stone.
- Biodegradable coir matting will then be overlain over the crushed stone and pinned into place using wooden stakes.
- A 50mm layer of topsoil will then overlay the matting and seeded with a native grass seed mix.
- The newly recharged dune and low points elsewhere on the dune system will be planted with *Fascicularia bicolor* bushes as shown on Drawing UA008878-ARC-XX-XX-DR-CE-0500-S2-P3. Planting will take place within a 4m wide strip across the width of the crest of the recharged dune. Where planting is to be undertaken in areas affected by the invasive Hottentot Fig, the fig material will be removed by hand and stored in a secure storage area prior to disposal.
- Once complete, the construction site will be demobilised, all plant and construction materials will be removed from site, including the temporary haul track (if installed) and all disturbed areas will be reinstated to their former condition.



**Figure 2-3: Proposed construction access routes to Porth Hellick from Porthloo and St Mary's harbour**

#### 2.7.4 South Dunes

Construction of the scheme at South Dunes will be in-accordance with the following outline methodology:

- The construction compound and materials storage area will be established in the existing compound area immediately north of the low-tide jetty at Carn Near, to the south west of the South Dunes sites. The compound area is currently used for storage of plant and machinery used in the agricultural, forestry and general maintenance work across the island. The compound area will be demarcated and secured using perimeter security fencing (Heras fencing or similar). See Drawing UA008878-ARC-XX-XX-DR-CE-0500-S2-P3 in Appendix A for the working area and construction compound.
- The rock rolls will be delivered to Penzance Harbour from Plymouth using a flatbed articulated lorry (bundled with slings for offloading and onloading), from where they will be transported to St Mary's Harbour for offloading onto a small boat for transport to Tresco.
- All construction materials and the welfare unit shall be transported to Tresco via small boat to the low-tide jetty at Carn Near. All materials will then be offloaded and transported by tractor and trailer to the construction compound for temporary storage using the existing access track.
- The welfare units shall be delivered to site and set up in the site compound. These will be self-contained units and will not be connected to mains drainage. All waste collected will be transported to the existing sewage treatment facility at Old Town on St Mary's for disposal.
- As required, the rock rolls will be transported to the scheme area via tractor and trailer using the existing access track and concrete slipway to the west of South Dunes, following the route shown on Figure 2-4.
- The timber stakes used to provide support for the rock rolls and the pegs used to support the coir matting will be transported to Tresco with the rock rolls or may be sourced on the island from the timber yard immediately adjacent to South Dunes.



- The rock rolls will then be installed in accordance with the manufacturer's installation guidelines (see Appendix D), as summarised below:
  - The timber stakes will be driven into position along a 10m length of dune toe at 1m centres.
  - The rock rolls, each measuring 2m by 0.3m, will then be lifted from the trailer using a crane lift, and then placed at the toe of the dune behind the line of timber stakes. The dune toe will be built up by laying the rolls in two layers of three rolls each. The rolls will then be laced together using 3mm twine or metal hog rings.
- Biodegradable coir matting will then be laid over the dune face, from the dune crest and will be folded behind the rock rolls at the toe. The matting will then be held in position using timber pegs installed at 500mm centres in rows 600mm apart. A thin layer of beach material will then be placed over the coir matting. The dune face will then be planted with mature Marram Grass *Ammophila arenaria*.
- The dune scour protection works will be constructed in 10m sections along its length to minimise the potential for mobilisation of construction materials as a result of wind or waves.
- Once complete, the construction site will be demobilised, all plant and construction materials will be removed from site via the jetty at Carn Near, and all disturbed areas will be reinstated to their former condition.

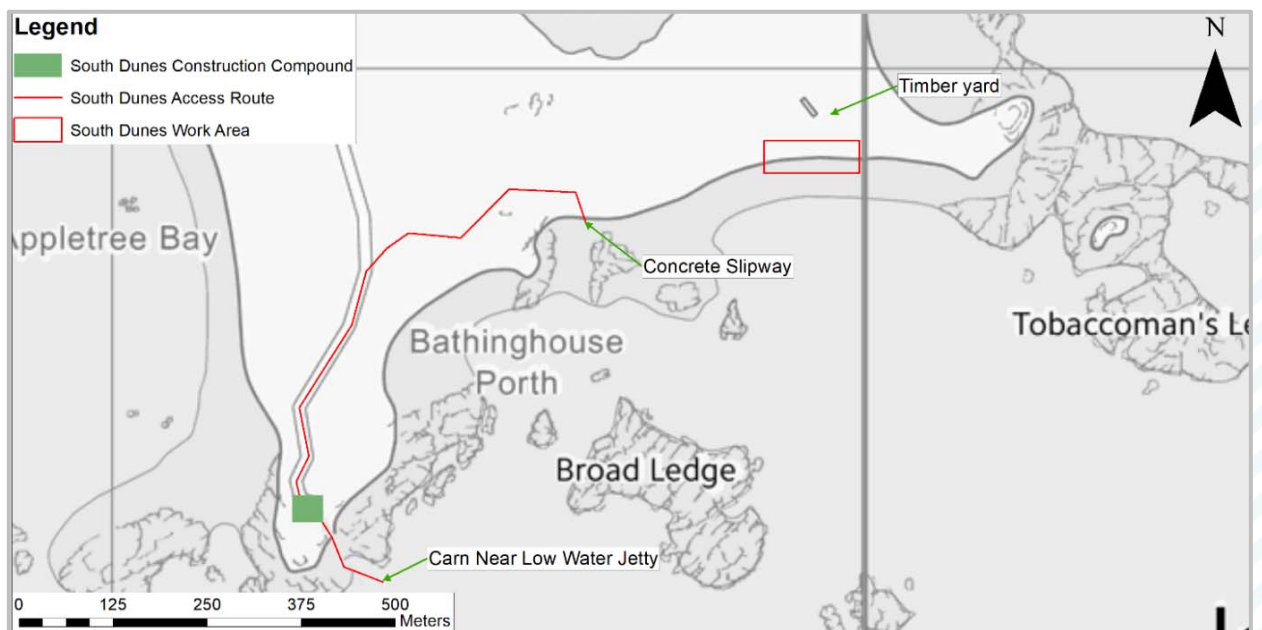


Figure 2-4: South Dunes Access Route

## 2.8 Operational requirements and decommissioning

It is anticipated that maintenance of the sea defences will be minimal throughout their design life and will be limited to periodic visual inspection of the works to identify any defects and/or damage caused by tidal or storm conditions. In particular the dunes at Porth Hellick would be maintained indefinitely, and therefore do not have an operation design life.

At South Dunes beach, the dunes will be monitored to determine whether the defences are having the desired effect and also to monitor any environmental changes/risks as a result of the works. At the end of the operational lifetime of the works (estimated to be between 5 and 10 years), the timber stakes will be removed, and the rock rolls will be cut; the rock roll mesh will be removed, and the crushed granite will be left in-situ. Should the monitoring show that

the defences are operating effectively, then a decision may be made to replenish the scheme at the end of its operational design life.

At Porthloo and Porth Mellon, a decision will be made at the end of the 50-year operational life to replenish the coastal defences. The resilience of the coastal defence to climate change would be also be reviewed at time of replenishment. However, it is anticipated that the proposed rock revetments at these two sites will be maintained in perpetuity and incorporated into any future coastal flood risk management works proposed.

**Table 2-13: Operational and climate change design life of the coastal defence proposals**

	Operational design life	Climate change design life (based on UKCP09 scenarios)
Porthloo	50 years	200 years
Porth Mellon	50 years	200 years
Porth Hellick	N/A	N/A
South Dunes	5-10 years	100 years

## 3 Environmental Impact Assessment methodology

### 3.1 The EIA Process

Regulation 4 of the Town & Country Planning (Environmental Impact Assessment) Regulations 2017 sets out that the environmental impact assessment is a process consisting of:

- (1) (a) the preparation of an environmental statement by the person seeking or initiating planning permission...
- (2) The environmental impact assessment must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of proposed development on the following—
  - (a) population and human health;
  - (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC(1) and Directive 2009/147/EC(2);
  - (c) land, soil, water, air and climate;
  - (d) material assets, cultural heritage and the landscape; and
  - (e) the interaction between the factors listed in sub-paragraphs (a) to (d).

EIA is defined as 'a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects'<sup>1</sup>. Online Government guidance<sup>2</sup> defines the aim of Environmental Impact Assessment 'to protect the environment by ensuring that a local planning authority, when deciding whether to grant planning permission for a project which is likely to have significant effects on the environment, does so in the full knowledge of the likely significant effects, and takes this into account in the decision-making process' and 'to ensure that the public are given early and effective opportunities to participate in the decision making procedures'.

The EIA process is closely aligned with the design process ( Figure 3-1)<sup>12</sup>. This effectively begins with EIA Screening, whereby the developer makes the decision whether EIA is required for the project in question. Suitable environmental alternatives (primary mitigation) should be considered at this early stage, but if it is decided that the potential likely significant effects on the environment cannot be avoided through mitigation measures, an EIA Screening Opinion should be sought from the appropriate authority by the developer. As well as outline design some environmental information is required to undertake EIA Screening, and so baseline surveys may be required to inform the EIA Screening Request.

It is often appropriate where EIA Screening is likely to return an outcome where statutory EIA is required, that EIA Scoping is undertaken at the same time. This combined approach makes use of the environmental baseline information collated for the EIA Screening Opinion request, to consider the scope of further detailed environmental impact assessment work required. Through the submission of an EIA Scoping Report, the developer requests that the relevant authority provide an EIA Screening Opinion in order to seek confirmation from the Statutory Environmental Consultees on the level of scope of EIA required.

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<sup>12</sup> Institute of Environmental Management and Assessment (IEMA) (2016) *Environmental Impact Assessment Guide to Shaping Quality Development*.  
[https://www.iema.net/assets/uploads/iema\\_guidance\\_documents\\_eia\\_guide\\_to\\_shaping\\_quality\\_development\\_v7.pdf](https://www.iema.net/assets/uploads/iema_guidance_documents_eia_guide_to_shaping_quality_development_v7.pdf)

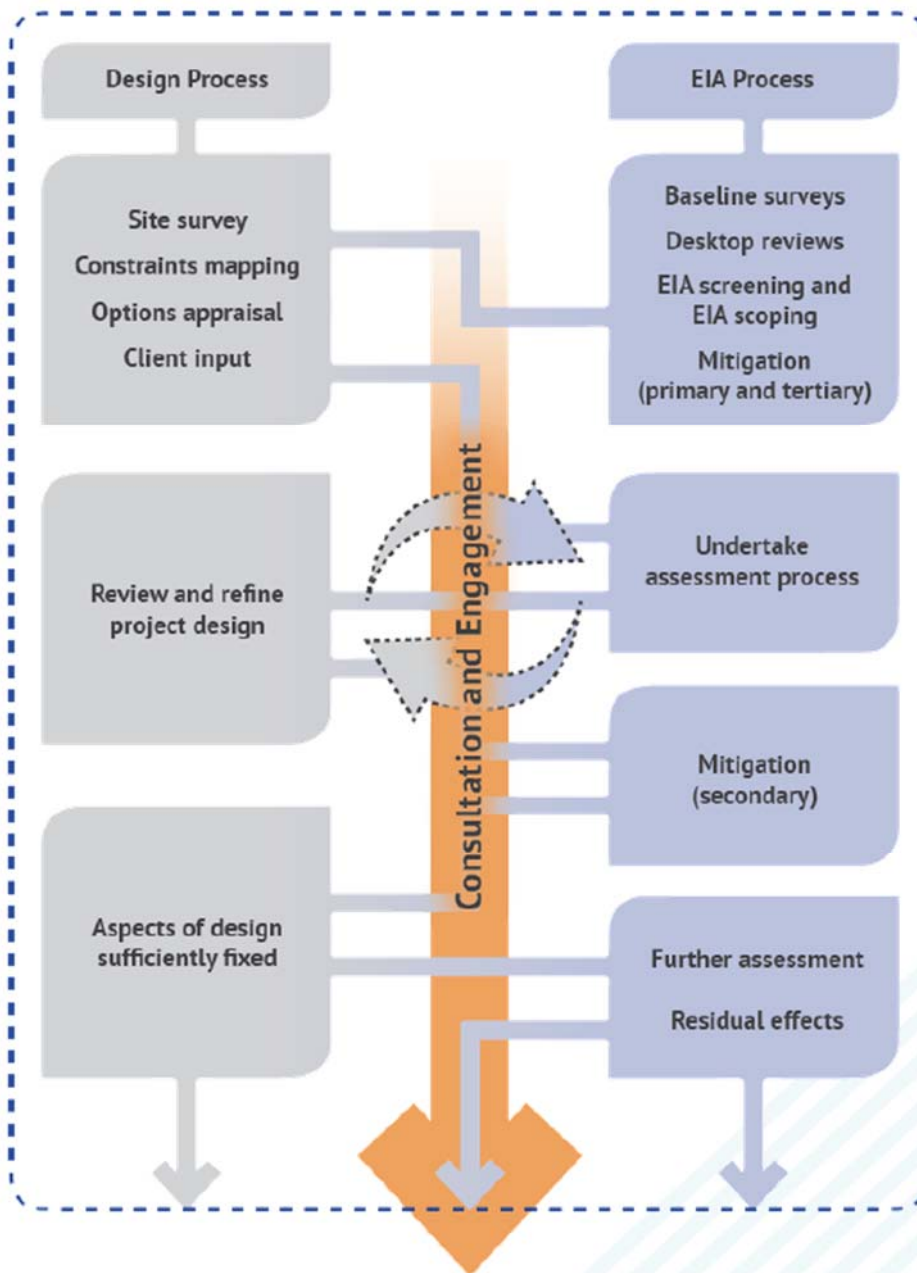


Figure 3-1: The interaction of design and EIA processes<sup>12</sup>

On the basis of the EIA Scoping Opinion response, further detailed baseline information is collected to inform the detailed impact assessments. The assessment involves firstly characterising the potential impacts and then the assessment of likely significant effects. At this stage Primary, Secondary and Tertiary Mitigation can be recommended to reduce or eliminate significant effects. This is an iterative process, whereby impact assessment process and design of the development process interact with one another to produce a mutually acceptable solution. This can also involve stakeholder engagement of the emerging design, to further minimise environmental effects. The results of the EIA process are documented in the ES, which should be well structured, proportionate and concise document. The ES is supplemented with an NTS in printed and digital format, which intended to make the findings of EIA publicly accessible.

Secondary and Tertiary Mitigation recommendations and commitments reported in the ES topic chapters often require separate environmental management plans in order to achieve the desired outcome. These are usually prepared during discharge of planning conditions or during pre-construction stage of the approved development but can be prepared in draft at the planning stage to demonstrate that commitments in the ES will be followed up.

With reference to the Institute of Environmental Management and Assessment (IEMA) (2016) a summary of the steps involved in the EIA process is set out as follows:

- 1 Identify aspects of environment likely to be significantly affected (preliminary baseline);
- 2 Propose primary mitigation (impact avoidance measures);
- 3 Define impact assessment methodology;
- 4 Collect environmental baseline;
- 5 Assess likely significance of the effects;
- 6 Propose secondary mitigation (iterate design to reduce or eliminate effects);
- 7 Report residual effects (in the relevant ES chapter); and
- 8 Set out follow up measures (tertiary measures and environmental management plan).

## **3.2 EIA screening and scoping**

### **3.2.1 EIA screening opinion request and response**

The scheme falls within Schedule 2 of the Town & Country Planning Environmental Impact Assessment Regulations 2017 section 10(m) Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dykes, moles, jetties and other sea defence works, excluding the maintenance and reconstruction of such works – All development. Under Regulation 5(8) of the EIA Regulations the proposals must therefore be screened for EIA development by the Local Planning Authority (LPA). Given that the proposals would affect an area below MHWS, the proposals also fall within Regulation 8(1) of the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended).

Habitats Regulations Assessment (HRA) Screening is undertaken in coordination with the EIA, in accordance with Regulation 27 (1) of the aforementioned EIA Regulations.

An EIA Screening Opinion was requested in October 2016 on the concept designs for the four proposed projects. It was determined by the LPA, in this case CIOs, that the sea defence works on each of the four sites would constitute EIA development in accordance with the 2011 Regulations (now superseded by the 2017 Regulations). This confirmed that the proposals would require the preparation of an ES to support the planning applications for the scheme. The EIA Screening Opinion request letter is provided in Appendix B.

### **3.2.2 EIA scoping opinion request**

The objective of EIA Scoping is to consider the scope and level of detail of the information to be provided in the ES (Regulation 14(1)). Often, before an Environmental Statement is authored for a scheme, an EIA Scoping Report is authored as part of the scoping stage. The Scoping Report should set out a proposed methodology for the assessment of likely significant effects based on reasonably accessible environmental baseline information and propose an appropriate structure for the ES. It is not a statutory requirement to undertake EIA Scoping.

An EIA Scoping Report for the proposed schemes was not prepared. However, an EIA Scoping Opinion Request was made to CIOs on 24<sup>th</sup> October 2017.

Environmental issues that are 'scoped in', would require further detailed technical studies undertaken to inform the ES. Where environmental issues are 'scoped out' these would not be considered further unless there is a material change in the outline scheme proposals.

### 3.2.3 EIA scoping opinion response

An EIA Scoping response was received on 15<sup>th</sup> November 2018 by CIOs. In forming their scoping opinion, CIOs consulted with Natural England, the Environment Agency and Historic England. A summary of the comments raised by the consultees is provided in Table 3-1, with the full responses provided in Appendix C.

**Table 3-1: Summary comments raised in the EIA Scoping Opinion Response and where the comment is addressed in the ES**

Summary of comment	Where in the ES
Establish the potential landscape and visual impact of the proposed development during both the construction and operation phases in the context of the AONB, Heritage Coast and Conservation Area.	Chapter 6: Landscape
Potential adverse amenity impacts associated with the development could occur during construction. This should be addressed in the ES.	Chapter 8: Land use, tourism and public amenity
The proposed sea defence areas include several Scheduled Monuments. In addition, there are other designated heritage assets in the vicinity. Any EIA should identify any designated or undesignated heritage assets and consider them in relation to the proposals.	Chapter 7: Historic environment
The ES should consider direct and indirect impacts of each proposal on any designated sites, including the Scilly Complex SAC, Isles of Scilly SPA, Isles of Scilly Ramsar, Peninnis to Dry Ledge MCZ, Merrick and Round Islands SSSI, Porthloo SSSI and Higher Moors and Porth Hellick Pool SSSI.	Chapter 5: Biodiversity and nature conservation
The ES should explain how the proposed works for each site meets the policies of the SMP.	Chapter 4: Coastal processes, geomorphology and flood risk
The following should be included in the ES: The influence of the proposed structures on the intertidal and nearshore wave climate. The influence of proposed structures on beach-dune sediment exchange within the upper beach area. Potential impacts on sediment transport (cross-shore, long-shore etc.) within the intertidal and nearshore zones. Potential for enhanced risk of outflanking of existing and/or new structures.	Chapter 4: Coastal processes, geomorphology and flood risk
The ES should identify how the introduced structures and materials at Porthloo will help facilitate the future transition to managed realignment of the frontage.	Chapter 4: Coastal processes, geomorphology and flood risk
Whilst adverse impacts on South Beach at Tresco are to be monitored, the ES should detail the following: What will be used as an indicator of adverse impacts? What response will be made to such impacts? How will this be monitored? Will this response be controlled through planning conditions? Is it meaningful to adopt a monitor and adapt approach for a structure which only has a 5-10 year design life?	Chapter 4: Coastal processes, geomorphology and flood risk
The EIA will need to consider impacts upon locally designated wildlife and geological sites.	Chapter 5: Biodiversity and Nature Conservation Chapter 8: Land use, tourism and public amenity
The ES should thoroughly assess the impact of the proposal on protected species and the impact of the proposals on habitats and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under S41 of the Natural Environment and Rural Communities (NERC) Act 2006.	Chapter 5: Biodiversity and Nature Conservation

Summary of comment	Where in the ES
The EIA should consider potential impacts on access land, public open land, rights of way and coastal access routes in the vicinity of the development. Consideration should be given to the potential impacts on the St Mary's Coast Path National Trail.	Chapter 8: Land use, tourism and public amenity It is a requirement under 296 (2) of the Marine & Coastal Access Act 2009 to establish a route along the whole of the English Coast. The St Mary's Coast Path National Trail is yet to be established and therefore at present does not exist. It is thereby scoped out of further assessment.
The England Biodiversity strategy published by Defra established principles for the consideration of biodiversity and the effects of climate change. The ES should reflect these principles.	Chapter 5: Biodiversity and Nature Conservation Chapter 9: Sustainability & Climate Change
The EIA should consider how the proposed works contribute to local environmental initiatives and initiatives to reduce the spread of invasive plant species on the island complex.	Chapter 5: Biodiversity and Nature Conservation
The ES should include an impact assessment to identify, describe and evaluate the effects likely to result from the project in combination with other projects and activities that are being, have been or will be carried out.	Chapter 11: Cumulative Impacts

### 3.3 The Environmental Statement

With reference to Regulation 17(3) of the Town & Country Planning (Environmental Impact Assessment) Regulations 2017/ Regulation 12(2) Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended), the ES must contain the information specified in Schedule 4 '*relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected*'. Table 3-2 sets out the sections of the ES in which this information is addressed.

**Table 3-2: Requirement of Schedule 4 and where requirements are addressed in the ES**

Chapter	Requirement	Where in the ES
1	A description of the development, including in particular: (a) A description of the location of the development; (b) A description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; (c) A description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (d) An estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.	Section 1.2, 2.6–2.8 and Chapters 8–10
2	A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Section 2.4

Chapter	Requirement	Where in the ES
3	A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	Section 2.3 and Section 2 of Chapters 4–10
4	A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: Population and human health	Chapters 8 & 10
	Biodiversity (for example flora and fauna)	Chapter 5
	Land (for example land take), soil (for example organic matter, erosion, compaction, sealing), material assets	Chapter 8
	Air	Chapter 10
	Water (for example hydromorphological changes, quantity and quality)	Chapter 4
	Climate (for example greenhouse gas emissions, impacts relevant to adaptation)	Chapter 9
	Cultural heritage, including architectural and archaeological aspects	Chapter 7
	Landscape	Chapter 6
5	<p>A description of the likely significant effects of the development on the environment resulting from, inter alia:</p> <p>(a) The construction and existence of the development, including, where relevant, demolition works;</p> <p>(b) The use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;</p> <p>(c) The emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;</p> <p>(d) The risks to human health, cultural heritage or the environment (for example due to accidents or disasters);</p> <p>(e) The cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;</p> <p>(f) The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; and</p> <p>(g) The technologies and substances used.</p> <p><i>The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term or long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC(a) and Directive 2009/147/EC(b).</i></p>	Section 5.3 of Chapters 4–10, Chapter 11 and Section 2.6.
6	A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical difficulties or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	Section 3.4.6 and Chapters 3–11



Chapter	Requirement	Where in the ES
7	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	Section 6 of Chapters 4–10
8	A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.* Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.  <i>*Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU(c) of the European Parliament and of the Council or Council directive 2009/71/Euratom(d) or UK environmental assessments may be used for the purpose provided that the requirements of this Directive are met.</i>	Chapter 9: climate change resilience assessment
9	A non-technical summary of the information provided under paragraphs 1 to 8.	Non-Technical Summary
10	A reference list detailing the sources used for the description and assessments included in the environmental statement.	Presented as footnotes within Chapters 3–11

### 3.4 EIA method of assessment

As noted above Regulation 17(4)(d) states that the ES must 'include the information reasonably required for reaching a reasoned conclusion on the significant effects of the development on the environment, taking into account current knowledge and methods of assessment'. Reference is made to the current EIA practice guidance, primarily:

- Online Government Guidelines<sup>13</sup>.
- Guidelines for Environmental Impact Assessment (IEMA, 2004) & 2006 Updates<sup>14</sup>.
- IEMA (2011) State of Environmental Impact Assessment Practice in the UK. Special Report<sup>15</sup>.
- IEMA (2016) Environmental Impact Assessment Guide to Shaping Quality Development<sup>12</sup>.
- IEMA (2016) Environmental Impact Assessment Guide to Delivering Quality Development<sup>16</sup>.

Other environmental topic-specific guidance is detailed in the methodology section of each ES chapter.

#### 3.4.1 Statement on competent expertise

As noted above Regulation 17(4)(b) requires that the ES must set out a 'statement by or on behalf of the applicant or appellant describing the expertise of the person who prepared the environmental statement'.

<sup>13</sup> <https://www.gov.uk/guidance/environmental-impact-assessment>

<sup>14</sup> IEMA (2004). Guidelines Environmental Impact Assessment. 2006 Updates.

<sup>15</sup> IEMA (2011). *State of Environmental Impact Assessment in the UK*. IEMA Special Report.

<sup>16</sup> IEMA (2016). *Environmental Impact Assessment Guide to Delivering Quality Development*. <https://www.iema.net/assets/newbuild/documents/Delivering%20Quality%20Development.pdf>

The JBA Consulting EIA Policy Statement requires that the appropriately qualified and experiences competent experts have the authority to technically review and approve EIA deliverables forming part of statutory ES reports coordinated by JBA. The EIA has been prepared by a multi-disciplinary team of environmental specialists as set out in Table 3-34. Overall coordination of the ES was overseen and technically reviewed by David Revill CEnv.

**Table 3-3: EIA team and qualifications**

EIA topic chapter	EIA chapter author	EIA chapter reviewer
Coastal Processes, Geomorphology and Flood Risk	Anissia Halwyn BSc PhD	Matthew Hird BSc MCIWEM C.WEM CEnv CSi
Biodiversity and Nature Conservation	Jonathan Harrison BSc MSc	Laura Thomas BA MRes CEng MCIEEM
Landscape	Christophe Watiez BA	Peter Harrison BA Grad Dip Larch CMLI
Historic Environment	Philip Moore BA	Kirsten Holland BSc MCIFA
Land Use, Tourism and Public Amenity	Ben Sullivan MSci GradIEMA	Mark Cope BSc MSc FGS MIEMA CEnv REIA
Sustainability & Climate Change	Ben Sullivan MSci GradIEMA	Mark Cope BSc MSc FGS MIEMA CEnv REIA
Other Construction Related Effects	Ben Sullivan MSci GradIEMA	Mark Cope BSc MSc FGS MIEMA CEnv REIA
Cumulative Effects	Ben Sullivan MSci GradIEMA	Mark Cope BSc MSc FGS MIEMA CEnv REIA

### 3.4.2 Defining the temporal and spatial scope of EIA

Regulation 18(3) states that the ES includes at least (a) 'a description of the proposed development comprising information on the site, design, size and other relevant features of the development...'

The temporal scope of the EIA is considered in terms of the following principal stages of development:

- existing conditions (baseline);
- construction (provided in Table 2-12)
- operation (including maintenance) of the development; and
- future decommissioning of the development.

The spatial scope of the EIA is considered on the basis of:

- the physical extent of the proposed works, as defined by the limits of land to be acquired or used (temporarily or permanently);
- the nature of the existing baseline environment, including the location of sensitive receptors;
- the geographical extent of impacts beyond the site, e.g. effects on traffic, or watercourses that might extend some distance from the development site; and
- the geographical boundaries of the political and administrative institution and authorities, which provide the planning and policy context for the project.

### 3.4.3 Defining impacts and effects

Schedule 4 of the EIA Regulations sets out the requirement of Regulation 18(3) that the ES provides both a description of the characteristics of the proposed development together with a description of the aspects of the environment likely to be significantly affected, including the following: *'population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape'*.

With reference to Schedule 3, which sets out the Regulation 5(4) selection criteria for EIA screening, the requirement for EIA is set out on the basis of: *1. the characteristics of the development; 2. the environmental sensitivity of geographical areas likely to be affected by development; and 3. the types and characteristics of the potential impact to identify the likely significant effects of the development on the environment.* The EIA should seek to identify the value, sensitivity or importance of the aspects of the environment, where they are likely to be affected by the development proposals, characterise the nature of any impacts on these aspects of the environment, and then assess the overall significance of the effect that would result if left unmitigated.

Distinction is drawn between characteristics of 'impacts' and the significance of 'effects', as not all impacts identified will necessarily have a likely 'significant' effect on the environment. Impacts and effects are defined in the ES as follows:

- *Impacts* are the predicted changes to the baseline environment attributable to the development; and
- *Effects* are consequences of impacts on environmental resources or receptors of a particular value, sensitivity or importance.

### 3.4.4 Assessment of significance

Schedule 4 of the EIA Regulations also requires a description of the factors likely to be significantly affected by the development using the following terms, which are defined for the purpose of this EIA thus:

- *Direct effects* – arise from the impact of activities that form an integral part of the project;
- *Indirect or secondary effects* – arise from the impact of activities that do not form part of the project, but are a consequence of it;
- *Cumulative effects* – result from multiple impacts or effects on a particular environmental resource or receptor, which would otherwise not occur or would be less severe;
- *Short-term, medium-term or long-term effects* – refer to the temporal scale of an effect;
- *Permanent effects* – result from an irreversible change to the baseline environment or which persist for the foreseeable future;
- *Temporary effects* – persist for only a limited period or which may disappear due to natural recovery of the environment or assimilation into it;
- *Positive effects* – have a beneficial influence on environmental receptors and resources; and
- *Negative effects* – have an adverse influence on receptors or resources.

Consideration of transboundary effects are also a requirement of Schedule 4, which in the UK are considered with regard to the geographical boundaries of the political and administrative institution and authorities, which provide the planning and policy context for the project (refer to section 3.4.2).

Significance of environmental effects is assessed herein on the basis of the magnitude, intensity or irreversibility of impacts versus the value, sensitivity or importance of the impacted environmental resource or receptor. Where applicable Table 3-4 will be used to assist in the judgement of significance. This matrix-based approach helps to provide consistent significance terminology throughout the ES and improves the judgement of significance scoring by pre-defining the relationship between impacts and effects. For consistency the significance of environmental effects assessment scores will be described using these terms where possible, with topic specific terminology set out in individual ES chapters where guidelines deviate from the standard approach.

**Table 3-4: Matrix of significance of effect scoring terms**

		Magnitude, intensity or irreversibility of impact			
		No Change	Minor	Moderate	Major
Magnitude, intensity or irreversibility of impact	Low	Not Significant or Neutral	Slight	Slight or Moderate	Moderate
	Medium		Slight or Moderate	Moderate	Moderate or Large
	High		Moderate	Moderate or Large	Large

### 3.4.5 Mitigation, enhancement and reporting of residual effects

Schedule 4 of the EIA Regulations sets out the requirement for inclusion in the ES: ‘A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases’.

Mitigation measures should be both reasonable and practicable, taking account of the following criteria:

- current best practice guidance;
- precedents set by similar projects;
- the effectiveness of different technical solutions;
- their feasibility in construction and operational terms; and
- their incremental costs.

When identifying the best possible design measures available to achieve the required mitigation within a scheme, the principles of the hierarchy of mitigation should be employed as follows (in order of preference):

- *Avoidance* – making changes to the project’s design to avoid or prevent adverse effects on an environmental feature;
- *Reduction* – where avoidance is not possible, adverse effects can be reduced through sensitive environmental treatments/design;
- *Remediation* – where adverse effects are unavoidable, management measures can be introduced to limit their influence; and
- *Compensation* – where avoidance or reduction measures are not available, it may be appropriate to provide compensatory measures to seek to offset the adverse effect with a comparable positive one.

Consideration to mitigation should be undertaken from the earliest possible design stage, after the baseline data has been collected, and throughout the EIA process. EIA mitigation can also therefore be characterised depending on the stage of the assessment when it is considered<sup>15</sup>.

- *Primary* – Changes made in the pre-application phase of the development, that modify the location or design of the development. This mitigation has the greatest ability to avoid impacts. They are the most effective when applied as early as possible, as it is often difficult to act on primary mitigation measures as the design begins to stabilise.
- *Secondary* – Actions that require activity to achieve a desired mitigation. These can be imposed in the ES in order to achieve planning consent.
- *Tertiary* – Actions that would have been undertaken regardless of the EIA process, due to other legislative requirements or standard practices. This mitigation is the least flexible – either the legislation exists to create the mitigation or does not (i.e. Protected Species Licencing).

Where positive effects can be voluntarily introduced without the requirement to mitigate an effect, this is termed 'enhancement'.

Any environmental effects that remain significant after mitigation are termed 'residual effects'. Residual effects are a convenient way of reporting the overall significance of environmental effects of a proposed development scheme and would therefore be reported in the ES conclusion and non-technical summary.

#### **3.4.6 Limitations and assumptions**

The following overarching assumptions and limitations are relevant to the ES:

- For the Porthloo, Porth Mellon and Porth Hellick schemes, only outline construction method statements were available to assess potential impacts of construction in all topics. For the South Dunes scheme, no Construction Method Statement was available; however, the CIoS did provide a statement on the likely construction methodology, which is summarised in this ES and informed the assessments undertaken. This limitation in turn meant assessments completed in the specialist chapters were based upon assumptions, which are stated in the methodology sections of the relevant chapters;
- Outline construction programmes were available, but detailed sequencing and phasing of works were not. As a result, temporally-reliant construction impacts in specialist chapters were based upon assumptions of the occurrence of certain aspects of works at certain times.

Topic chapter specific limitations and assumptions are set out in in the methodology section of the relevant topic chapter.

## 4 Coastal processes, geomorphology and flood risk

### 4.1 Introduction

This chapter assesses the potential for the proposed schemes to cause likely significant effects on geomorphology, coastal processes and flood risk. In addition to the issues defined at the scoping stage, a range of environmental issues were raised in the EIA scoping response provided by the CIOs in November 2018. A summary of the issues identified of relevance to this chapter include:

- The influence of the proposed structures on the intertidal and nearshore wave climate;
- The influence of proposed structures on beach-dune sediment exchange within the upper beach area;
- Potential impacts on sediment transport within the intertidal and nearshore zones; and
- Potential for enhanced risk of outflanking of existing and/or new structures.

### 4.2 Baseline conditions

#### 4.2.1 Introduction

Gaining an appreciation of the baseline conditions at, and in the vicinity of, each site is essential to identify ongoing physical processes. By using this information, potential impacts of the scheme can then be identified and assessed. Proxies from nearby coastline have been used where site-specific information is unavailable. The key interest areas for this chapter are:

- Hydrodynamics (wave climate and tidal regime)
- Coastal morphology
- Sediment dynamics and transport
- Flooding

#### 4.2.2 Tidal regime

The Isles of Scilly have a semi-diurnal tidal regime. The coastline is classified as macrotidal, with mean spring and neap tidal ranges at 5m and 2.3m respectively<sup>17</sup>. The principal tidal levels relative to chart datum and local datum are presented in Table 4-1.

**Table 4-1: Critical tidal levels for the Isles of Scilly (ATT<sup>17</sup>)**

Return period	Water level (mCD)	Water Level (mOD)
Highest Astronomical Tide (HAT)	6.30	3.39
Mean High Water Spring (MHWS)	5.70	2.79
Mean High Water Neap (MHWN)	4.30	1.39
Mean Sea Level (MSL)	3.19	0.28
Mean Low Water Neap (MLWN)	2.00	-0.91
Mean Low Water Spring (MLWS)	0.70	-2.21
Lowest Astronomical Tide (LAT)	0.10	-2.81

Water flow is complex between the islands. The pattern of flow through the islands is as follows (from English Heritage, 2004<sup>18</sup>):

<sup>17</sup> Admiralty TotalTide Software

<sup>18</sup> English Heritage (2004) Rapid Coastal Zone Assessment for the Isles of Scilly

“FIRST FLOOD (HW-4 to HW-2). Flow is from the south through south-west. Water is funnelled into St Mary’s Sound and leaves via all other exits. At the end of the period flow is starting to enter between Tresco and St Martin’s.

LATE FLOOD (HW-2 to HW+2). Flow is from south-west, west, north-west, and then west. Water enters St Mary’s Sound and between Bryher and Tresco and Tresco and St Martin’s, exits between St Mary’s and St Agnes and St Mary’s and St Martin’s. After HW there is little flow into St Mary’s Sound, and flow reverses in the Bar Point area carrying water southwards.

EARLY EBB (HW+2 to HW+4). Flow is from north to north-east. Water enters between Bryher and Tresco, Tresco and St Martin’s and exits by all other routes.

LATE EBB (HW+4 to HW-4). Flow is from north-east, east, and then south-east. Water enters between St Mary’s and St Martin’s, and exits by all other routes.”

Tidal diamond data from Admiralty TotalTide Software<sup>17</sup> for each location is presented in the below sections. Figure 4-1 indicates the location of the tidal diamonds around the islands.

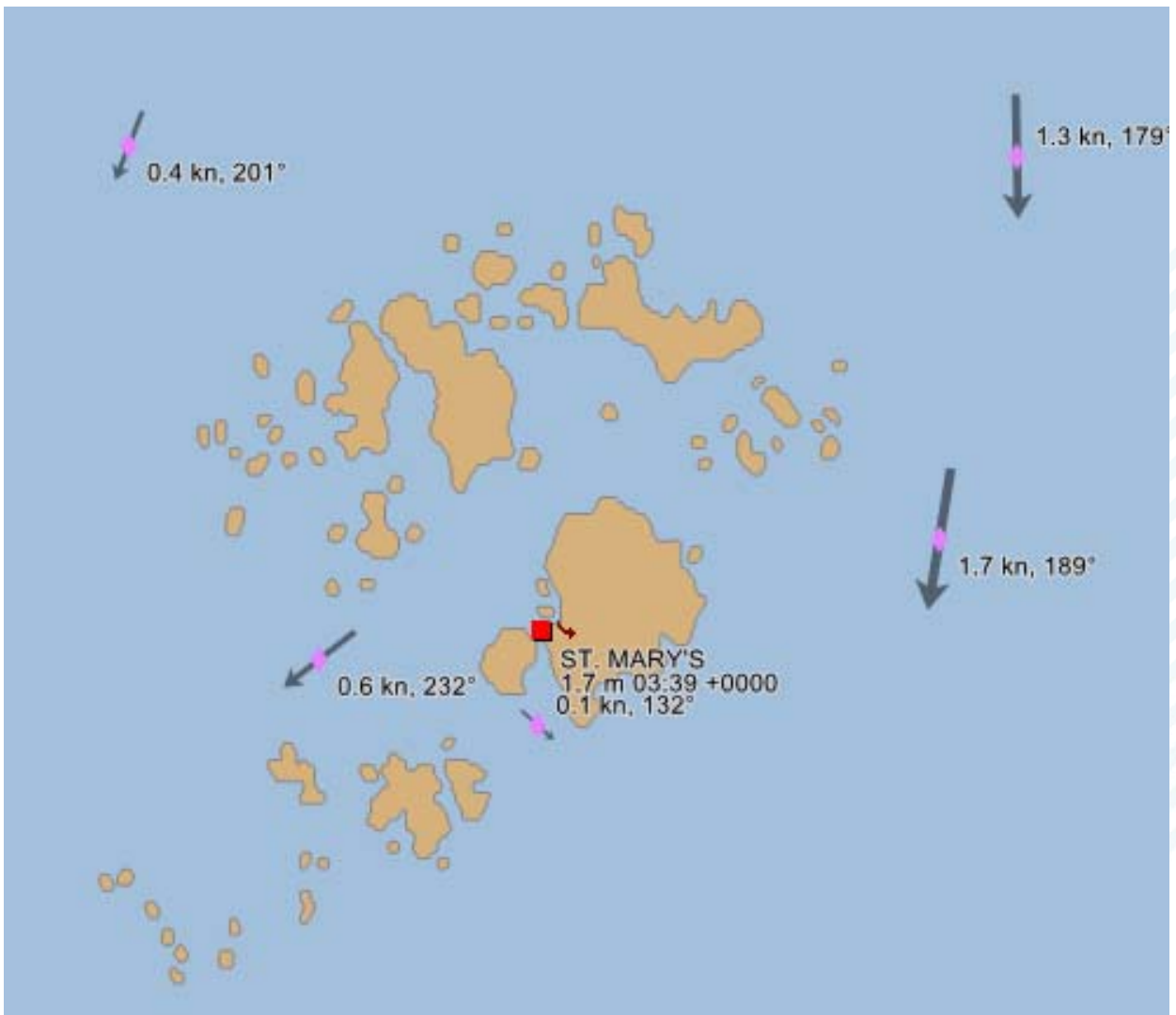


Figure 4-1: Tidal diamonds around the Isles of Scilly (ATT<sup>17</sup>)

***Porthloo, Porth Mellon and South Beach***

Table 4-2 reproduces tidal diamond data from Admiralty TotalTide Software<sup>17</sup> for two locations, one to the west of St Mary’s (49°55'N 6°22'W) and another to the south-west

(49°54'N 6°19'W) (Figure 4-1). This indicates maximum spring and neap tidal rates of 1.7kts (0.88m/s) 0.8kts (0.41m/s) respectively to the south-west and 1.5kts (0.77m/s) and 0.7kts (0.36m/s) respectively to the west. The tidal diamond to the west of St Mary's (therefore south-west of Tresco) is most relevant to South Beach. Tidal currents at Porthloo, Porth Mellon and South Beach are relatively weak, with velocities generally less than 1.5kt, likely to be further reduced within the indented bays of Porthloo and Porth Mellon.

**Table 4-2: Tidal diamond data for two points around Porthloo (Source ATT<sup>17</sup>)**

Time (hr)	49°54'N 6°19'W			49°55'N 6°22'W		
	Direction (°)	Spring rate (kts)	Neap rate (kts)	Direction (°)	Spring rate (kts)	Neap rate (kts)
-06h	300°	0.4	0.2	320°	0.4	0.2
-05h	020°	0.1	0.0	042°	0.3	0.1
-04h	109°	0.7	0.3	097°	0.6	0.3
-03h	110°	1.2	0.5	116°	1.0	0.4
-02h	111°	1.5	0.7	121°	0.8	0.4
-01h	111°	1.6	0.7	125°	0.7	0.3
HW	111°	1.7	0.8	161°	0.2	0.1
+01h	125°	1.5	0.7	224°	1.0	0.4
+02h	190°	0.1	0.0	233°	1.1	0.5
+03h	275°	1.3	0.6	241°	1.2	0.5
+04h	272°	1.7	0.8	262°	1.5	0.7
+05h	265°	1.0	0.4	262°	1.2	0.5
+06h	292°	0.7	0.3	296°	0.5	0.2

### ***Porth Hellick***

Table 4-3 reproduces tidal diamond data from Admiralty TotalTide Software<sup>17</sup> for one location to the east of Porth Hellick (Figure 4-1). This indicates maximum spring and neap tidal rates of 2.9kts (1.49m/s) and 1.4kts (0.72m/s) respectively. Velocities are therefore slightly higher than the locations on the inside of the archipelago. However, velocities are likely to be lower than presented in Table 4-3, as Porth Hellick is an indented bay.

**Table 4-3: Tidal diamond data for one point to the east of Porth Hellick (Source ATT<sup>17</sup>)**

Time (hr)	49°56'N 6°13'W		
	Direction (°)	Spring rate (kts)	Neap rate (kts)
-06h	007°	0.9	0.4
-05h	011°	1.1	0.5
-04h	017°	1.6	0.8
-03h	022°	1.7	0.8
-02h	027°	1.4	0.7
-01h	035°	0.9	0.4
HW	110°	0.2	0.1
+01h	201°	2.0	0.9
+02h	188°	2.9	1.4
+03h	202°	2.2	1.0
+04h	227°	1.1	0.5
+05h	326°	0.4	0.2
+06h	000°	0.7	0.3



### 4.2.3 Wave climate

The Isles of Scilly generally has a high energy wave climate due to the exposed location of the islands in the Atlantic Ocean. The biggest waves are from between the south-west and north-west, but significant waves can also come from the east<sup>18</sup>. Therefore, the west, south and east coast of St Mary’s is very exposed to Atlantic waves and swell, whilst the north western side is mostly sheltered by Tresco. All but the northern coast of Tresco is sheltered from Atlantic swell and waves.

Waves with short wave lengths are not efficiently refracted. Therefore, during these conditions, wave energy is mostly lost as waves break on the outer coast of the archipelago, causing calm conditions on the inner coast (e.g. where Porthloo, Porth Mellon and South Beach are located). However, waves with longer wave lengths are more likely to refract between the islands, which can cause strong wave conditions even on the inside of major inlets<sup>18</sup>.

The Channel Coastal Observatory (CCO) have been monitoring wave data to the south of St Mary’s (49° 53.53' N 06° 18.77' W) since 2014. The directional Waverider Buoy is located in approximately 53m(CD). Table 4-4 shows the recorded monthly averages of significant wave height (Hs), wave period (Tp), significant wave period (Ts) and wave direction for the period between May 2014 and May 2019.

**Table 4-4: Monthly averages of significant wave height(Hs), wave period (Tp), significant wave period (Ts) and wave direction (May 2014-May 2019). Source CCO<sup>19</sup>**

Month	Hs (m)	Tp (s)	Tzs (s)	Direction (degrees)
January	1.49	9.1	5.2	227
February	1.63	9.0	5.3	205
March	1.47	9.3	5.3	220
April	1.19	8.6	5.0	209
May	0.90	8.3	4.8	222
June	0.81	7.7	4.6	219
July	0.75	7.6	4.6	243
August	0.83	7.5	4.7	245
September	1.00	7.9	4.8	216
October	1.26	8.5	5.0	207
November	1.52	8.5	5.2	209
December	1.72	9.0	5.4	218

The wave climate is naturally variable, on a seasonal, interannual and longer-term basis, which has subsequent impacts on the nearshore wave climate and sediment transport processes at each location. Storm frequency and sequencing will also affect these processes.

For each location, numerical modelling has allowed the prediction of the joint probability combinations of water levels, wave heights and periods, and the single probability estimates of wave heights for a range of return periods, as presented in the below sections.

#### **Porthloo**

Porthloo is not directly impacted by open sea wave conditions due to its location on the inside of the archipelago. However, the small breakwater on the northern side of Newford Island was likely constructed to protect the shore from strong wave conditions<sup>20</sup>.

<sup>19</sup> Channel Coastal Observatory (CCO). Available online at: <http://www.channelcoast.org/> [Accessed on 3 May 2019]

Strong wave-breaking conditions may occur when high local winds happen from a westerly direction, causing large wave heights with a short wave period. Alternatively, strong wave breaking may occur when waves with a very long period from the open sea are able to refract between the islands at high tide<sup>20</sup>.

Numerical modelling of the nearshore wave climate at Porthloo indicates 1 in 1-year wave heights of 1.7m and 1 in 100-year storm waves of 2.11m (Table 4-5). Joint probability estimates of significant wave heights and periods and water levels have also been calculated for a range of return periods (Table 4-6). This indicates that the predicted 100-year event would be a 3.6m still water level (tide plus storm surge) coinciding with waves with long periods, with significant wave heights of 2.09m.

**Table 4-5: Significant wave height return periods**

Return period (years)	Significant wave height (m)
1	1.70
2	1.78
5	1.88
10	1.95
25	2.02
50	2.07
75	2.09
100	2.11
200	2.17
1000	2.27

**Table 4-6: Joint probability of significant wave heights, water levels and significant wave periods for a range of return periods**

Return period	Water level (m)	Significant wave height (m)	Significant wave period (s)
1	3.04	1.61	9.54
2	3.08	1.79	9.60
5	3.22	1.94	9.56
10	3.6	1.84	8.92
25	3.57	2.06	8.99
50	3.54	2.00	10.46
75	3.5	2.10	10.57
100	3.6	2.09	10.18
200	3.66	2.09	10.60
1000	3.73	2.31	10.75

### ***Porth Mellon***

The wave climate at Porth Mellon is generally similar to Porthloo due to their proximity and location within an indented bay. However, wave heights are comparatively lower at Porth Mellon, as the bay faces north-west, slightly away from the dominant south-west wave direction. Numerical modelling of the nearshore wave climate at Porthloo indicates 1 in 1-year wave heights of 0.70m and 1 in 100-year storm waves of 1.18m (Table 4-7) Joint probability estimates of significant wave heights and periods and water levels have also been calculated for a range of return periods (Table 4-8). This indicates that the predicted 100-year event would be a 3.6m still water level coinciding with waves with significant wave heights of 1m.

<sup>20</sup> Duchy of Cornwall (2012) Porthloo Slipway Improvements Isles of Scilly Environmental Statement

**Table 4-7: Significant wave height return periods**

Return period (years)	Significant wave height (m)
1	0.70
2	0.77
5	0.78
10	0.88
25	0.95
50	0.99
75	1.01
100	1.02
200	1.07
1000	1.18

**Table 4-8: Joint probability of significant wave heights, water levels and significant wave periods for a range of return periods**

Return period	Water level (m)	Significant wave height (m)	Significant wave period (s)
1			
2			
5	3.4	0.75	9.61
10	3.36	0.85	9.93
25	3.63	0.90	8.95
50	3.51	0.99	9.66
75	3.53	1.07	8.79
100	3.6	1.00	9.85
200	3.61	1.09	9.56
1000	3.66	1.22	10.52

### ***Porth Hellick***

As Porth Hellick is a south-east facing bay, it is sheltered from waves from the dominant south-west direction. However, it is fully exposed to less common south-easterly storms and waves. Numerical modelling of the nearshore wave climate at Porthloo indicates 1 in 1-year wave heights of 0.79m and 1 in 100-year storm waves of 1.22m (Table 4-9). Joint probability estimates of significant wave heights and periods and water levels have been calculated for a range of return periods (Table 4-10). This indicates that the predicted 100-year event would be a 3.52m still water level coinciding with waves with significant wave heights of 1.23m.

**Table 4-9: Significant wave height return periods**

Return period (years)	Significant wave height (m)
1	0.79
2	0.89
5	0.99
10	1.05
25	1.12
50	1.16
75	1.19
100	1.22
200	1.25
1000	1.33

**Table 4-10: Joint probability of significant wave heights, water levels and significant wave periods for a range of return periods**

Return period	Water level (m)	Significant wave height (m)	Significant wave period (s)
1	3.24	0.63	6.49
2	2.99	0.93	7.00
5	3.14	0.95	8.59
10	3.4	0.81	10.28
25	3.42	1.12	8.13
50	3.6	0.98	9.09
75	3.58	1.09	8.77
100	3.52	1.23	8.43
200	3.5	1.29	9.13
1000	3.87	1.23	8.81

### **South Beach**

Due to its location on the south-east shore of Tresco, on the inside of the archipelago, South Beach is sheltered from most extreme waves and swell from the Atlantic. However, similar to Porthloo and Porth Mellon, this part of the coastline is vulnerable to strong wave-breaking conditions when waves with long periods refract between the islands. South Beach could be affected by waves and storms from the south-east as well as the south-west.

Numerical modelling of the nearshore wave climate at Porthloo indicates 1 in 1-year wave heights of 1.34m and 1 in 100 year storm waves of 1.76m (Table 4-11). Joint probability estimates of significant wave heights and periods and water levels have also been calculated for a range of return periods (Table 4-12). This indicates that the predicted 100-year event would be a 3.5m still water coinciding with waves with significant wave heights of 1.8m.

**Table 4-11: Significant wave height return periods**

Return period (years)	Significant wave height (m)
1	1.34
2	1.42
5	1.52
10	1.59
25	1.66
50	1.72
75	1.75
100	1.76
200	1.82
1000	1.90

**Table 4-12: Joint probability of significant wave heights, water levels and significant wave periods for a range of return periods**

Return period	Water level (m)	Significant wave height (m)	Significant wave period (s)
1	2.64	1.41	8.19
2	2.85	1.54	7.47
5	3.24	1.42	9.27
10	3.34	1.51	8.65
25	3.23	1.65	8.91
50	3.63	1.55	9.62

75	3.66	1.64	9.05
100	3.5	1.80	8.11
200	3.61	1.67	9.84
1000	3.71	1.81	10.17

#### 4.2.1 Coastal morphology

##### **Porthloo**

Porthloo is small bay on the western shore of St. Mary’s. It is the most northerly bay within St Mary’s Pool, which contains a number of other small embayments to the south (including Porth Mellon). Porthloo is a natural rocky bay, with a sand and pebble beach backed by a small embryo dune system in the southern half of the bay.

The cliffs to the north of Porthloo are designated as Porthloo SSSI for their geological features, due to “Exposures of Quaternary sediments in the cliffs at Porthloo comprise, from the base upwards, a succession of raised beach deposits, organic silts and sands, head deposits and a capping layer of loess”<sup>21</sup>. The SSSI is in Favourable condition.

The bay at Porthloo is flanked by two resistant granite promontories, forming Taylor’s Island (to the north) and Newford Island (to the south). The two islands create a narrow, funnelled embayment. Granite outcrops are also present to the north of the bay (Carn Morval Point).

Inland of the beach, there is a large alluvium crest forming small dunes above the mean high-water spring level. The dunes are colonised by Marram Grass. The deposits are underlain by rubble in the northern part of the bay. The beach crest at the back of the beach is very steep, in the northern part of the bay it has a slope of 1:2.7, peaking at 6.77m high and 10–11m wide. In the southern part, the crest is slightly steeper at 1:2.5, peaking at 5.86m and 10–11m wide.

The northern intertidal area is floored by bedrock, with thin surface deposits of small boulders and sandy gravels (Figure 4-2). In the southern half of the bay, the upper intertidal zone is covered by approximately a metre of local beach material (loose sand, boulders and large cobbles). These are underlain by brown ram deposits (relatively unconsolidated). Full trial pit results can be viewed in Appendix E. The beach is widest in the southern area, at a maximum of approximately 75m to Mean Low Water, whilst in the northern half it is a maximum of approximately 55m wide.

Defences exist with the aim of protecting the bay from coastal erosion and flooding. A small breakwater extends northwards from Newford Island, immediately seaward of the new slipway. This has been present since before 1909, where it is labelled as a quay on historic maps. An ad-hoc embankment is built out of building material to the north of the bay. Dune stabilisation works took place in 2014/15, including Marram Grass planting. However, wave action on the seaward face of the dunes has exposed the underlying geotextile matting and caused a near vertical dune face to develop<sup>22</sup>.

A new concrete slipway was constructed from the boat yard onto the beach in 2014 (Figure 4-3).

To the south-east of Porthloo, there is a low-lying area of land containing topogenous mire, which is designated as Lower Moors SSSI. This area provides freshwater supply to the island.

<sup>21</sup> Natural England (1996) Porthloo SSSI citation [Online] Available at: <<https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/2000177.pdf>> [Accessed May 2019]

<sup>22</sup> Arcadis (2018) Business Case Approval Sheet: Isles of Scilly Flood Defence and Dune Management Project



**Figure 4-2: Boulders and sand in the north of the bay at Porthloo**



**Figure 4-3: Slipway constructed at Porthloo in 2014**

### ***Porth Mellon***

Porth Mellon is located to the south of Porthloo, within St Mary's Pool. It is also a small, sandy pocket beach backed by a natural dune system, enclosed by resistant granite promontories, which separate the bay from Town Beach (to the south-west) and Thomas' Porth to the north.

The beach is wide and dissipative. The beach is widest in the southern area, at a maximum of approximately 100m to Mean Low Water, whilst in the northern half it is a maximum of approximately 80m wide. The bay at Porth Mellon is slightly more sheltered from extreme wave conditions than Porthloo, as the bay faces north-west, slightly away from the dominant south-west wave direction.

The northern and south-western extent of the bay is floored by bedrock, overlain by small boulders in the intertidal area (Figure 4-4). In the vicinity of the proposed works, the upper intertidal zone is floored by half a metre of compact ram deposits (sand, gravel, clay), overlain by 0.2m of loose to compact medium to coarse grained sand and gravel, overlain by just over a metre of loose sand with boulders. Full trial pit results can be viewed in Appendix E.

The roll back of the beach crest is constrained by Telegraph Road in the south-western part of the bay, and a café and boatshed are encroaching onto the beach face (Figure 4-5). Immediately south-west of these buildings, the beach crest is approximately 18m wide and peaks at 6.2m. However, the beach crest severely decreases in height and width to the west of the slipway, decreasing to approximately 10m and peaking at 4.9m. In this corner of the bay, the beach crest is basically a steep vegetated bank colonised by garden escapees (Figure 4-6). The reduced width and height are due to the erosion of the crest as the beach is unable to roll back in response to rising sea levels. This has led to undercutting of Telegraph Road. The remainder of the bay (north-east of the café and boatsheds) is relatively unconfined and the beach crest is, therefore, high and wide. Immediately north of the boatshed, the crest is approximately 20m wide and peaks at approximately 7m.

A long slipway is present on the promontory between Town Beach and Porth Mellon and a long pier juts out into the sea to the west of Town Beach; these structures are on historic maps dated to 1906. These structures are likely to exert a sheltering effect on the bay at Porth Mellon.



**Figure 4-4: Boulders in the south west of Porth Mellon bay**



**Figure 4-5: Buildings encroaching onto beach at Porth Mellon**





**Figure 4-6: Vegetated bank to the west of the slipway at Porth Mellon**

***Porth Hellick***

Porth Hellick is on the south-east coast of St. Mary's. It is a sandy pocket beach flanked by granite outcrops to the north and south. The bay is elongated and narrow, protruding approximately 400m inland.

The mouth of the bay is very narrow as a result of the presence of resistant granite outcrops – Porth Hellick Point to the north and Newfoundland Rocks to the south (Figure 4-7). Newfoundland Rocks separate Porth Hellick from another rocky bay to the south (Porth Loggos). The rocky outcrops are likely to shelter the bay from extreme waves from the south east, which is why a wide, sandy beach has been able to form within the otherwise rocky bay.

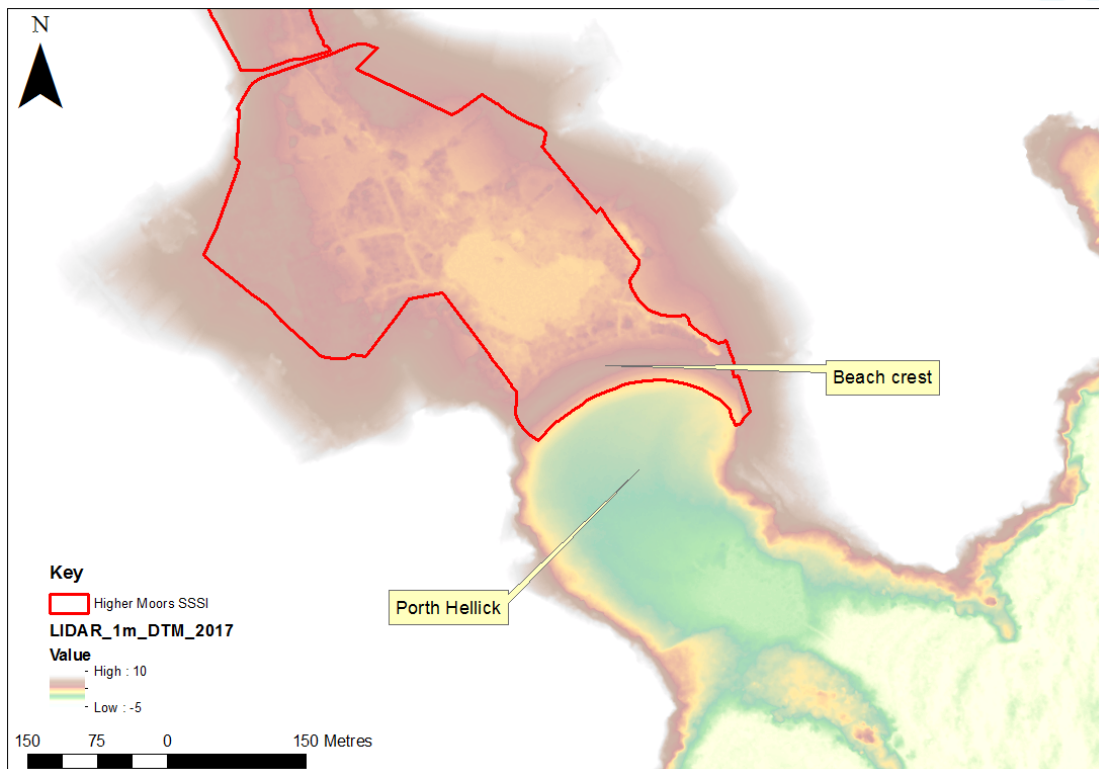


**Figure 4-7: Narrow, rocky entrance to Porth Hellick Bay**

The beach is backed by a sand/shingle dune ridge. This ridge separates the beach from very low lying land forming Higher Moors SSSI and fresh water resource (Figure 4-8; Figure 4-9).



**Figure 4-8: Aerial imagery showing Porth Hellick Beach and Higher Moors SSSI**



**Figure 4-9: LiDAR image showing low elevated SSSI behind beach crest at Porth Hellick**

The beach is 250m wide and mainly composed of coarse sand. At the entrance of the bay, bedrock outcrops are present, and boulders are strewn over the sandy surface. Sparse boulders and cobbles cover the remainder of the intertidal zone.

The dune at the back of the beach is composed of coarse sand (4-10mm particle size)<sup>23</sup> (Figure 4-10). The crest is well colonised by vegetation, including *Fascicularia bicolor* and *Carpobrotus edulis*. Crest levels are higher in the western side of the bay than the east, varying from over 5.5m in the west to over 4.25m in the east. The beach crest is wide and stable, with a crest slope of generally between 1:6 and 1:8. The gentle crest slope indicates that the beach is in equilibrium with its formative processes and is effective at absorbing wave energy<sup>25</sup>.

There are gaps and low points in the dune as a result of storm events during the past decade. There are also trampled access routes over the top of the dunes and local loss of vegetation. At the eastern end of the bay, the dune has been trampled and eroded by boat launching.

Boulder defences are in place on the eastern side of the bay. There is also an outfall at the eastern end of the bay. The construction of this outfall required the excavation of the dune, but sediment was not reinstated to match existing dune levels<sup>23</sup> (Figure 4-11).



**Figure 4-10: Coarse sand and shingle in the dune bank**

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<sup>23</sup> Arcadis (2019) Isles of Scilly Dune and Flood Defence Scheme Site Information – Porth Hellick

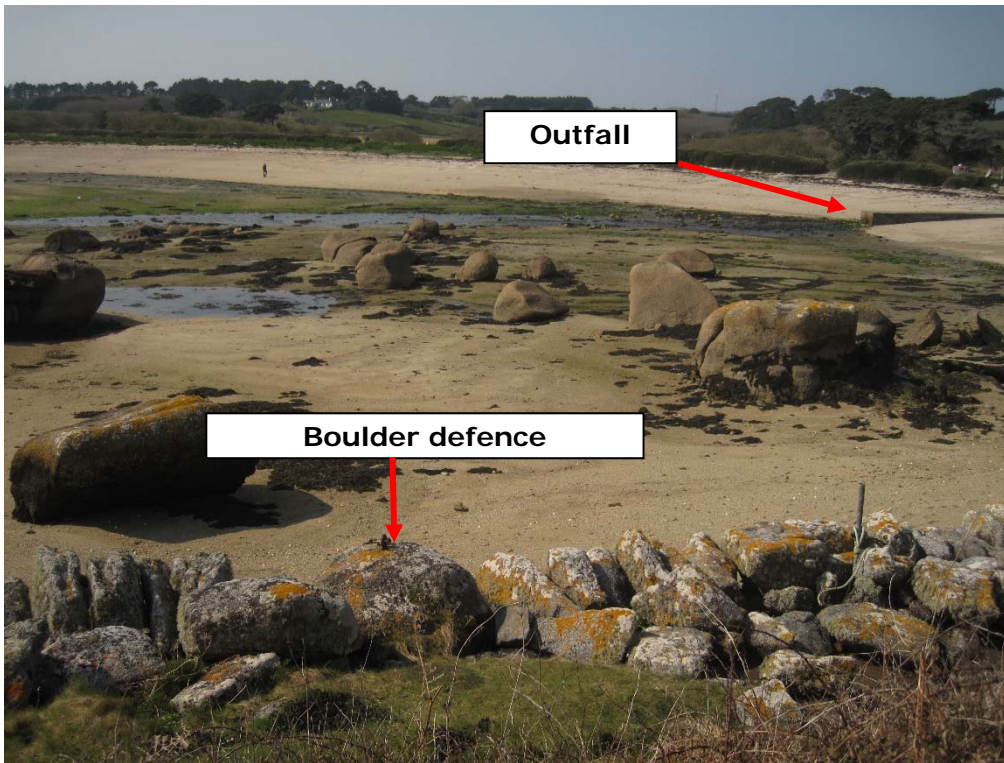


Figure 4-11: Boulders and outfall in eastern side of Porth Hellick

**South Beach**

The southern area of Tresco comprises a sand dune complex that extends from the granite rocky promontories of Crow Point in the west to Tobaccoman's Point in the east. The sand dunes are fronted by a wide, dissipative beach (Figure 4-12).



Figure 4-12: South Beach, Tresco

In the vicinity of the proposed works, the beach sediment in the upper intertidal area is composed of over 3m of unconsolidated loose sand. Full trial pit results can be viewed in Appendix E. The sand is fine grained at the beach crest, but transitions to coarse sand below the high-water mark and is overlain by cobbles (Figure 4-13). Exposed bedrock and small boulders are present midway along the beach at Crab's Ledge (Figure 4-12).



**Figure 4-13: South Beach sediment grading**

The sand dunes are colonised by Marram Grass along the majority of their length. However, erosion of the dune face is evident in a number of locations. The profile of the foredune crest is variable within the study extent. To the west of Crab's Ledge, the crest is shallower in gradient, indicating it is accreting and in equilibrium with coastal processes. However, to the east of Crab's Ledge, the crest of the dune becomes over steepened and unvegetated in places.

#### **4.2.2 Coastal dynamics**

Seabed deposits, such as tidally-generated megaripples and sand ribbons, in many parts of the archipelago indicate that sand transport is regularly occurring in these zones<sup>18</sup>. Sediment transport on St Mary's tends to occur from north to south as a response to tidal activity<sup>24</sup>.

Wave energy also causes transport to occur from west to east, which at times can counteract transport in response to the tides. There is no dominant direction of sediment transport on St Mary's due to the exposure of the coastline to all directions.

<sup>24</sup> Royal Haskoning (2010) Cornwall & Isles of Scilly Shoreline Management Plan Revision 2

Locally, coarser particles of sand are generally driven onshore by the waves and tide, whilst finer particles are moved offshore, due to high energy conditions.

There is no dominant direction of sediment transport on Tresco, but finer sands and sediment tend to accumulate on large beaches on the east, south and west coasts where more sheltered.

### ***Porthloo***

There is high potential for sediment transport at certain times of year, mostly due to wave action but to some extent tidal energy. As there are a wide range of wave conditions, erosion and deposition patterns are likely to be random and erosion/deposition sites may alternate in a cyclical nature. Over longer timescales, the rate of sediment transport will be highly dependent upon sediment supply. Beach levels at Porthloo are likely to vary seasonally, accumulating during constructive summer wave conditions and losing sediment during winter destructive wave conditions.

It was suggested in the Porthloo Slipway ES<sup>20</sup> that there appears to be no strong supply of sand from offshore into St Mary's Sound. There is a gap between the sandy zone within the bays of St Mary's Sound and the main body of sand offshore in St Mary's Roads and it is possible that sand arrives from the south and moves northwards via longshore drift. This suggests that sand transport occurs around the promontories between the small bays from south to north.

Aerial photography supports the observation in the Porthloo Slipway ES that the neck connecting Newford Island with the mainland is composed of a large amount of sand, indicating that sand is transported from Porth Mellon in the south (Figure 4-14). However, sand deposits are smaller in extent on the southern side of the neck, which could mean that sediment transport is slow<sup>20</sup>.

The southern half of the bay is widest, which could be due to the input of sediment from the south, or alternatively due to the sheltering effect of Newford Island. The body of sand present in the sublittoral zone of the bay (evident in Figure 4-14) is likely to be a local reservoir for sediment entering/leaving the bay<sup>20</sup>.



**Figure 4-14: Aerial photograph of Porthloo**

In the north of the bay, where there is a thinner, less dissipative sand body, erosion of the ram cliffs is occurring (Figure 4-15).



**Figure 4-15: Erosion of ram cliff in northern part of bay**

The berm in the upper half of the beach is mostly artificial, containing rubble dating back to 1900. There has been a history in this location of rubble dumping to protect the beach crest<sup>25</sup>. The rubble slope has been partially covered by sand (Figure 4-16). True marram dune only exists in a small area in the southern half of the bay where there is a large enough sand supply to contribute to dune growth (Figure 4-17).



Figure 4-16: Rubble partially covered in sand in northern part of bay

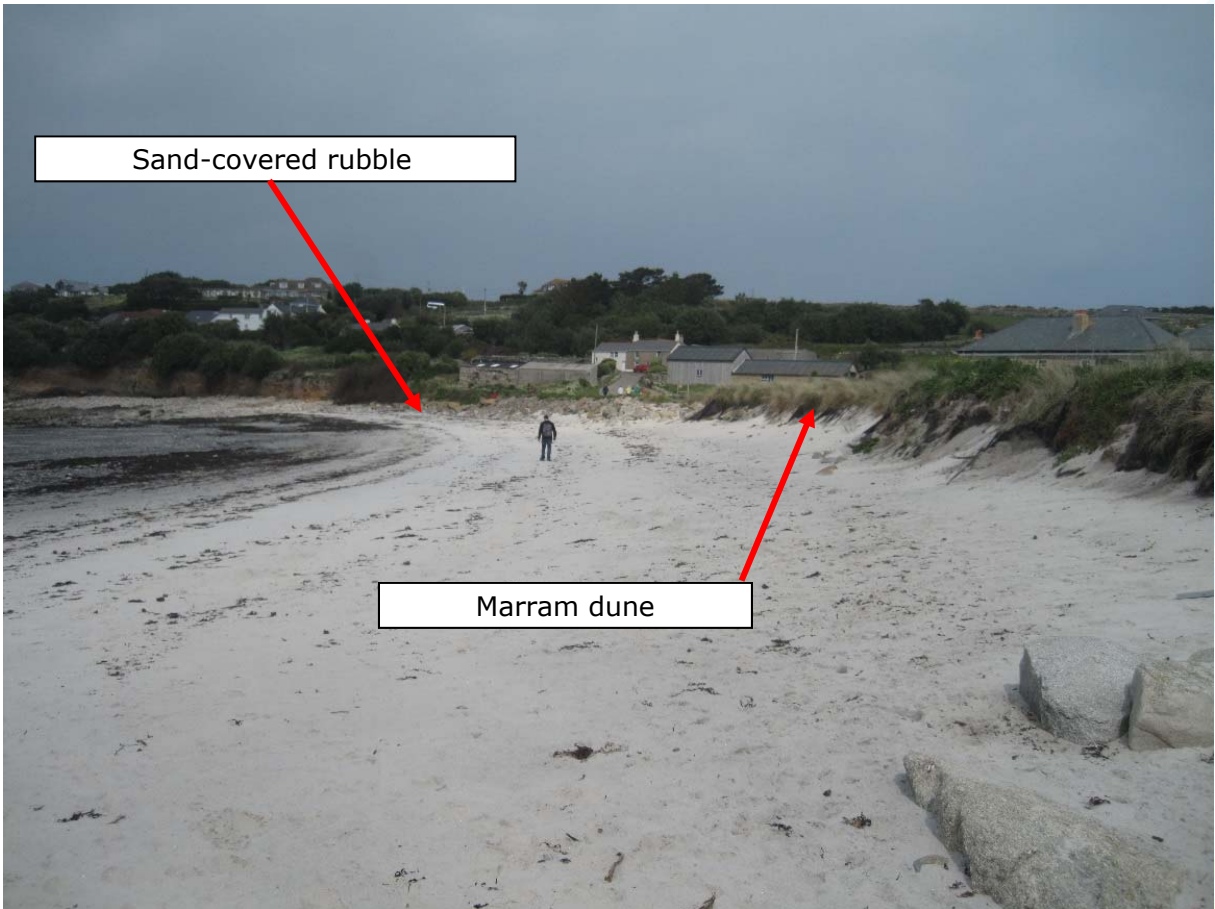


Figure 4-17: Photo looking north from the slipway



There can be significant onshore-offshore displacement of beach sediment at times. Although generally this may take place over decadal timescales<sup>20</sup>, the beach can be severely impacted during storm events. Figure 4-18 shows how the beach crest significantly steepened following severe storms during the winter of 2013–2014. Although dune stabilisation works have taken place since this event, the dune face has steepened to near-vertical, possibly as the dunes are mostly made ground and have an intermittent/slow sediment supply.

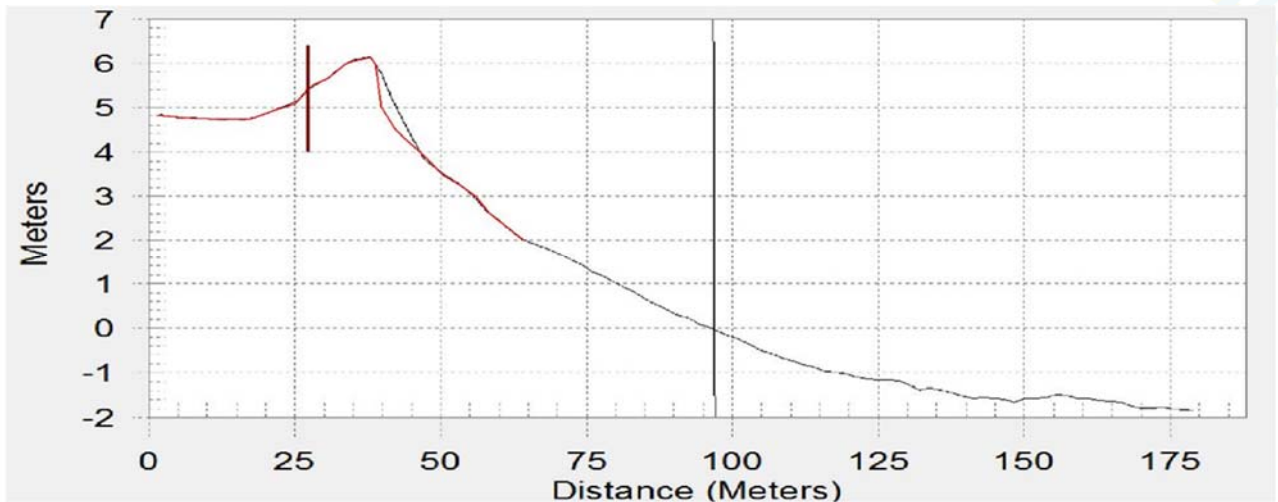


Figure 4-18: Cross-section of the beach crest 15m north of slipway. Black line: 2007; red line: 2014<sup>25</sup>

Examination of historic maps indicates that there has been apparent slow retreat of the mean high-water mark by approximately 20m per century (Figure 4-19)<sup>25</sup>. The SMP2 predicts that inland erosion in this location may be as much as 30m by 2105<sup>24</sup>.

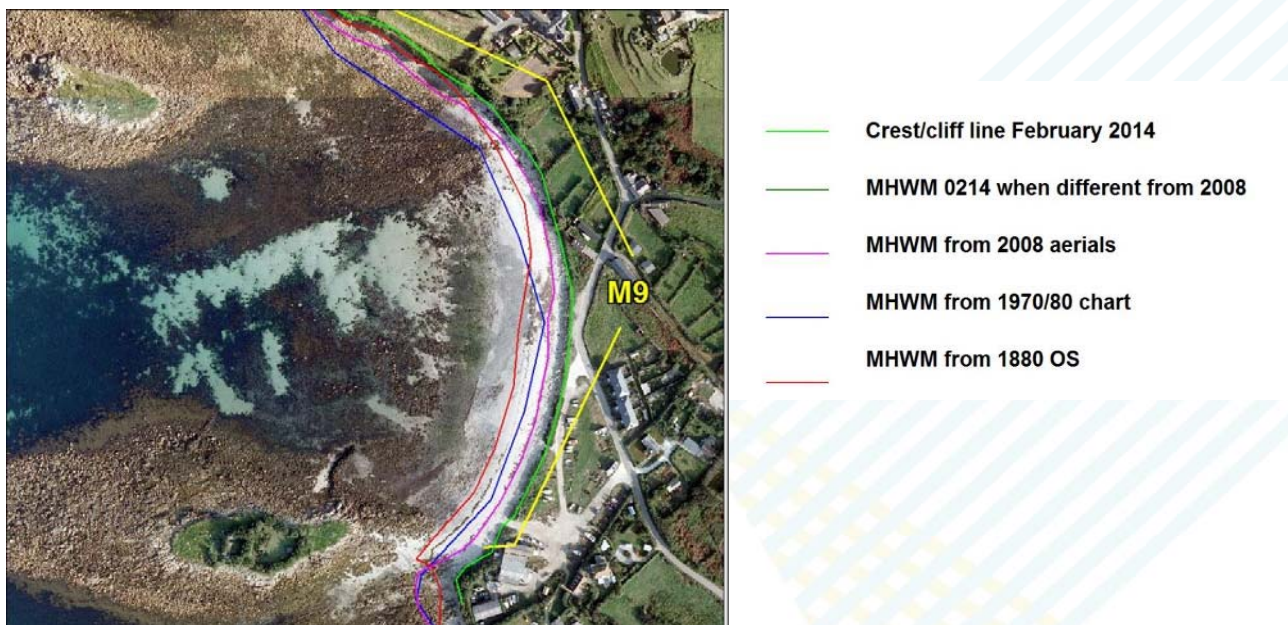


Figure 4-19: Aerial imagery showing retreat of the mean high water mark<sup>25</sup>

<sup>25</sup> Ambios Environmental Consultants Ltd (2014) St Mary's Review of coastal erosion and flood defences, Isles of Scilly

### ***Porth Mellon***

Sediment transport patterns within and adjacent to the bay at Porth Mellon are likely to be very similar to Porthloo, with longshore drift generally occurring in a south-west to north-east direction within St. Mary's Sound, travelling around granite promontories.

The south west corner of the bay at Porth Mellon is therefore likely to receive more sediment, which contributes to its increased beach width, alongside being in the sheltered lee of the promontory between Porth Mellon and Town Beach. It is very likely that if it were not for the coastal squeeze occurring at this location, the beach crest would be widest and tallest at this end of the beach due to the available sediment for aeolian transport. The beach crest is generally wider and taller in the southern half of the beach, but this is interrupted by the encroachment of buildings and the proximity of Telegraph Road to the beach edge, which has caused the beach crest to be squeezed and reduced in size by rising sea levels.

The beach has been relatively stable over time, due to its large volume of sand which is trapped by local morphology. In the 2014 storms, localised erosion of the dune face and upper beach area occurred, particularly around hard structures and boulders in the north of the beach. However, the dunes generally recovered quickly following the storms (Figure 4-20)<sup>25</sup>.



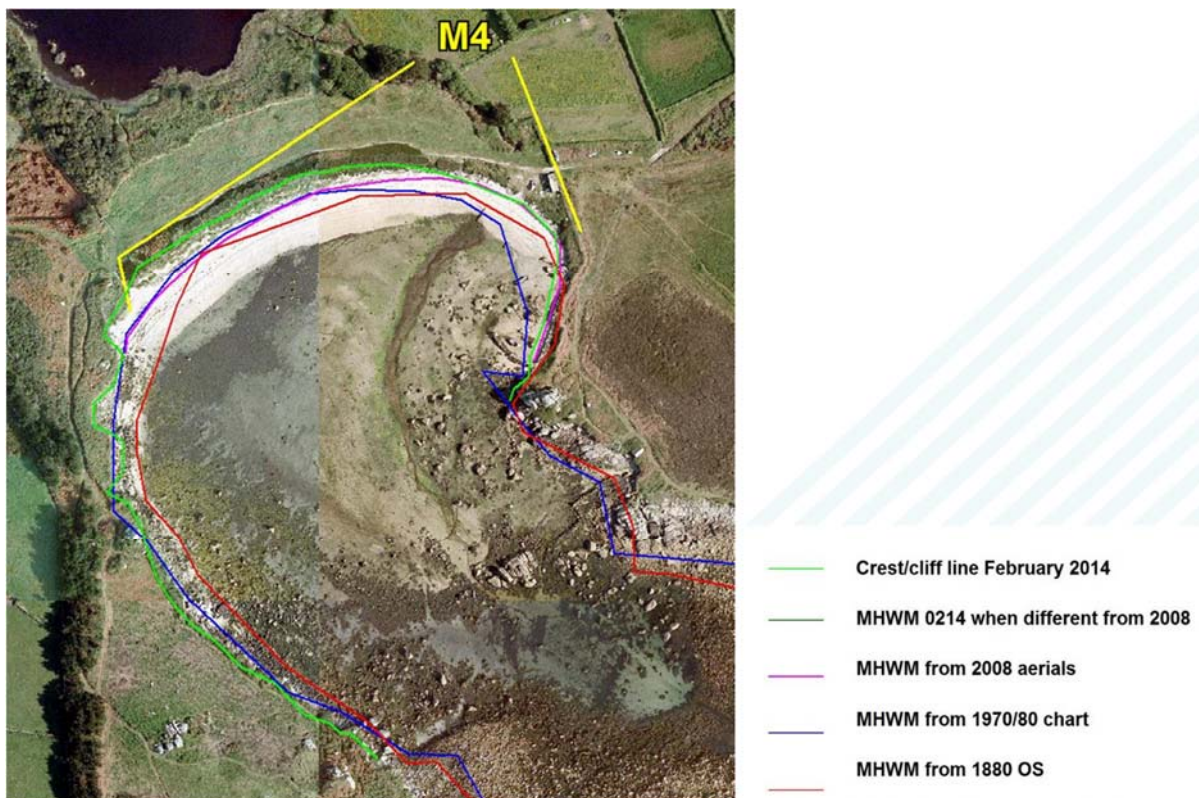
**Figure 4-20: Dune face in good condition in north of bay (1st March 2014)<sup>25</sup>**

### **Porth Hellick**

Tidal activity is the dominant force delivering sediment from the north coast of St. Mary's<sup>18</sup>. However, waves from the south east may occasionally drive coarse particles of sand onshore during high energy conditions. Although sheltered from south westerly prevailing wave conditions, when waves arrive from the south east the bay is fully exposed. Rocky outcrops at the entrance of the bay are likely to provide some shelter from extreme waves, as will the long dissipative sandy beach. However, the beach crest is vulnerable to erosion and overtopping when strong wave conditions from the south east coincide with high tides.

It would appear from LiDAR imagery that the main flow route into the bay is in through the mouth between Newfoundland Rocks and Porth Hellick Point. Water then flows to the western side of the bay, before circulating to the eastern edge. The western side of the beach crest is therefore accreting faster than the eastern side, as it is receiving larger amounts of sediment. This explains the increased width and height of the ridge in the west of the bay. Ram cliff erosion has occurred in the eastern side of the bay, possibly due to this circulation of tidal currents and concentration of wave energy.

Between 2007 and 2017, the beach profile has increased in cross-section by 0–3%, and around 5m<sup>2</sup> of material has accreted at the western end of the bay<sup>22</sup>. However, although the beach has been largely stable, with some ram cliff retreat especially to the east of the bay<sup>25</sup> (Figure 4-21), SMP2 predicts up to 65m of erosion by 2105, which would cut through the existing ridge<sup>24</sup>.



**Figure 4-21: Aerial imagery showing retreat of the mean high water mark at Porth Hellick<sup>25</sup>**

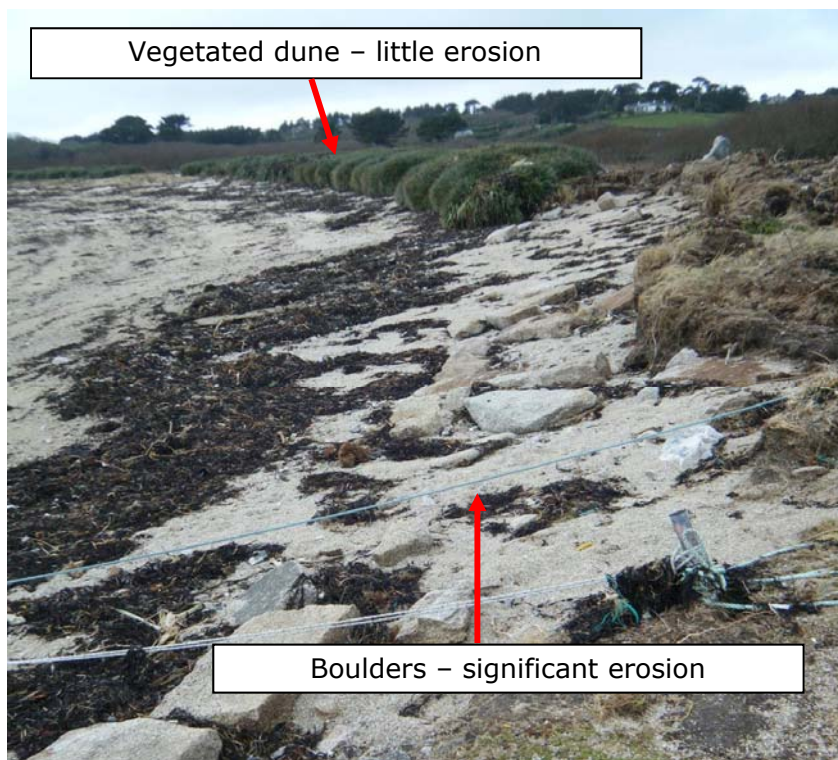
In the 2013-2014 storms, slight overtopping of the beach crest occurred, as well as localised erosion around Cloudesley Shovel grave and ram cliff erosion. The beach performed well during the storms, demonstrating effective energy absorption<sup>25</sup>. However, it has been reported that the ridge has not been mobile and responsive during storm events, and in 2014 green water was seen to wash over the ridge<sup>22</sup>. There are a number of gaps in the ridge which

could allow seawater to overtop during storm events (Figure 4-22). These gaps are likely to erode further during future storm events due to the concentration of wave energy.



**Figure 4-22: Vulnerable zones of weakness on Porth Hellick beach crest**

There is evidence to suggest that the exotic vegetation along the majority of the ridge acts as a more effective wave defence than boulders in the eastern section (Figure 4-23)



**Figure 4-23: Porth Hellick beach erosion following 2013/14 storms<sup>25</sup>**

### South Dunes

The South Dunes coastline does not act like a typical linear coastline as it is subject to multidirectional influences from wave, wind and tide, including tidal storm surges. However, there is a good sediment supply to the beach, indicated by the vast sand flats present in St. Mary's Road and Tresco Flats. A large amount of sand is visible on aerial imagery in the subtidal area fronting South Beach (Figure 4-12). This sediment is likely to be a reservoir of sand transported from other areas around the island.

Recent storms in 2014 have indicated a key area of vulnerability at South Beach which would have significant impacts on critical infrastructure if breached<sup>22</sup>.

The vulnerable area is a 100m length of the South Beach dunes where the telecommunications cable comes ashore. The South West Coastal Monitoring Programme found that there has been a 7-22% loss in cross sectional area over the vulnerable site at South Beach, whilst accretion has occurred either side of this area (Figure 4-24). Local observations suggest the foredune across South Beach frontage has been subject to elevated rates of erosion, potentially reaching 1m per year over the last 10 years<sup>22</sup>. Figure 4-25 shows the over steepened face of the dunes following the 2013–2014 storms.



Figure 4-24: South Dunes change in cross-sectional area 2007–2017



**Figure 4-25: Dune erosion at South Dunes following 2014 storms**

Localised dune stabilisation was undertaken in 2014, in front of the dune in the vicinity of the cable junction box and the wood store (Figure 4-26). These defences have helped to capture windblown sand in the area and the dunes either side are shown signs of recovery following storm erosion.

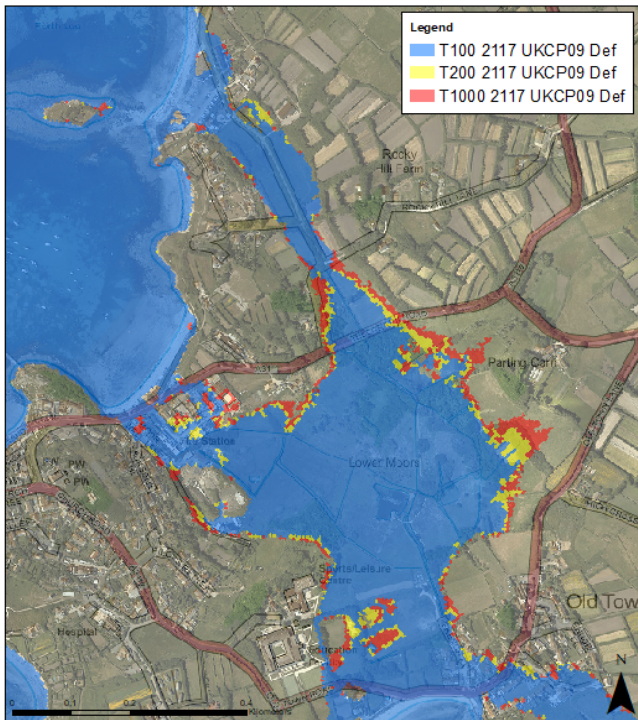


**Figure 4-26: Localised defence works on South Dunes**

### 4.2.3 Flooding

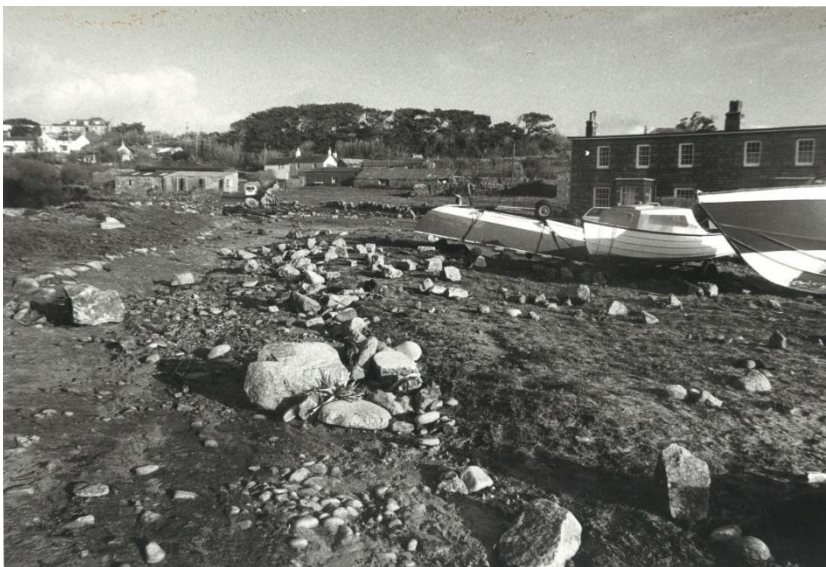
#### Porthloo

During storm events, the southern end of the beach is at risk of overtopping, causing inundation of the commercial area. Work has been undertaken which confirms a flood water drainage link from Porthloo to the Lower Moors SSSI during a 1 in 100-year event for the year 2117 (Figure 4-27).



**Figure 4-27: Flood risk map, 2018, showing inundation at Porthloo with climate change to the year 2117 using UKCP09 guidance for sea-level rise**

The embankment was overtopped during storms in 1989 and 2014 (Figure 4-28; Figure 4-29).



**Figure 4-28: Debris from overtopping of the bank in 1989 storms**



Figure 4-29: Erosion of bank after 2014 storm

**Porth Mellon**

There are two flooding routes through lower elevated areas to the north and south of the bay at Porth Mellon. One of these routes is the slipway in the south-western part of the bay. The low-lying hinterland behind the beach provides a route for flood water into the Lower Moors SSSI, as can be seen in Figure 4-30.

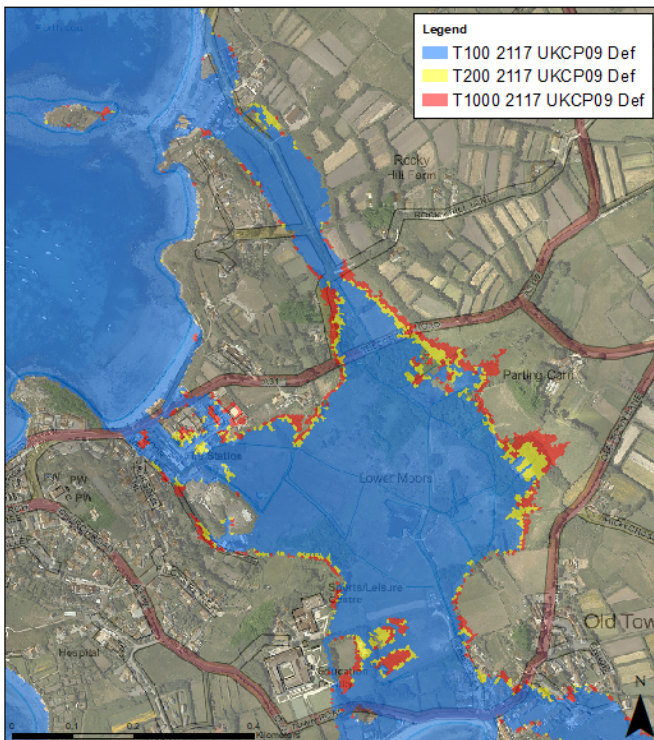


Figure 4-30: Flood risk map, 2018, showing inundation at Porth Mellon with climate change to the year 2117 using UKCP09 guidance for sea-level rise



Severe undercutting of the bank and road occurred in this location during 2014, which led to breaching of the slipway<sup>22</sup> (Figure 4-31; Figure 4-32).



Figure 4-31: Breaching of the slipway during 2014 storms<sup>22</sup>



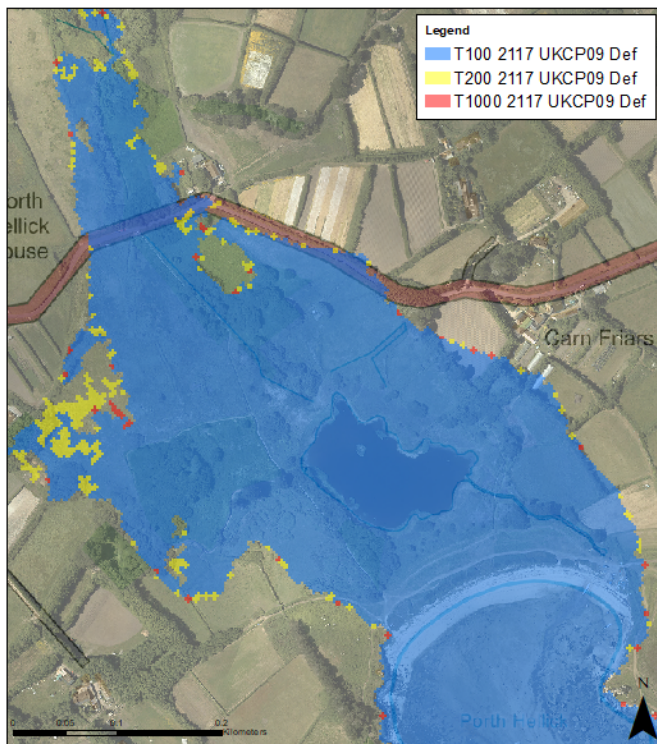
Figure 4-32: Flooding of Telegraph Road following breaching<sup>22</sup>

### ***Porth Hellick***

Porth Hellick is exposed to south-easterly storms and waves. Inundation could have significant strategic implications for the freshwater supply to St. Mary's<sup>26</sup>.

Flood mapping shows inundation of the low-lying land behind the sand/shingle dune ridge during 1 in 100, 200 and 1000-year events in 2117 (Figure 4-33).

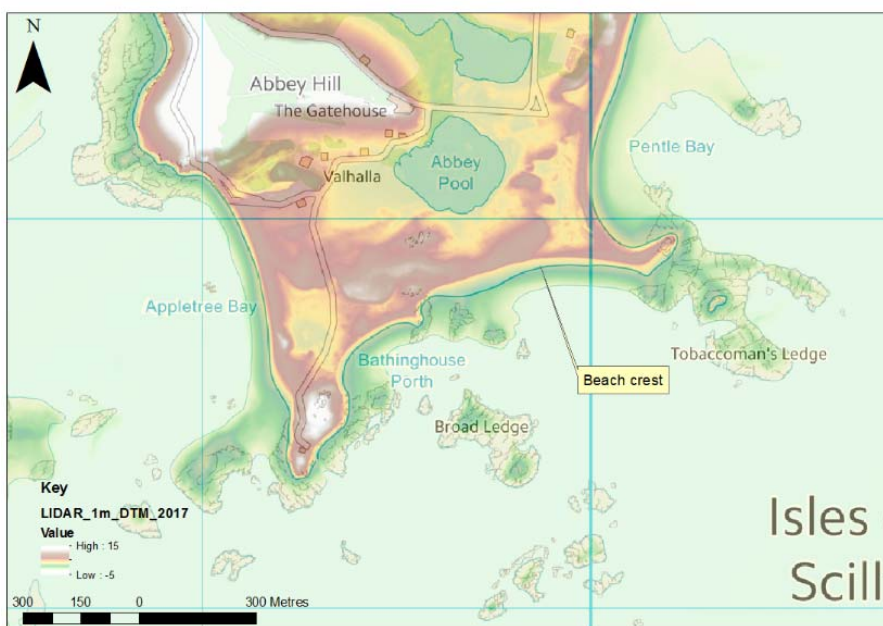
<sup>26</sup> ARUP (2011) Isles of Scilly Water Interests Survey: Report on Flood Defences



**Figure 4-33: Model flood extents St Mary's Porth Hellick Defended 2117 UKCP09**

**South Dunes**

The dune complex is vulnerable to breaching in lower elevated areas, which would cause inundation of the freshwater lakes at Great Pool and Abbey Pool and damage to critical infrastructure. Figure 4-34 shows the low-lying land behind the beach crest, which would be inundated if the ridge were to be breached during a storm event. Figure 4-35 shows the flood extents for 1 in 100, 200 and 1000-year events in 2117; there is a clear flood pathway through the dunes at South Beach.



**Figure 4-34: LiDAR imagery showing vulnerability of low lying land behind beach crest**



Figure 4-35: Model flood extents Tresco Defended 2117 UKCP09

### 4.3 Assessment methodology and assessment criteria

This assessment considers the potential short-term (construction) and long-term (operational) impacts of the proposals on the local and regional coastal processes.

The assessment of the coastal processes, geomorphology and flood risk has been undertaken as a desk-based assessment utilising the following sources:

- Existing literature, including Shoreline Management Plans, flood and erosion reports, the Environmental Statement for Porthloo Slipway improvements (2012);
- Available data and reports on the Channel Coastal Observatory (<https://www.channelcoast.org/>);
- Remote assessment via photographs, aerial imagery and LiDAR imagery (<https://www.channelcoast.org/>);
- Historical maps (<https://maps.nls.uk/>) and geological maps (<https://www.bgs.ac.uk/data/mapViewers/home.html?src=topNav>);
- Baseline flood data based on UKCP09 scenarios; and
- Geotechnical site investigation – a series of trial pits on the foreshore at Porthloo, Porth Mellon and South Beach were taken by Arcadis in May/June 2017.

UKCP09 flood risk data has been used as UKCP18 flood risk data is not currently available. The Environment Agency are yet to issue guidance on the use of UKCP18 and are still using UKCP09 on current flood maps.

A number of sources of potential impacts on coastal processes have been identified from activities associated with defence construction. At Porthloo these are:

- Stockpiling and storage of rock on the beach;
- Excavation for rock revetment and concrete wall construction;
- Tracked vehicle movements on the beach; and
- Physical presence of the rock revetment and reinforced concrete wall.

At Porth Mellon, sources of potential impacts on coastal processes from revetment construction are:

- Stockpiling and storage of rock on the beach;
- Excavation for rock revetment;
- Tracked vehicle movements on the beach; and
- Physical presence of the rock revetment.

At Porth Hellick, sources of potential impacts on coastal processes from dune construction are:

- Stockpiling and storage of bags of crushed Cornish Granite on the beach;
- Tracked vehicle movements on the beach;
- Construction of beach access ramp; and
- Physical presence of the newly re-charged dune and access ramp.

At South Dunes, sources of potential impacts on coastal processes from dune stabilisation are:

- Dune scour protection works; and
- Physical presence of the rock rolls and timber stakes.

In accordance with the definitions of impacts provided in Table 4-13, these activities have been assessed with regards to their potential to impact on coastal processes; namely, changes to nearshore wave climate, beach-sediment exchange in the upper shore and sediment transport within the intertidal and nearshore zones.

**The consequences of these impacts have been assessed with regards to scale at which they naturally operate in accordance with the sensitivity criteria provided in**

Table 4-14. Table 4-13 has then been used in order to determine the significance of the effect on scheme proposals. Where the consequences of the changes in coastal processes would impact on specific environmental receptors of value (i.e. ecological receptors), these are addressed as secondary effects in the relevant section of the ES.

**Table 4-13: Criteria for defining the magnitude of impacts on coastal processes**

Impact score	Criteria
<b>Major</b>	Major change in the strength of magnitude of the process operating.
<b>Moderate</b>	Moderate change in the strength of magnitude of the process operating.
<b>Minor</b>	Minor change in the strength of magnitude of the process operating.
<b>Negligible or no change</b>	No perceptible change in the strength of magnitude of the process operating.

**Table 4-14: Criteria for defining the sensitivity of coastal processes**

Sensitivity score	Criteria
<b>High</b>	Coastal processes operating at the scale of PDZ18 (Isles of Scilly).
<b>Medium</b>	Coastal processes operating at the scale of MA42 (St. Mary's)/MA44 (Tresco).
<b>Low</b>	Coastal processes operating at the scale of the site or limited to the immediate nearshore zone.

## 4.4 Potential impacts and significant effects

### 4.4.1 Porthloo

#### *Construction impacts*

The Porthloo SSSI is located on the northern boundary of the construction area; however, no impacts on the SSSI are anticipated during construction.

All works requiring beach access would be conducted under dry conditions (i.e., when tide levels expose the work areas). The length of the tidal cycle and therefore the working window would vary depending on the level of the astronomical tide. The outline construction methodology indicates that the rock revetment would be constructed from the toe to the crest in 10m sections along its length so that the toe excavation can be backfilled with site won sand within a single tidal window (before the next incoming tide) to minimise the potential for mobilisation of construction materials or excavated materials.

During construction, the rock will be delivered to the beach by landing craft and temporarily stored on the foreshore of the working area prior to installation. Existing rock rubble will be removed and placed in a designated part of the working area prior to re-use in the revetment or removal from site. The working area is largely above the MHW level; therefore, the storage of this material is only likely to be wetted by wave run-up during a storm event. The storage of the material could cause small-scale, localised changes to current flows over and around the rock piles during extreme events, which could increase turbulence around the rock piles, resulting in increased localised sediment mobilisation on the lee side of the piles. The potential rate of erosion will depend on the current velocity and will therefore be dependent on the tidal state, wave height and the duration that the rock piles remain on the beach. Coastal processes at this scale are low sensitivity and following removal of the rock pile, the beach profile will return to its previous state. It is therefore considered that the temporary storage of rock material on the beach will have **Negligible Impact** on the local hydrodynamic and sediment regimes.

There is a limited risk that excavation during construction could mobilise beach sediment into the sea. The excavator will excavate a 10m section of the revetment toe trench within a tidal window. All arisings will be placed on a dumper truck and then used as backfill along the revetment toe, within the same tidal window. Any excess material will be transported from site. This will reduce the potential for sediment mobilisation. A geotextile membrane will also underlie the rock armour, which will reduce erosion at the toe and base of the revetment and prevent leaching of underlying substrate. Therefore, it is unlikely that significant volumes of sediment will be mobilised during construction and the coastal processes are considered as low sensitivity. As a result, **Negligible Impact** on the sediment regime is anticipated.

An excavator and dumper truck will transport the rock across the beach to the revetment location ready for placing. The movement of these vehicles is likely to produce tracks in the beach sands. The findings of the geotechnical site work indicate that these tracks are unlikely

to expose the underlying sediment layers, due to the depth of the overlying sand layer. The rate of beach material disturbance by the vehicles will be dependent on various factors, such as vehicle type, drive type (tracked or wheeled), track/wheel type and dimensions, weight of vehicle (including loads), friction angle between wheels/tracks and the beach and the nature of the sediment (cohesion and adhesion, etc.). The movement of the vehicles on the beach will be along designated routes, thereby limiting the potential impact area and allowing continual visual monitoring. All disturbed areas will be returned to their former state following construction. Based on the low magnitude of the disturbance, its localised nature and the low sensitivity of the coastal processes considered, **Negligible Impact** on the sediment regime is anticipated.

### ***Operational impacts***

The placement of the rock armour will be undertaken on a relatively small section of the crest (110m). Approximately 30m of retaining wall will be constructed at the southern end of the revetment, to tie in the existing timber wall that forms part of the existing managed dune system.

The new revetment will reduce erosion of the beach crest and prevent erosion of the existing access road (Porthloo Lane) during storm events. The existing crest is eroded and oversteep, and it appears to be unable to adjust to rising sea levels due to its existence on made ground and limited sediment supply. Stabilisation works involving dune re-profiling and planting with Marram Grass have had little success, with the crest returning to their oversteep profile.

The crest level of the new revetment (6.7mAOD) corresponds with the adjacent managed dune defence and the crest of the retaining wall will be similar to the height of the rock armour. The slope of the crest will be generally be of a slightly shallower gradient than the existing rock rubble revetment, between 1:2 and 1:1.5, increasing to 1:3 at either end. Although the new revetment will be wider than the existing rubble revetment, the footprint of the defence remains well above the mean high-water spring tide level and will only be wetted during extreme wave/storm surge conditions. However, the shallower gradient of the revetment will reduce wave reflection onto the beach face, which should reduce the potential for higher wave energy conditions at the top of the beach. The coastal processes at this scale are considered as low sensitivity. Therefore, it is considered that the proposed operations will have **Negligible Impact** on the hydrodynamic regime within the area.

Cross-beach transfer of sediment will not be impacted by the new revetment. Onshore/offshore movement of beach material will only be impacted during extreme conditions, although this impact is anticipated to be minimal due to the existing stabilising presence of rubble revetment in the area. It is considered that the proposed defence will have **Negligible Impact** on the sediment regime within the area.

The works at Porthloo Bay will prevent the overtopping of the defence during a 1 in 200-year flood event and therefore reduce flood risk to the Lower Moors SSSI. The processes at this scale are considered as Medium Sensitivity. The works will therefore have a **Moderate Impact** on flood risk, but this effect will be positive.

## ***4.4.2 Porth Mellon***

### ***Construction impacts***

All works requiring beach access would be conducted under dry conditions (i.e., when tide levels expose the work areas). The length of the tidal cycle and therefore the working window would vary depending on the level of the astronomical tide. The outline construction methodology indicates that the rock revetment would be constructed from the toe to the crest in 10m sections along its length so that the toe excavation can be backfilled with site won sand within a single tidal window (before the next incoming tide) to minimise the potential for mobilisation of construction materials or excavated materials.

During construction, the rock will be delivered to the beach by landing craft and temporarily stored on the foreshore of the working area prior to installation. Existing rock rubble will be removed and placed in a designated area within the working area prior to re-use in the revetment or removal from site. The storage of the material could cause small-scale changes to current flows over and around the rock piles during extreme events, which could increase turbulence around the rock piles, resulting in increased localised sediment mobilisation on the lee side of the piles. The potential rate of erosion will depend on the current velocity, and will therefore be dependent on the tidal state, wave height and the duration that the piles remain on the beach. Coastal processes at this scale are low sensitivity and following removal of the rock pile, the beach profile will return to its previous state. It is therefore considered that the temporary storage of rock material on the beach will have **Negligible Impact** on the local hydrodynamic and sediment regimes.

There is a limited risk that excavation during construction could mobilise beach sediment into the sea. The excavator will excavate a 10m section of the revetment toe trench within a tidal window. All arisings will be placed on a dumper truck and then used as backfill along the revetment toe, within the same tidal window. Any excess material will be transported from site. This will reduce the potential for sediment mobilisation. A geotextile membrane will also underlie the rock armour, which will reduce erosion at the toe and base of the revetment and prevent leaching of underlying substrate. It is unlikely that significant volumes of sediment will be mobilised during construction and the processes are considered as low sensitivity; therefore, a **Negligible Impact** on the sediment regime is anticipated.

An excavator and dumper truck will transport the rock across the beach to the revetment location ready for placing. The movement of these vehicles is likely to produce tracks in the beach sands. The findings of the geotechnical site work indicate that these tracks are unlikely to expose the underlying sediment layers, due to the depth of the overlying sand layer. The rate of beach material disturbance by the vehicles will be dependent on various factors, such as vehicle type, drive type (tracked or wheeled), track/wheel type and dimensions, weight of vehicle (including locals), friction angle between wheels/tracks and the beach and the nature of the sediment (cohesion and adhesion, etc.). The movement of the vehicles on the beach will be along designated routes, thereby limiting the potential impact area and allowing continual visual monitoring. All disturbed areas will be returned to their former state following construction. Based on the low magnitude of the disturbance, its localised nature, and the low sensitivity of the coastal processes, it is considered that the works will have **Negligible Impact** on the sediment regime.

### ***Operational impacts***

The placement of the rock armour will be undertaken on a relatively small section of the bay (40m). The revetment crest level will be 6.19mAOD, which will tie into the vegetated bank along Telegraph Road. The revetment will have a width of 14.95m and a slope varying between 1:2 and 1:1.5, which will increase to a 1:3 slope at each end of the revetment. The slope of the rock armour will be significantly shallower than the steep frontage of the existing bank. The defence will therefore act to absorb wave energy, causing reflected waves to be smaller. The coastal processes at this scale are low sensitivity. It is considered that the proposed coastal defences will have **Negligible Impact** on the hydrodynamic regime at Porth Mellon.

Erosion around hard structures has occurred during storm events at other locations on the beach, but this has generally occurred in the northern part of the bay which is more exposed to waves than the southern part of the bay. The shallow gradient of the structure should lead to the accretion rather than erosion of sediment, due to the high sediment supply to this part of the beach. This accretion will further help to reduce wave energy.

The proposed works will disconnect the face of the vegetated bank from the beach. The vegetated bank is so severely eroded in the vicinity of the works that it now resembles a steep bank colonised by garden escapees, rather than a functioning dune face able to trap

and retain sediment. Due to the position of Telegraph Road and adjacent infrastructure, there is no potential for the beach crest to roll back and recover to become a natural dune system in this area. As sea levels rise, the vegetated bank will undercut even further, which could cause breaching of the bank during storm events. There is the potential that sand will accumulate on and in front of the rock armour, allowing the defence to trap and retain sediment more than the existing steep bank is able to. The coastal processes at this scale are low sensitivity. It is considered that the proposed coastal defences will have **Negligible Impact** on the hydrodynamic regime and sediment dynamics at Porth Mellon.

The proposed defence will reduce wave undercutting of the vegetated bank, which will reduce the risk of breaching that has formerly caused flooding of the adjacent slipway and Telegraph Road. Breaching or overtopping of the defence could affect a range of strategically important assets including adjacent residential and commercial properties, the island's waste and recycling facility, Telegraph Road, which is the principal highway connecting the area to Hugh Town and the rest of St Mary's, and could also result in saline intrusion into the Lower Moors SSSI to the south east, which is a major source of freshwater for the island. The height of the formalised defence will prevent overtopping during a 1 in 200-year event. Wave energy may be propagated up the slipway to the tide gate as the rock armour could prevent waves from dissipating to the west. However, as a demountable stop log defence is already utilised here to prevent flooding and has been strengthened since the storms of 2014. Therefore, it is not considered that the development proposals will cause any significant negative impact on flood risk. The processes impacted at this scale are Medium Sensitivity. The works are anticipated to have a **Moderate Impact** on flood risk during extreme events, but this effect is positive.

#### 4.4.3 Porth Hellick

##### **Construction impacts**

The working area is located above high tide. All works requiring beach access would be conducted at low tide. The length of the tidal cycle and therefore the working window would vary depending on the level of the astronomical tide.

During construction, the building materials will be delivered to Porthloo by landing craft or to St Mary's harbour. The materials will then be transported to the site compound at Porth Hellick. At Porth Hellick, an excavator will deliver the crushed stone from the storage area to the dune recharge area for installation and grading. The movement of these vehicles on the beach at Porthloo and Porth Hellick is likely to produce tracks in the beach sands. The rate of beach material disturbance by the vehicles will be dependent on various factors, such as vehicle type, drive type (tracked or wheeled), track/wheel type and dimensions, weight of vehicle (including loads), friction angle between wheels/tracks and the beach and the nature of the sediment (cohesion and adhesion, etc.). The movement of the vehicles on the beach will be along designated routes, thereby limiting the potential impact area and allowing continual visual monitoring. All disturbed areas will be returned to their former state following construction. Based on the low magnitude of the disturbance, its localised nature and the low sensitivity of the impacted coastal processes, it is considered that the works will have **Negligible Impact** on the sediment regime at Porthloo and Porth Hellick.

The newly recharged dune will be overlain by biodegradable coir matting and planted with vegetation to reduce sediment mobilisation following construction. Recharging the dune is anticipated to have **Negligible Impact** on the sediment regime.

##### **Operational impacts**

The proposed scheme involves reconstruction of the dune at the eastern end of the bay. This section of the bay is eroding, due to trampling of the dunes by boat users and the presence of an outfall which has caused local drawdown.

The crest level, width and gradient of the dune will match the existing dune profile in other sections of the bay. The dune will only be inundated during storm events, but during these



events the new dune is likely to absorb wave energy rather than reflect it and is therefore considered a positive management response affecting low sensitivity processes, with **Negligible Impact** on hydrodynamics.

The construction of a formal access point will reduce widespread erosion occurring on the eastern side of the crest as a result of trampling by vehicles. However, trampling may still occur in the vicinity of the formal path as users venture off the path.

Filling and planting vegetation in the gaps in the existing ridge will reduce further erosion during storm events. This action is anticipated to have **Negligible Impact** on the hydrodynamic regime and sediment dynamics.

The new dune will be constructed from crushed Cornish granite (sized 4-10mm). The crushed granite aligns with the granitic geological composition of the Scilly Isles and the size of the crush is anticipated to match the existing sediment. Therefore, a **Negligible Impact** on sediment dynamics or physical characteristics of the dune is anticipated.

Filling in existing gaps in the ridge and increasing the height of the dune ridge in the eastern side of the bay will reduce the flood pathway leading to the Higher Moors SSSI. There is anticipated to be no negative impact on flooding. The processes impacted at this scale are Medium Sensitivity. The works are anticipated to have a **Moderate Impact** on flood risk during extreme events, but this effect will be positive.

#### 4.4.4 South Dunes

##### **Construction Impacts**

The dune scour protection works involve driving timber stakes into position at the dune toe and placing rock rolls in layers behind the timber stakes. Biodegradable coir matting will cover the dune face, which will then be covered by a thin layer of beach material. The dune scour protection works will be constructed in 10m sections along its length to minimise the potential for mobilisation of construction materials as a result of wind or waves. The dune face will also be planted with mature Marram Grass, which will reduce sediment mobilisation following construction. It is unlikely that significant volumes of sediment will be mobilised during construction and the coastal processes impacted at this scale are low sensitivity. Therefore, a **Negligible Impact** on the sediment regime is anticipated.

##### **Operational Impacts**

The proposed works involve the construction of a rock roll defence up to 1m high to provide increased wave protection to the dune toe during storm events. The defence would be placed along the toe of a 200m long section of dunes on South Dunes beach, either side of the telecommunications cable junction box. The rock roll will only extend along the vulnerable section, identified as at risk of breaching due their reduced height in comparison to dunes in the west.

The defence would be located above the 1 in 200-year extreme water level, including an allowance for climate change for up to 2066. The structure would still experience wave run up during storm events, but these waves would be less than 1m high, the forces of which the rock roll would be able to withstand. As observed from the localised 2014 defence works (vertical timber fencing), it is anticipated that windblown sand will accrete at the base of the rock rolls. This should lead to their burial and colonisation by marram grass, with exposure only anticipated during storm events. During storm events there is a slight potential for erosion to occur at the base of the defence. Although this effect is anticipated to be a temporary, localised effect on low sensitivity processes, this is a trial defence and if the dune experiences long term adverse effects following storm events it will be removed. Therefore, a **Negligible Impact** on hydrodynamics or the sediment regime is anticipated.

The rock rolls will consist of granular granite material (40-75mm), in-keeping with the granitic composition of the islands. The granular sediment would allow better dispersal of wave energy

than a solid vertical structure, reducing the potential for erosion around the structure. Therefore, a **Negligible Impact** on hydrodynamics or the sediment regime is anticipated.

No significant negative effect on flood risk is anticipated. This scheme aims to reduce flooding of the low-lying land behind the dune complex. The processes impacted at this scale are Medium Sensitivity. The works are anticipated to have a **Moderate Impact** on flood risk during extreme events, but this effect will be positive.

#### 4.5 Cumulative effects

No cumulative effects are anticipated from the proposed works at the different locations. The works are all small-scale, localised and will cause no major obstruction to longshore sediment supply. Therefore, at each site no impacts are anticipated outside of the nearshore zone. There are no planned coastal developments that could interact with the impacts on coastal processes.

#### 4.6 Mitigation measures

##### 4.6.1 Porthloo

Potential coastal process impacts would be mitigated through the adoption of good construction practices. All work will be non-tidal (i.e. undertaken above MHWS or during periods that allow for dry working), with all intertidal works (i.e. vehicle movements on beach) ceasing three hours prior to the anticipated high tide time. In addition, the rock revetment will be constructed in sections that can be completed during a single tidal period. These practices will eliminate the potential for excavation operations introducing beach material into the water column.

All tidal work schedules will be assessed two weeks in advance of the works. Works will also cease during storm events. These practices will again assist in reducing the amount of material available for entrainment within the water column.

Beach levels around the rock storage area will be visually monitored and reinstated if necessary. Any areas of erosion evident following the removal of the rock storage area will be reinstated using any excess excavated material.

Similarly, construction traffic pathways on the beach will be periodically assessed and beach levels reinstated using the excavated material. This will assist in maintaining the natural profile of the beach.

It is recommended that a full beach level survey is undertaken at the same time of the year at five-yearly intervals until it is clear that the presence of the formalised rock armour is not causing impact on beach geomorphology; in particular, sedimentation patterns on the beach face and the ability of the adjacent natural dunes to adjust to rising sea levels.

##### 4.6.2 Porth Mellon

Potential coastal process impacts would be mitigated through the adoption of good construction practices. All work will be non-tidal (i.e. undertaken above MHWS or during periods that allow for dry working), with all intertidal works (i.e. vehicle movements on beach) ceasing three hours prior to the anticipated high tide time. In addition, the rock revetment will be constructed in sections that can be completed during a single tidal period. These practices will eliminate the potential for excavation operations introducing beach material into the water column.

All tidal work schedules will be assessed two weeks in advance of the works. Works will also cease during storm events. These practices will again assist in reducing the amount of material available for entrainment within the water column.

Beach levels around the rock storage area will be visually monitored and reinstated if necessary. Any areas of erosion evident following the removal of the rock storage area will be reinstated using any excess excavated material.

Similarly, construction traffic pathways on the beach will be periodically assessed and beach levels reinstated using the excavated material. This will assist in maintaining the natural profile of the beach.

It is recommended that a full beach level survey, is undertaken at the same time of the year at five-yearly intervals until it is clear that the presence of the formalised rock armour is not causing impact on beach geomorphology, with particular attention to erosion around the structure itself and around the adjacent slipway.

Although the functioning dune area (north of the slipway) is unlikely to be impacted by the rock armour, it is recommended that re-routing the track at the north-eastern part of the bay would allow the increase of critical mass of dune body in this zone<sup>25</sup>. This would adhere to the SMP2 policy of Strategic Realignment in Epochs 2 and 3.

#### **4.6.3 Porth Hellick**

Potential coastal process impacts would be mitigated through the adoption of good construction practices. All work will be non-tidal (i.e. undertaken above MHWS or during periods that allow for dry working), with all intertidal works (i.e. vehicle movements on beach) ceasing three hours prior to the anticipated high tide time.

All tidal work schedules will be assessed two weeks in advance of the works. Works will also cease during storm events. These practices will again assist in reducing the amount of material available for entrainment by wind or waves into the water column.

It is recommended that fencing is erected either side of the formal path, to avoid further trampling of the dune system. This fencing should at least be present during the first few years following dune construction to allow the newly constructed dune to regenerate.

#### **4.6.4 South Dunes**

Potential coastal process impacts would be mitigated through the adoption of good construction practices. All work will be non-tidal (i.e. undertaken above MHWS or during periods that allow for dry working). In addition, the dune scour protection works will be constructed in 10m sections along its length to minimise the potential for mobilisation of construction materials as a result of wind or waves.

All tidal work schedules will be assessed two weeks in advance of the works. Works will also cease during storm events. These practices will again assist in reducing the amount of material available for entrainment by wind or waves into the water column.

Although it is anticipated that the rock rolls will instigate the accretion of beach sediment at the foot of the dunes, a programme of beach level monitoring will be required to monitor any potential effects on the geomorphology of the dune complex as a result of the proposed scheme. This will need to be undertaken bi-yearly to gain an adequate understanding of long-term patterns over short-term storm response. Persistent erosion or scour at the base of the dunes, accompanied by dune face oversteepening, will indicate that the rock rolls are having an adverse impact on the dune geomorphology.

After 5-10 years, or before if the dune experiences long term adverse effects following storm events, the scour protection will be removed. The timber stakes will be removed, and the rock rolls will be cut. Once the mesh is removed, the crushed granite will be left in situ. At this point, it may be necessary to conduct soft restoration works such as vegetation planting in combination with sediment fencing/netting, to avoid 'catch-up' erosion following removal.

## **4.7 Residual effects**

### **4.7.1 Porthloo**

No significant effects on coastal processes are predicted, whilst any impacts on beach habitat, including damage and disturbance during construction, would be temporary in nature and therefore not significant. The rock armour revetment is likely to have a positive effect on flood risk.

### **4.7.2 Porth Mellon**

No significant effects on coastal processes are predicted, whilst any impacts on beach habitat, including damage and disturbance during construction, would be temporary in nature and therefore not significant. The rock armour revetment is likely to have a positive effect on flood risk.

### **4.7.3 Porth Hellick**

Both dune construction and creation of a formalised path are considered to be positive management responses, which should alleviate existing erosion problems. No significant effects on coastal processes are predicted, whilst any impacts on beach habitat, including damage and disturbance during construction, would be temporary in nature and therefore not significant. The dune recharge is likely to have a positive effect on flood risk.

### **4.7.4 South Dunes**

No significant effects on coastal processes are predicted, provided the scheme is monitored at regular intervals. The toe protection must be removed if any adverse effect on the dune geomorphology is identified, and soft restoration works must take place to allow the dunes to rollback naturally.

## 5 Biodiversity and nature conservation

### 5.1 Introduction

This chapter is structured with the key headings recommended in the Chartered Institute of Ecological and Environmental Management (CIEEM) guidelines on Ecological Impact Appraisal (EcIA)<sup>27</sup>.

EcIA is a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems. EcIA can be used for the appraisal of projects of any scale: it is a systematic, repeatable process applicable to a wide range of projects.

### 5.2 Baseline conditions

#### 5.2.1 Baseline data collection methodologies

##### *Desk-based assessment*

A desk-based study was undertaken to collate information on statutory and non-statutory conservation sites within a 2km radius of the proposed schemes, along with records of species that are afforded legal protection or are otherwise of nature conservation importance within this area. Information has also been sought on Habitats and Species of Principal Importance and other notable species within the study area e.g. local Biodiversity Action Plan (BAP) habitats and species.

Data for the desk-based study were collected from the following sources:

- Multi-agency Geographical Information Centre (MAGIC) website;
- Natural England's website;
- The Environmental Records Centre for Cornwall and the Isles of Scilly (ERCCIS); and
- EMODnet – European Marine Observation Data Network (EMODnet) Seabed Habitats project.

##### *Field surveys*

A Preliminary Ecological Appraisal (PEA) was carried out in April 2019 by an experienced ecologist, which identified initial ecological constraints. The data and recommendations from the PEA have been used to inform this EcIA chapter. The PEA included an Extended Phase 1 Habitat Survey, which was completed following Joint Nature Conservation Committee (JNCC) survey methods<sup>28</sup>.

Following these surveys, it was considered that further specific species or habitat surveys were not required.

#### 5.2.2 Desk-based study results

##### *Statutory designated sites*

Twelve statutory sites are located within 2km (where relevant) of the four sites, with several of the designations overlapping. The twelve statutory sites are as follows (these are also shown in Appendix F):

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<sup>27</sup> CIEEM EcIA Guidelines (Terrestrial, Freshwater and Coastal) Second Edition and CIEEM EcIA Guidelines (Marine and Coastal).

<sup>28</sup> JNCC (2010), Handbook for Phase 1 habitat survey - a technique for environmental audit & Parry, M.E.V. (2015), Guidance on Assigning Benthic Biotopes using EUNIS or the Marine Habitat Classification of Britain and Ireland, JNCC Report 546.

- Isles of Scilly Special Protection Area (SPA)
- Isles of Scilly Complex Special Area of Conservation (SAC)
- Isles of Scilly Ramsar site
- Isles of Scilly Marine Conservation Zone (MCZ)
- Porthloo Site of Special Scientific Interest (SSSI)
- Higher Moors & Porth Hellick Pool (St. Mary's) SSSI
- Lower Moors (St. Mary's) SSSI
- Peninnis Head (St Mary's) SSSI
- Watermill Cove (St. Mary's) SSSI
- Great Pool (Tresco) SSSI
- Castle Down (Tresco) SSSI
- Pentle Bay, Merrick and Round Islands (Tresco) SSSI

The following site descriptions were compiled using Natura 2000 Site Synopsis, Standard Data Form and draft generic conservation objectives available from Natural England and the JNCC as well as other readily accessible internet resources concerning the nature and wildlife value of the sites.

*Isles of Scilly Special Protection Area and Ramsar site*

The South Dunes work site is located within the Isles of Scilly SPA and Ramsar site. The SPA and Ramsar cover the archipelago of the low-lying granite islands and rocks of the Scilly Isles. The islands included within the SPA support a breeding seabird assemblage of European importance. The isolated nature of the islands, along with their low levels of disturbance, makes them suitable for nesting seabirds which as Storm Petrel *Hydrobates pelagicus* and Lesser Black-backed Gull *Larus fuscus*. The SPA boundary currently only encompasses those areas used for nesting; however Natural England have recently completed a public consultation on potentially extending the SPA boundary to also include the marine environment. A decision is yet to be made<sup>29</sup>.

The site qualifies for SPA designation by supporting populations of European importance of the following Annex 1 species from the Birds Directive (Directive 2009/147/EC on the conservation of wild birds) during the Breeding Season:

- Storm Petrel
- Lesser Black-backed Gull

In addition, the area qualifies for SPA designation under Article 4.2 of the Directive by regularly supporting at least 20,000 seabirds during the breeding season, including Great Black-backed Gull *Larus marinus*, Shag *Phalacrocorax aristotelis*, Lesser Black-backed Gull and Storm Petrel.

The site qualifies for Ramsar designation under Ramsar criterion 6 species/populations occurring at levels of international importance.

Qualifying Species/populations (as identified at designation):

- **Species regularly supported during the breeding season:**
  - European Storm Petrel, World - 71 apparently occupied sites, representing an average of 0.2% of the GB population (Seabird 2000 Census)

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<sup>29</sup> Amendment to Isles of Scilly Special Protection Area: comment on proposals: <https://consult.defra.gov.uk/natural-england-marine/isles-of-scilly-potential-special-protection-area/>

- Lesser black-backed gull *Larus fuscus graellsii*, W Europe/Mediterranean/W Africa - 3603 apparently occupied nests, representing an average of 2.4% of the breeding population (Seabird 2000 Census)
- **Species/populations identified subsequent to designation for possible future consideration under criterion 6.**

**Species regularly supported during the breeding season:**

- European shag *Phalacrocorax aristotelis aristotelis*, Coastal N Europe 1091 apparently occupied nests, representing an average of 1.3% of the breeding population (Seabird 2000 Census)

Impacts for these designated sites will be considered further for the proposed works at South Dunes, Porthloo, Porth Mellon and Porth Hellick.

Isles of Scilly Complex Special Area of Conservation

All four sites are located within the Isles of Scilly Complex SAC, which comprises 75% marine areas and sea inlets, 20% tidal rivers, estuaries, mudflats, sandflats and lagoons (including saltwork basins) and 5% shingle, sea cliffs and islets.

Annex I habitats under the Habitat Regulations that are a primary reason for the selection of this SAC are:

- Sandbanks which area slightly covered by sea water all the time
- Mudflats and sandflats not covered by seawater at low tide
- Reefs

Annex II species that are a primary reason for selection of this site are:

- Shore dock *Rumex rupestris*

Annex II species present as a qualifying feature, but not a primary reason for site selection are:

- Grey seal *Halichoerus grypus*

Impacts for this designated site will be considered further for the proposed works at South Dunes, Porthloo, Porth Mellon, and Porth Hellick.

Isles of Scilly Marine Conservation Zone (MCZ)

Immediately to the south of Porth Hellick is one of eleven areas that make up the Isles of Scilly MCZ. This is a collection of inshore sites covering a total of over 30km<sup>2</sup>. These sites display a broad range of physical conditions that support a high diversity of habitats and species. The area from Peninnis to Dry Ledge (south of Porth Hellick) is designated for eight main features. These are:

- Intertidal coarse sediment
- Intertidal mixed sediments
- Intertidal sand and muddy sand
- Low energy intertidal rock
- Moderate energy intertidal rock
- Intertidal underboulder communities
- Spiny lobster *Palinurus elephas*
- Stalked jellyfish *Halicystus auricula*

Impacts for this designated site will be considered further for the proposed works at Porth Hellick.

#### Porthloo Site of Special Scientific Interest (SSSI)

The Porthloo work site is located within the Porthloo SSSI, with the Porth Mellon work site approximately 500m to the south. It is designated as SSSI due to its exposures of Quaternary sediments in the cliffs showing changes in the climates and environments of the Quaternary Period.

Impacts for this designated site will be considered further for the proposed works at Porthloo.

#### Higher Moors and Porth Hellick Pool Site of Special Scientific Interest

The Higher Moors and Porth Hellick Pool SSSI is located towards the south-east of St. Mary's and the Porth Hellick work site is located on its southern extent. The Porthloo work site is located approximately 1,200m to the north-west, and the Porth Mellon work site 1,200m to the west.

The SSSI is designated due to its neutral grassland habitats supporting notable communities of Balm-leaved Figwort *Scrophularia scorodonia* and the bindweed *Calystegia sepium* subsp. *Roseata*. Management at the site provides suitable disturbance and bare ground for germination.

Impacts for this designated site will be considered further for the proposed works at Porth Hellick.

#### Lower Moors Site of Special Scientific Interest

The Lower Moors SSSI is located on the island of St. Mary's, immediately to the east of Hugh Town, approximately 300m south-east of the Porth Mellon work site, 700m south of the Porthloo work site, and 1,000m west of the Porth Hellick work site.

The site exhibits a range of wetland habitats developed on alluvium and peat overlying the bedrock. Streams and drainage ditches flow southwards towards Old Town Bay. The site is dominated by Common Reed *Phragmites australis* with the occasional Grey Willow *Salix cinerea*. There is an area of shallow open water in the centre of the site which is particularly important for passage and wintering species such as Snipe *Gallinago gallinago* and Water Rail *Rallus aquaticus*, as well as less common Corncrake *Crex crex* and Spotted Crake *Porzana porzana* on passage.

Impacts for this designated site will be considered further for the proposed works at Porthloo and Porth Mellon.

#### Peninnis Head Site of Special Scientific Interest

Peninnis Head SSSI is located on the south site of St Mary's, approximately 800m south of the Porth Mellon work site. It is a prominent cliffhead with notable granite cliffs and tors. It supports maritime heathland, grassland and scrub habitats. It lies to the south of the glacial limit in the Isles of Scilly and provides comparison with glaciated bedrock areas in the north of the islands. The species rich maritime grassland occurs along the coastal margin and is dominated by Thrift *Armeria maritima*, Yorkshire-fog *Holcus lanatus* and Common Sorrel *Rumex acetosa*. These grasslands have provided habitat for the nationally rare Early Meadow-grass *Poa infirma* and the nationally scarce Western Clover *Trifolium occidentale*. The extreme oceanic conditions have also encouraged the development of a rich lichen flora on cliff, tor and heathland habitats.

Given the distance from the SSSI and the small-scale nature of the works at the four locations it is not considered that there will be an impact upon this SSSI from the proposed works and it will not be considered further.

#### Watermill Cove Site of Special Scientific Interest

Watermill Cove SSSI is located in the north-east of St. Mary's, approximately 1,900m east of the Porthloo work site, and 1,500m north of the Porth Hellick work site. It is designated for



its exposures of Quaternary sediments in the cliffs, comprising a succession of raised beach deposits, head deposits, organic silts and sands, and a second layer of head deposits. This sequence shows changes in climates and environments of the Quaternary periods.

Given the distance from the SSSI and the small-scale nature of the works at the four locations it is not considered that there will be an impact upon this SSSI from the proposed works and it will not be considered further.

#### Great Pool Site of Special Scientific Interest

Great Pool SSSI is located on Tresco, approximately 500m north of the South Dunes work site. It is the largest area of freshwater on the Isles of Scilly and is protected from the sea by a narrow sandbank at Abbey Farm to the west and wider sand dunes to the east.

The shallow water on the lake edges supports the notable Brackish Water-crowfoot *Ranunculus baudotii*. The adjacent marginal vegetation is dominated by dense Common Reed *Phragmites australis*. Siltation has led to the development of spongy waterlogged soils with Royal Fern *Osmunda regalis*, Tubular Water-dropwort *Oenanthe fistulosa* and Soft Rush *Juncus effusus*. The drier areas are also important for populations of the two nationally rare plants, Balm-leaved Figwort *Scrophularia scorodonia* and Babington's Leek *Allium babingtonii*. The pool and surrounding reedbeds are important for breeding and migrant birds. These include Water Rail *Rallus aquaticus*, Sedge Warbler *Acrocephalus schoenobaenus* and Reed Warbler *A. scirpaceus*, as well as wintering wildfowl including Teal *Anas crecca* and Shoveler *Anas clypeata*.

Impacts for this designated SSSI will be considered further in relation to the proposed works at South Dunes only.

#### Castle Down Site of Special Scientific Interest

Castle Down SSSI is located on the northern extent of Tresco, approximately 2000m north of the South Dunes work site. It is an exposed headland predominantly covered by waved maritime heathland and dominated by Heather *Calluna vulgaris*. It is of particular importance for its lichen flora, with a range of rare oceanic heathland species including the only known European record of *Heterodermia propagulifera* together with *H. leucomelos* and *H. obscurata*. In total, 45 species of lichens have been recorded at the site.

Additionally, the lichen rich heathland supports an important breeding colony of Common Tern *Sterna hirundo*.

Given the distance from the SSSI and the small-scale nature of the works at the four locations it is not considered that there will be an impact upon this SSSI from the proposed works and it will not be considered further.

#### Pentle Bay, Merrick and Round Islands Site of Special Scientific Interest

Pentle Bay, Merrick and Round Islands SSSI is located on the south of the island of Tresco. The South Dunes work site is located within this SSSI. It exhibits an important transition inland from dunes to lichen-rich heathland and incorporates a number of small uninhabited islands including Merrick Island and Round Island, which are important for breeding birds. Shoreline vegetation is minimal but includes the nationally scarce Sea Spurge *Euphorbia paralia*. A belt of sand dunes dominated by Marram Grass *Ammophila arenaria* has formed and supports Babington's Leek *Allium babingtonii* and Balm-leaved Figwort *Scrophularia scorodonia*, both of which are nationally rare. The heathlands support a large diversity of lichen flora, including a number of rare oceanic species such as *Heterodermia leucomelos* and *Pseudocyphellaria aurata*.

The site is also of particular importance for its breeding birds, supporting breeding populations of Roseate Tern *Sterna dougallii* and Storm Petrel *Hydrobates pelagicus*.

Impacts for this designated SSSI will be considered further in relation to the proposed works at South Dunes only.

### 5.2.3 Field surveys

The Extended Phase I Habitat Survey identified the presence of a number of habitats, as described in the following sections (see Appendix F for the accompanying Phase I Habitat Maps). All coastal habitats are identified as Habitats of Principal Importance within the England Biodiversity List, published under the requirements of S41 of the NERC Act 2006.

#### ***Porthloo***

##### *Boulders/rocks above the high tide mark*

Ad-hoc rock armour has historically been added to the beach within the work site. A number of lichen species that would normally be associated with splash zones of rocky shore habitats were observed during the survey. Sea Beet *Beta vulgaris subsp. maritima* has established in some of the gaps in the armour.

##### *Open dune*

To the south of the proposed scheme a narrow band of dune habitat is present, bound from behind by a wooden wall. Netting has been placed along the dune front in an attempt to prevent erosion. The habitat is indicative of fore dune or yellow dune habitat with a predominantly open plant cover. Marram Grass dominates for the most part. At the forefront of the dunes the invasive non-native Hottentot Fig *Carpobrotus edulis* is dominant in places with Sea Beet also common.

##### *Coastal grassland*



**Figure 5-1: Eroding area of coastal grassland grading into a vegetated earth bank**



**Figure 5-2: Narrow band of sand dune located to the west of the works**

Within the footprint of the proposed works is a small area of coastal grassland. This area slopes directly down to the beach and is being eroded, creating areas of bare earth adjacent to the beach. Above the beach the area is subject to large amount of erosion from human traffic. The invasive non-native species, Three-cornered Garlic *Allium triquetrum* has also colonised this area.

##### *Intertidal sand*

The bay consists predominantly of fine to medium sand. A walk along the intertidal zone revealed relatively few worm casts or evidence of any other benthic invertebrates, although conditions were considered suitable for a range of benthic species. In the eastern corner of

the bay is a drift line approximately 5m wide of decomposing seaweed. A community of Sandhoppers *talitrid* sp. amphipods appeared to have developed throughout much of this habitat. It is likely that the base remains permanently wet and may provide habitat for Oligochaete species such as enchytraeids.

#### Sand above the high tide mark

The bay consists predominantly of fine to medium sand, which, above the high tide mark, is devoid of vegetation.

#### Maritime soft cliff

To the north of the proposed works is the exposed cliffs that form the Porthloo SSSI. The exposed sediments are largely free from vegetation. However, an underdeveloped lichen zone is present at its base.

#### Intertidal rocky habitat

To the north and south corners of the bay is a mixed substratum of boulders on pebbles and sand.

A band of sand in the littoral fringe leads to bedrock with a broad barnacle and limpet zone, before graduating into Spiral Wrack *Fucus spiralis* and shallow rockpools in the upper eulittoral zone. In the mid-shore, there are narrow bands of Bladder Wrack and Serrated Wrack *Fucus serratus* with Thongweed *Himantalia elongata* dominant lower down the shore.

The under boulder zone on the lower shore was dominated by abundant Thongweed and to a lesser extent Brown Forking Weed *Bifurcaria bifurcata*. Pink encrusting coralline algae was common in the understory and rockpools with a number of red algae including Irish Moss *Chondrus crispus* and Bunny Ears *Lomentaria articulata*.

#### Protected Species

##### *Birds*

Suitable habitat for passerine bird species in the form of scrub and broadleaved trees is present immediately to the east of the site. Habitats within or adjacent to the site do not provide nesting opportunities for bird species associated with the SPA or Ramsar site.

##### *Bats*

The broadleaved trees located to the east of the scheme did not provide any potential roosting opportunities for bats as the trees were all small in size and lacked cracks, crevices or Ivy cover that would provide roosting opportunities.

The areas of scrub and the intertidal areas provide foraging potential for bat species.

##### *Marine mammals*

A number of marine mammals have been recorded within the waters around St Mary's. However, the works will not require piling or percussive construction techniques. As all works will also take place out of the water it is not considered that they will cause a disturbance to marine mammals and impacts arising from disturbance are not considered further. Impacts with regards to changes in water quality are considered within impacts to marine designations and subtidal habitats.

##### *Reptiles*

No terrestrial reptile species have been recorded on St Mary's.

### *Terrestrial invertebrates*

Habitats present within the proposed site provides foraging opportunities for a range of terrestrial invertebrates, including endemic species that are found only on the Scilly Isles, such as the Scilly Bumblebee.

### *Marine macroinvertebrates*

Areas adjacent to the proposed work site provide habitats for a range of marine macroinvertebrate species, including those associated with intertidal rocky habitat and intertidal sand habitat.

### *Invasive non-native species*

Hottentot Fig is locally abundant adjacent to the works area, although none was recorded within the site boundary. Three-cornered Garlic is also present within the non-native scrub habitat immediately above the proposed works.

## ***Porth Mellon***

### *Vegetated bank*

The footprint of the works comprises of a bank in the south-west corner of the beach. It consists of a remnant sand dune which now consists of a mixture of artificially placed and natural material, a large part of which is garden waste from adjacent houses. As a result, the bank is a mixture of native and ornamental flower species. Below the vegetated part of the bank a number of loose boulders separating it from the beach. Two invasive non-native species were identified in this bank, Hottentot Fig *Carpobrotus edulis* and Three-cornered Garlic *Allium triquetrum*, both of which are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) making it an offence to plant these species or cause them to spread in the wild.



**Figure 5-3: Area of works is a mix of native and non-native species**



**Figure 5-4: Top view of area of works**

### *Non-native scrub*

The headland located immediately to the west of the proposed site is predominantly a mixture of native and non-native scrub species with occasional broadleaved trees. Towards the seaward extent of the headland, dominant species include Willow *Salix* sp., Australian Laurel *Pittosporum tobira*, Ivy *Hedera helix* and Gorse *Ulex europaeus*, with small amounts of Bramble *Rubus fruticosus* agg. also present.

### Maritime cliff and slope

The headland to the west of the proposed works consists of sand and clay exposures above areas of granite bedrock, with loose boulders present throughout. No vegetation has colonised the exposed sediments. However, the black lichen *Verrucaria maura* has colonised much of the exposed bedrock and boulders forming the distinctive black band. Other lichens associated with supralittoral and littoral fringe rock, such as *Xanthoria parietina*, *Caloplaca marina*, *Caloplaca thallincola* and *Ramalina* sp., could also be found colonising the boulders and the areas of exposed bedrock.



**Figure 5-5: Exposed sediments and rock present along the headland to the west of the proposed works**

### Intertidal boulders/rocks

In the western corner of the bay, boulders are present in the intertidal zone. The boulders support small amounts of algae, such as furoids and green seaweeds, with the mixture of boulders and pebbles on the intertidal sand being colonised predominantly by the Wrack *Fucus vesiculosus*, creating a habitat indicative of *Fucus vesiculosus* on mid-eulittoral mixed substrata (LR.LLR.F.Fves.X<sup>30</sup>). The wrack *Ascophyllum nodosum* was also present on larger boulders. Due to the sheltered nature of the bay, filter feeders, such as sponges and ascidians, were absent from the under boulder and under canopy community. The Common Periwinkle *Littorina saxatilis* was most common, with occasional limpets *Patella vulgata* and Dog Whelks *Nucella lapillus* also present. Similar to the rest of the intertidal sand in the bay, the sediment

<sup>30</sup> JNCC (2015) The Marine Habitat Classification for Britain and Ireland Version 15.03 [Online]. [Date accessed]. Available from: [jncc.defra.gov.uk/MarineHabitatClassification](http://jncc.defra.gov.uk/MarineHabitatClassification)

between patches of hard substrata contained occasional casts, likely from the Lugworm *Arenicola marina*.

#### Intertidal sand

The bay consists predominantly of fine to medium sand. A walk along the intertidal zone revealed relatively few worm casts or evidence of any other benthic invertebrates, although conditions were considered suitable for a range of benthic species. The strandline was relatively sparse but did provide habitat for Sandhoppers (talitrid amphipods) and other terrestrial invertebrates.

#### Sand above the high tide mark

The bay consists predominantly of fine to medium sand, which, above the high tide mark, is devoid of vegetation.

#### Open dune

To the east of the proposed scheme, a narrow band of dune habitat is present, bound by the beach and a dry-stone wall behind. The habitat is indicative of fore dune or yellow dune habitat, with a predominantly open plant cover. Marram Grass *Ammophila arenaria* dominates in places, with Couch grasses *Elymus* sp. dominant in the less stable areas. At the forefront of the dunes, the invasive non-native Hottentot Fig *Carpobrotus edulis* is dominant in places, with Sea Beet.

#### Protected Species

##### *Birds*

The site provides suitable habitat for passerine bird species in the form of scrub and broadleaved trees to the west of the site. Habitats within or adjacent to the site do not provide nesting opportunities for bird species associated with the SPA or Ramsar site.

A small number of Little Ringed Plover *Charadrius dubius* were recorded during the surveys, foraging in the intertidal zone. These birds continued foraging despite ongoing disturbance from walkers and activity at the sailing club.

##### *Bats*

The broadleaved trees located to the west of the scheme did not provide any potential roosting opportunities for bats as they were all small in size and lacked the cracks and gaps that would provide roosting opportunities. Similarly, the buildings located on the beach were considered to have negligible potential for roosting bat species.

The areas of scrub and the intertidal areas provide foraging potential for bat species.

##### *Marine mammals*

A number of marine mammals have been recorded within the waters around St Mary's. However, the works will not require piling or percussive construction techniques. As all works will also take place out of the water, it is not considered that they will cause a disturbance to marine mammals and impacts arising from disturbance are not considered further. Impacts with regards to changes in water quality are considered within impacts to marine designations and subtidal habitats.

##### *Reptiles*

No terrestrial reptile species have been recorded on St Mary's.

##### *Terrestrial Invertebrates*

Habitats present within the proposed site provide foraging opportunities for a range of terrestrial invertebrates, including endemic species that are found only on the Scilly Isles, such as the Scilly Bumblebee.

### *Marine invertebrates*

Areas adjacent to the proposed work site provide habitats for a range of marine macroinvertebrate species, including those associated with intertidal rocky habitat and intertidal sand habitat.

### *Invasive non-native species*

Hottentot Fig is locally abundant within and adjacent to the works area. Three-cornered Garlic is also present within the non-native scrub habitat immediately above the proposed works.

### ***Porth Hellick***

#### *Introduced scrub*

The dune/bank system is extensively vegetated with the bromeliad *Fascicularia bicolor*, a non-native perennial plant species originally imported from Chile. The plant forms dense, rigid clumps that provide significant erosion protection for the adjacent land and reduces wave overtopping; in effect, it provides an ad-hoc flood and coastal erosion defence.

#### *Coastal grassland*

Behind the line of *Fascicularia bicolor*, a well-managed coastal grassland is present. The sward is extremely short through a combination of mowing and rabbit grazing. There are also areas of high erosion caused by visitors to the beach. The grassland, for the most part, was dominated by Red Fescue *Festuca rubra*, with other species such as Creeping Bent *Agrostis stolonifera*, Buck's-horn Plantain *Plantago coronopus*, Ribwort Plantain *Plantago lanceolata* and Sea Plantain *Plantago maritima*. Hottentot Fig has colonised large areas within adjacent to the areas of *Fascicularia bicolor*.

#### *Sand above the high tide mark*

Above Mean High Water Spring (MHWS), the bay consists of fine to medium sand, which, above the high tide mark is devoid of vegetation.



**Figure 5-6: Gap in the line of *Fasicularia bicolor***

#### Running water

Immediately to the north of the proposed work site, a watercourse flows from the Hellick Pool SSSI and is culverted beneath the works area to where it flows out into the bay. A tidal flap prevents sea water from flowing back into the watercourse. The watercourse is lined with scrub and small broadleaved trees.

#### Protected species

##### *Birds*

Suitable habitat for passerine bird species in the form of scrub and broadleaved trees is present immediately to the east of the site.

Habitats within or adjacent to the site do not provide nesting opportunities for bird species associated with the SPA or Ramsar site.

##### *Bats*

The broadleaved trees located to the east of the scheme were all small in size and did not provide any potential roosting opportunities for bats, lacking the cracks, gaps or dense ivy cover suitable for bat roosts.

The areas of scrub and the intertidal areas provide foraging potential for bat species.

##### *Marine mammals*

A number of marine mammals have been recorded within the waters around St Mary's. As all works will also take place out of the water, it is not considered that they will cause a



disturbance to marine mammals and impacts arising from disturbance are not considered further. Impacts with regards to changes in water quality are considered within impacts to marine designations and subtidal habitats.

#### *Reptiles*

No terrestrial reptile species have been recorded on St Mary's.

#### *Terrestrial invertebrates*

Habitats present within the proposed site provide foraging opportunities for a range of terrestrial invertebrates, including endemic species that are found only on the Scilly Isles, such as the Scilly Bumblebee.

#### *Marine invertebrates*

Areas adjacent to the proposed work site provide habitats for a range of marine macroinvertebrate species, including those associated with intertidal rocky habitat and intertidal sand habitat.

#### *Invasive non-native species*

Hottentot Fig is locally abundant adjacent to the works area, although none was recorded within the site boundary. Three-cornered Garlic is also present within the non-native scrub habitat immediately above the proposed works.

### **South Dunes**

#### Open dune

To the east and west of the proposed work site, open dune habitat slopes down to the foreshore. The habitat is indicative of fore dune or yellow dune habitat, with a predominantly open plant cover. Marram Grass dominates for the most part. At the forefront of the dunes, the invasive non-native Hottentot Fig is dominant in places with Sea Bindweed *Calystegia soldanella* and Sea Spurge *Euphorbia paralias* also becoming established. In the area of the proposed works, the dunes are highly eroded and at a steep angle, as a result, no vegetation has been able to become established on the loose surface.

Further back from the foreshore, the dune habitat grades to grey dune and eventually to dune heath where areas of scattered scrub are also present. This area is intersected by tracks.

#### Intertidal sand

The intertidal area directly in front of the proposed works consists predominantly of fine to medium sand. A walk along the intertidal zone revealed relatively few worm casts or evidence of any other benthic invertebrates, although conditions were considered suitable for a range of benthic species.

#### Sand above the high tide mark

The foreshore adjacent to the works consists predominantly of fine to medium sand, which, above the high tide mark is devoid of vegetation.

#### Protected species

##### *Birds*

Suitable habitat for passerine bird species in the form of scrub and broadleaved trees is present immediately to the east of the site.

Habitats within or adjacent to the site do not provide nesting opportunities for bird species associated with the SPA or Ramsar site.

### *Marine mammals*

A number of marine mammals have been recorded within the waters around Tresco. However, the works will not require piling or percussive construction techniques. As all works will also take place out of the water, it is not considered that they will cause a disturbance to marine mammals and impacts arising from disturbance are not considered further. Impacts with regards to changes in water quality are considered within impacts to marine designations and subtidal habitats.

### *Reptiles*

No terrestrial reptile species have been recorded on Tresco.

### *Terrestrial Invertebrates*

Habitats present within the proposed site provide foraging opportunities for a range of terrestrial invertebrates including endemic species that are found only on the Scilly Isles such as the Scilly Bumblebee.

### *Marine invertebrates*

Areas adjacent to the proposed work site provide habitats for a range of marine macroinvertebrate species, including those associated with intertidal rocky habitat and intertidal sand habitat.

### *Invasive non-native species*

Hottentot Fig is locally abundant adjacent to the works area, predominantly covering the wooden stakes that have been added to stabilise the dune to the south of the proposed works. It is also present throughout the open dune habitat located above the works.

## **5.3 Potential impacts and significant effects**

### **5.3.1 Assessment methodology and assessment criteria**

The assessment of ecological impacts has been undertaken following current best practice provided by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

Ecological features include nature conservation sites, habitats, species assemblages/communities or populations or groups of species. The assessment of the significance of predicted impacts on ecological features is based on both the 'importance' of a feature and the nature and magnitude of the impact that the project will have on it. Impacts may be direct (e.g. the loss of species or habitats), or indirect (e.g. effects due to noise, dust or disturbance).

The impact assessment process involves:

- Identifying and characterising impacts;
- Incorporating measures to avoid and mitigate (reduce) these impacts;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset residual effects; and
- Identifying opportunities for ecological enhancement

The assessment includes potential impacts (direct, indirect, secondary and cumulative) on each ecological feature determined as important from all phases of the project and describes in detail the impacts that are likely to be significant, making reference to the following characteristics:

- Positive or negative
- Extent

- Magnitude
- Duration
- Timing
- Frequency
- Reversibility

**Important ecological features**

Various characteristics contribute towards the importance of ecological features, for example, naturalness, rarity, diversity and connectivity.

The importance of an ecological feature should be considered within a defined geographical context. For the purposes of this assessment the following frame of reference has been used:

- International and European
- National
- Regional/County
- Local

Consideration of impacts at all scales is important, and essential if objectives for no net loss of biodiversity and maintenance of healthy ecosystems are to be achieved. Ecological features have been valued using the scale set out in Table 5-1, with examples provided of criteria used when defining the level of importance.

**Table 5-1: Examples of the criteria used to define the importance of ecological features**

Level of importance	Examples of criteria
International and European	An internationally important site e.g. SPA, SAC, Ramsar (or a site considered worthy of such designation); A regularly occurring substantial population of an internationally important species (listed on Annex IV of the Habitats Directive).
National	A nationally designated site e.g. SSSI, or a site considered worthy of such designation; A viable area of a habitat type listed in Annex I of the Habitats Directive or of smaller areas of such habitat which are essential to maintain the viability of a larger whole; A regularly occurring substantial population of a nationally important species, e.g. listed on Schedules 5 and 8 of the Wildlife and Countryside Act 1981 (as amended).
Regional/County	Viable areas of S41 list or LBAP priority habitat, or smaller areas of such habitat which are essential to maintain the viability of a larger whole; A site designated as a non-statutory designated site e.g. Local Wildlife Site; A regularly occurring substantial population of a nationally scarce species, including species listed on the S41 list or local BAP.
Local	Areas of internationally or nationally important habitats which are degraded and have little or no potential for restoration; A good example of a common or widespread habitat in the local area; Species of national or local importance, but which are only present very infrequently or in very low numbers within site area.

The approach of this assessment is to consider the value of the site for the species under consideration, rather than the nature conservation importance of the species itself. While the importance of the species present is taken into account, in order to assess nature conservation importance, the number of individuals of that species using the site, and the nature and level of this use, is also taken into account, and an assessment is made of the value of the site to that species.

### ***Legally protected species***

There is also a need to identify all legally protected species that could be affected by the proposed works in order that measures can be taken to ensure that contravention of the legislation is avoided.

Where a protected species is not considered to be an important ecological feature, for example Badger, which is protected for animal welfare reasons rather than nature conservation value, the measures that will be taken to ensure compliance with legislation are outlined within this chapter.

### ***Determining ecological significant effects***

For the purposes of this assessment, a significant effect is an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general (CIEEM, 2016). Effects can be considered significant at a wide range of scales from international to local.

Significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution). Table 5-2 details the factors that have been considered in the determination of significant effects on ecological features.

**Table 5-2: Determining ecologically significant effects**

<b>Ecological feature</b>	<b>Consideration</b>
<b>Designated sites</b>	Will the project undermine the site's conservation objectives? Will the project positively or negatively affect the conservation status of habitats or species for which the site is designated? Will the project have positive or negative effects on the condition of the site or its interest/qualifying features? Will the project remove or change any key characteristics? Will there be an effect on the nature, extent, structure and function of component habitats? Will there be an effect on the average population size and viability of component species? Will there be an impact on wider ecosystem functions and processes?
<b>Habitats</b>	Will the project positively or negatively affect the conservation status of the habitat? Will it affect its extent, structure and function as well as its distribution and its typical species within a given geographical area?
<b>Species</b>	Will the project positively or negatively affect the conservation status of the species? Will it affect its abundance and distribution within a given geographical area?

### **5.3.2 Evaluation**

The nature conservation sites, habitats and species that have been identified as important ecological features have been evaluated based on the criteria given in Table 6-5. The importance of the feature is defined with reference to the geographical context of each site.

#### ***Porthloo***

The works will involve landing a landing craft on the beach at Porthloo at high tide in the intertidal zone. The landing craft will moor on Porthloo beach at mid to high tide and the rock offloaded onto the foreshore in the working area where it will be stored temporarily prior to installation. There is, therefore, the potential to disturb intertidal sediments and the benthic invertebrates associated with them. Materials for the Porth Hellick scheme may also arrive at Porthloo.

The works will not directly impact subtidal habitats associated with the SAC and impacts to these habitats are considered to be limited to indirect impacts arising from pollution events or runoff. The SAC provides protection for sandflats not covered by water at hightide. The SAC does not extend into the works area; however, this habitat is considered to be present and there is the potential for disturbance through the landing of the landing craft and the transport of materials across the intertidal zone.

The scheme will result in the loss of sand above the MHWS as well as replacement of existing rock armour with the new stone.

**Table 5-3: Evaluation of nature conservation importance**

Ecological feature	Evaluation rationale	Importance of feature or importance of site to feature
Isles of Scilly SPA and Ramsar site	Qualifying species regularly supported during breeding season: European Storm-petrel <i>Hydrobates pelagicus</i> ; representing average 0.2% of UK population, and Lesser Black-backed Gull <i>Larus fuscus graellsii</i> ; representing average 2.4% of the breeding population.	International
Isles of Scilly Complex SAC	Designated for habitats: Sandbanks which are slightly covered by sea water all the time; Mudflats and sandflats not covered by seawater at low tide; and Reefs. Also designated for populations of Shore Dock <i>Rumex rupestris</i> .	International
Porthloo SSSI	A Geological Conservation Review Site.	National
Subtidal Habitats	Sub-tidal habitats within 2km of the scheme area are protected through various international and national designations.	International/National
Intertidal Habitats	Intertidal mixed habitats and intertidal rocky habitats have the potential to support a number of marine invertebrates.	National / County
Breeding Birds	Schedule 1 birds and their breeding sites are protected under the Wildlife and Countryside Act 1981 (as amended) from disturbance during the breeding season. A number of designations detailed above provide protection for breeding bird species; this section will deal with any direct impacts to breeding birds from the proposed works.	National
Marine Invertebrates	The intertidal habitats provide a number of marine macroinvertebrates which in turn provide a food source bird species.	International

### ***Porth Mellon***

The works will involve landing a landing craft on the beach at Porth Mellon at high tide in the intertidal zone. The landing craft will moor on Porth Mellon beach at mid to high tide and the rock offloaded onto the foreshore in the working area where it will be stored temporarily prior to installation. There is, therefore, the potential to disturb intertidal sediments and the benthic invertebrates associated with them.

The works will not directly impact subtidal habitats associated with the SAC and impacts to these habitats are considered to be limited to indirect impacts arising from pollution events or runoff. The SAC provides protection for sandflats not covered by water at hightide. The SAC does not extend into the works area; however, this habitat is considered to be present

and there is the potential for disturbance through the landing of the landing craft and the transport of materials across the intertidal zone.

The scheme will result in the temporary disturbance to the vegetated bank habitat and the loss of sand above the high tide mark.

**Table 5-4: Evaluation of nature conservation importance**

Ecological feature	Evaluation rationale	Importance of feature or importance of site to feature
Isles of Scilly SPA and Ramsar site	Qualifying species regularly supported during breeding season: European Storm-petrel <i>Hydrobates pelagicus</i> ; representing average 0.2% of UK population, and Lesser Black-backed Gull <i>Larus fuscus graellsii</i> ; representing average 2.4% of the breeding population.	International
Isles of Scilly Complex SAC	Designated for habitats: Sandbanks which are slightly covered by sea water all the time; Mudflats and sandflats not covered by seawater at low tide; and Reefs. Also designated for populations of Shore Dock <i>Rumex rupestris</i> .	International
Subtidal Habitats	Sub-tidal habitats within 2km of the scheme area are protected through various international and national designations.	International/National
Intertidal Habitats	Intertidal mixed habitats and intertidal rocky habitats have the potential to support a number of marine invertebrates.	National / County
Breeding Birds	Schedule 1 birds and their breeding sites are protected under the Wildlife and Countryside Act 1981 (as amended) from disturbance during the breeding season. A number of designations detailed above provide protection for breeding bird species; this section will deal with any direct impacts to breeding birds from the proposed works.	National

### **Porth Hellick**

The works may involve landing a landing craft on the beach at Porthloo at high tide in the intertidal zone (an alternative construction method will involve bring materials ashore via St Mary's Harbour and transporting materials to site via the road network). The landing craft would moor on Porthloo beach at mid to high tide and the rock offloaded onto the foreshore in the working area where it will be stored temporarily prior to installation. There is, therefore, the potential to disturb intertidal sediments and the benthic invertebrates associated with them.

Materials will then be transported to the Porth Hellick site via existing roads and farm tracks. These farm tracks run adjacent to the Higher Moors and Porth Hellick Pool SSSI. The existing tracks are located away from the main pool and the potential for disturbance to breeding birds is considered low. However, mitigation measures to avoid all impacts are detailed in the below tables.

The works will not directly impact subtidal habitats associated with the SAC and impacts to these habitats are considered to be limited to indirect impacts arising from pollution events or runoff.

The planting of the bromeliad will result in the permanent small-scale loss of coastal grassland habitat in the footprint of the works. However, within the footprint of the works the habitat is

already in poor condition due to erosion from natural causes and visitor footfall. The plant is not considered invasive and will not impact upon habitats designated under the SSSI.

**Table 5-5: Evaluation of nature conservation importance**

Ecological feature	Evaluation rationale	Importance of feature or importance of site to feature
Isles of Scilly SPA and Ramsar site	Qualifying species regularly supported during breeding season: European Storm-petrel <i>Hydrobates pelagicus</i> ; representing average 0.2% of UK population, and Lesser Black-backed Gull <i>Larus fuscus graellsii</i> ; representing average 2.4% of the breeding population.	International
Isles of Scilly Complex SAC	Designated for habitats: Sandbanks which are slightly covered by sea water all the time; Mudflats and sandflats not covered by seawater at low tide; and Reefs. Also designated for populations of Shore Dock <i>Rumex rupestris</i> .	International
Isles of Scilly MCZ	Qualifying features: Intertidal coarse, mixed, sand and muddy sediments, low, moderate and high intertidal rock, fragile sponge communities, intertidal underboulder communities, Pink Sea Fan <i>Eunicella verrucosa</i> , Spiny Lobster <i>Palinurus elephas</i> , and Stalked Jellyfish <i>Haliclystus auricula</i> and <i>Lucernariopsis campanulata</i> .	National
Higher Moors and Porth Hellick Pool SSSI	Site exhibits a wide diversity of habitats with several rare and notable plant species. The pool and surrounding reed beds are important for breeding birds.	National
Coastal Grassland Habitats	Coastal grassland is the predominate habitat which will be impacted upon by the works.	National
Subtidal Habitats	Sub-tidal habitats within 2km of the scheme area are protected through international/national designations	International/National
Intertidal Habitats	Porth Hellick Bay contains a wide variety of intertidal habitats. Intertidal mixed habitats and intertidal rocky habitats have the potential to support a number of marine invertebrates.	National / County
Breeding Birds	Schedule 1 birds and their breeding sites are protected under the Wildlife and Countryside Act 1981 (as amended) from disturbance during the breeding season. A number of designations detailed above provide protection for breeding bird species; this section will deal with any direct impacts to breeding birds from the proposed works.	National

### **South Dunes**

All construction materials and the welfare unit will be transported to Tresco via small boat to the low-tide jetty at Carn Near. All materials will then be offloaded and transported by tractor and trailer to the construction compound for temporary storage using the existing access track. It is considered that this will mitigate any impacts to Pentle Bay, Merrick and Round Islands SSSI.

The works will result in the disturbance to sand and shingle above the high tide mark.

The works will not directly impact subtidal habitats associated with the SAC and impacts to these habitats are considered to be limited to indirect impacts arising from pollution events or runoff.

**Table 5-6: Evaluation of nature conservation importance**

Ecological feature	Evaluation rationale	Importance of feature or importance of site to feature
Isles of Scilly SPA and Ramsar site	Qualifying species regularly supported during breeding season: European Storm-petrel <i>Hydrobates pelagicus</i> ; representing average 0.2% of UK population, and Lesser Black-backed Gull <i>Larus fuscus graellsii</i> ; representing average 2.4% of the breeding population.	International
Isles of Scilly Complex SAC	Designated for habitats: Sandbanks which are slightly covered by sea water all the time; Mudflats and sandflats not covered by seawater at low tide; and Reefs. Also designated for populations of Shore Dock <i>Rumex rupestris</i> .	International
Great Pool SSSI	Largest area of freshwater on Scilly. Supports Brackish Water-crowfoot <i>Ranunculus baudotii</i> . Pool and surrounding reedbeds are important for breeding and migrant birds.	National
Pentle Bay, Merrick and Round Islands SSSI	Notified for shoreline vegetation, dune grassland species and heathland species. Two nationally rare plant species are found in the dunes, Babington's Leek <i>Allium babingtonii</i> and Balm-leaved Figwort <i>Scrophularia scorodonia</i> . Site is also of importance for its breeding seabirds.	National
Sand Dune habitats	Nationally important Sand Dune Habitat designated as Pentle Bay, Merrick and Round Islands SSSI.	National
Subtidal Habitats	Sub-tidal habitats within 2km of the scheme area are protected through various international and national designations.	International/National
Intertidal Habitats	Intertidal mixed habitats and intertidal rocky habitats have the potential to support a number of marine invertebrates.	National / County
Breeding Birds	Schedule 1 birds and their breeding sites are protected under the Wildlife and Countryside Act 1981 (as amended) from disturbance during the breeding season. A number of designations detailed above provide protection for breeding bird species; this section will deal with any direct impacts to breeding birds from the proposed works.	National



### 5.3.3 Significant Effects

Table 5-7: Details on potential impacts on biodiversity at Porthloo

Ecological feature	Potential impact	Effect without mitigation	Mitigation	Significance of residual effect
<b>Isles of Scilly SPA and Ramsar site</b>	Disturbance to breeding birds. However, St Mary's has not been identified as an important stronghold for the species associated with the SPA and Ramsar and disturbance to SPA protected species is considered very unlikely as habitats suitable for these species to breed was not recorded within the site boundaries.	Disturbance to breeding bird populations which may utilise the islands. Temporary negative effect at national scale.	Works and compound areas will be clearly demarcated prior to the commencement of the works; this will be communicated to all site staff and visitors regularly. Given the amount of existing disturbance from visitors and maintenance traffic at Porthloo, it is considered unlikely that birds will choose to nest within close proximity to the access track. However, a nesting bird check for all bird species will be carried out by a suitably qualified ecologist prior to any enabling works taking place between March and September. This will identify any nests that are present and advise suitable mitigation (i.e. exclusion zones) should there be potential for damage, destruction or disturbance. Site compound will be located away from vegetated areas.	No significant negative effect on conservation status of the site.
<b>Isles of Scilly Complex SAC</b>	Direct damage to maritime habitats via pollution and run-off. Impacts to intertidal sandflats through placement of the landing craft are considered below.	Temporary negative effect at international scale.	Industry standard construction practices as detailed in the Construction Environmental Management Plan (CEMP). All machinery to be in good condition and to be checked daily to prevent pollution incidents. Drip trays will be used to prevent oil leaking from machinery when parked/stored, and during refuelling of machinery. If fuel spillages happen due to refuelling, they will be carefully contained, to ensure they will not be released into the waters. Where there is potential for pollutants to be escape in drainage water, this will be collected, passed through settlement and oil interception facilities to remove pollutants before being discharged to the sea. All waste will be carefully contained within the site compound and taken off site by appointed waste management companies. A CEMP will be produced during the pre-construction period and implemented during construction period to	No significant negative effect on conservation status of the site.

			<p>minimise the risk of pollution events occurring. The application of good practice construction methodology, through the implementation of a CEMP to control the use and storage of potentially contaminating materials and litter, will further avoid any likely significant effects on coastal habitats during the construction phase.</p> <p>An ECoW will be appointed to oversee the implementation of the CEMP.</p>	
<b>Porthloo SSSI</b>	Damage to cliffs and exposed sediments.	No significant negative effect on the site.	Works and compound areas will be clearly demarcated prior to the commencement of the works and this will avoid the base of the cliffs. This will be communicated to all site staff and visitors regularly.	No significant negative effect on conservation status of the site.
<b>Breeding birds</b>	Disturbance during construction works.	Temporary negative effect at national scale.	<p>No habitats suitable for breeding bird species will be directly impacted upon. Works and compound areas will be clearly demarcated prior to the commencement of works this will be communicated to all site staff and visitors regularly.</p> <p>Given the amount of disturbance from visitors it is considered unlikely that birds will choose to nest within close proximity to proposed works, however, a nesting bird check will be carried out by a suitably qualified ecologist prior to any enabling works taking place. This will identify any nests that are present and advise suitable mitigation should there be potential for disturbance.</p> <p>Site compound will be located away from vegetated areas.</p>	No significant effect on the wider bird populations or conservation status of breeding bird species.
<b>Subtidal habitats</b>	Direct damage via pollution and run-off.	Temporary negative effect at regional scale.	<p>Industry standard construction practices as detailed in the CEMP.</p> <p>All machinery to be in good condition and to be checked daily to prevent pollution incidents.</p> <p>Drip trays will be used to prevent oil leaking from machinery when parked/stored, and during refuelling of machinery. If fuel spillages happen due to refuelling, they will be carefully contained, to ensure they will not be released into coastal waters. Where there is potential for pollutants to be escape in drainage water, this will be collected, passed through</p>	No significant negative effect on conservation status of the habitat.

			settlement and oil interception facilities to remove pollutants before being discharged to the sea. The application of good practice construction methodology, through the implementation of a CEMP to control the use and storage of potentially contaminating materials and litter, will further avoid any likely significant effects on coastal habitats during the construction phase.	
<b>Intertidal habitats</b>	Direct damage via pollution and run-off.	Temporary negative effect at regional scale.	See above recommendations for subtidal habitats.	No significant negative effect on conservation status of the habitat.
<b>Intertidal habitats including sandflats not covered by seawater at high tide.</b>	Direct disturbance through landing of the landing craft and transport across the beach.	Temporary negative effect at regional scale.	Access route clearly demarcated to minimise disturbance. All plant and delivery drivers will be fully briefed on the importance of adhering to the track limits. All habitats will be reinstated following the completion of the works. Habitat Regulations Assessment appropriate assessment will be completed to assess impacts to the SAC.	Temporary small-scale negative effect on conservation status of the habitat.
<b>Marine invertebrates</b>	Direct loss of habitat and smothering of species present through the placement of rock armour onto intertidal sand habitats.	Small scale negative effect at local scale.	The small-scale loss of this habitat is unavoidable if rock armour is to be placed in this location. It is recommended that as much rock as possible is placed onto existing rocky shore and shingle habitat to minimise smothering. The majority of the habitat present where rock armour will be placed is above MHWS, a very small amount of rock may be just below MHWS.	No significant effect on wider populations of marine macroinvertebrates or conservation status of marine invertebrate species.
<b>Invasive non-native species</b>	Further spread of non-native invasive species.	Small scale negative effect at local scale.	Hottentot Fig and Three-cornered Garlic is present immediately adjacent to the proposed works. A detailed CEMP will be produced detailing measures to be implemented that will ensure that these species are not further spread as a result of the works.	No significant negative effect on conservation status of adjacent habitats.

**Table 5-8: Details on potential impacts on biodiversity at Porth Mellon**

Ecological feature	Potential impact	Effect without mitigation	Mitigation	Significance of residual effect
<p><b>Isles of Scilly SPA and Ramsar site</b></p>	<p>Disturbance to breeding birds. However, St Mary's has not been identified as an important stronghold for the species associated with the SPA and Ramsar and disturbance to SPA protected species is considered very unlikely as habitats suitable for these species to breed was not recorded within the site boundaries.</p>	<p>Disturbance to breeding bird populations which may utilise the islands. However, St Mary's has not been identified as an important stronghold for the species associated with the SPA and Ramsar. Temporary negative effect at national scale.</p>	<p>Works and compound areas will be clearly demarcated prior to the commencement of the works; this will be communicated to all site staff and visitors regularly. Given the small amount of suitable habitat present within the works area and the existing amount of disturbance from visitors it is considered unlikely that birds will choose to nest within close proximity to the proposed works. However, a nesting bird check will be carried out by a suitably qualified ecologist prior to any enabling works taking place between March and September. This will identify any nests that are present and advise suitable mitigation (e.g. exclusion zones) should there be potential for damage, destruction or disturbance. Access track will utilise existing unvegetated tracks and the limits of the track clearly demarcated to avoid all vegetated areas. All plant and delivery drivers will be fully briefed on the importance of adhering to the track limits.</p>	<p>No significant negative effect on conservation status of the site.</p>
<p><b>Isles of Scilly Complex SAC</b></p>	<p>Direct damage to maritime habitats via pollution and run-off.</p>	<p>Temporary negative effect at international scale.</p>	<p>Industry standard construction practices as detailed in the CEMP. All machinery to be in good condition and to be checked daily to prevent pollution incidents. Drip trays will be used to prevent oil leaking from machinery when parked/stored, and during refuelling of machinery. If fuel spillages happen due to refuelling, they will be carefully contained, to ensure they will not be released into the waters. Where there is potential for pollutants to be escape in drainage water, this will be collected, passed through settlement and oil interception facilities to remove pollutants before being discharged to the sea. All waste will be carefully contained within the site compound and taken off site by appointed waste management companies. A CEMP will be</p>	<p>No significant negative effect on conservation status of the site.</p>

			produced during the pre-construction period and implemented during construction period to minimise the risk of pollution events occurring. The application of good practice construction methodology, through the implementation of a CEMP to control the use and storage of potentially contaminating materials and litter, will further avoid any likely significant effects on coastal habitats during the construction phase.	
<b>Subtidal habitats</b>	Direct damage via pollution and run-off.	Temporary negative effect at regional scale.	Industry standard construction practices as detailed in the CEMP. All machinery to be in good condition and to be checked daily to prevent pollution incidents. Drip trays will be used to prevent oil leaking from machinery when parked/ stored, and during refuelling of machinery. If fuel spillages happen due to refuelling, they will be carefully contained, to ensure they will not be released into the Solent. Where there is potential for pollutants to be escape in drainage water, this will be collected, passed through settlement and oil interception facilities to remove pollutants before being discharged to the sea. All waste will be carefully contained within the site compound away by appointed waste management companies. A CEMP will be produced during the pre-construction period and implemented during construction period to minimise the risk of pollution events occurring. The application of good practice construction methodology, through the implementation of a CEMP to control the use and storage of potentially contaminating materials and litter, will further avoid any likely significant effects on coastal habitats during the construction phase.	No significant negative effect on conservation status of the habitat.
<b>Intertidal habitats</b>	Direct damage via pollution and run-off.	Temporary negative effect at regional scale.	See above recommendations for subtidal habitats.	No significant negative effect on conservation status of the habitat.
<b>Breeding birds</b>	Disturbance during construction works.	Temporary negative effect at national scale.	No habitats suitable for breeding bird species will be directly impacted upon. Works and compound areas will be clearly demarcated prior to the commencement of	No significant effect on the wider bird populations or conservation status of breeding bird species.

			works this will be communicated to all site staff and visitors regularly. Given the amount of disturbance from visitors it is considered unlikely that birds will choose to nest within close proximity to proposed works, however, a nesting bird check will be carried out by a suitably qualified ecologist prior to any enabling works taking place. This will identify any nests that are present and advise suitable mitigation should there be potential for disturbance.	
<b>Marine invertebrates</b>	Direct damage through the placement of a delivery landing craft in the intertidal zone and tracking vehicles from here to the works site.	Small scale negative effect at local scale.	The small-scale loss of this habitat is unavoidable if rock armour is to be placed in this location. It is recommended that as much rock as possible is placed onto existing rocky shore and shingle habitat to minimise smothering.	No significant effect on wider populations of marine macroinvertebrates or conservation status of marine invertebrate species.
<b>Invasive non-native species</b>	Further spread of non-native invasive species.	Small scale negative effect at local scale.	Hottentot Fig and Three-cornered Garlic is present immediately adjacent to the proposed works. A detailed CEMP will be produced detailing measures to be implemented that will ensure that these species are not further spread as a result of the works.	No significant negative effect on conservation status of adjacent habitats.

Table 5-9: Details on potential impacts at Porth Hellick

Ecological feature	Potential impact	Effect without mitigation	Mitigation	Significance of residual effect
<b>Isles of Scilly SPA and Ramsar site</b>	Disturbance to breeding birds. However, St Mary's has not been identified as an important stronghold for the species associated with the SPA and Ramsar and disturbance to SPA protected species is considered very unlikely as habitats suitable for these species to breed was not recorded within the site boundaries.	Disturbance to breeding bird populations which may utilise the islands. Temporary negative effect at national scale.	Works and compound areas will be clearly demarcated prior to the commencement of the works; this will be communicated to all site staff and visitors regularly. Given the existing amount of disturbance from visitors and maintenance traffic it is considered unlikely that birds will choose to nest within close proximity to the access track. However, a nesting bird check will be carried out by a suitably qualified ecologist prior to any enabling works taking place between March and September. This will identify any nests that are present and advise suitable mitigation (e.g., exclusion zones) should there be potential for damage, destruction or disturbance. Access track will utilise existing unvegetated tracks and the limits of the track clearly demarcated to avoid all vegetated areas. All plant and delivery drivers will be fully briefed on the importance of adhering to the track limits.	No significant negative effect on conservation status of the site.
<b>Isles of Scilly Complex SAC</b>	Direct damage to maritime habitats via pollution and run-off.	Temporary negative effect at international scale.	Industry standard construction practices as detailed in the CEMP. All machinery to be in good condition and to be checked daily to prevent pollution incidents. Drip trays will be used to prevent oil leaking from machinery when parked/ stored, and during refuelling of machinery. If fuel spillages happen due to refuelling, they will be carefully contained, to ensure they will not be released into the waters. Where there is potential for pollutants to be escape in drainage water, this will be collected, passed through settlement and oil interception facilities to remove pollutants before being discharged to the sea. All waste will be carefully contained within the site compound and taken off site by appointed waste management companies. A CEMP will be produced during the pre-construction period	No significant negative effect on conservation status of the site.

			and implemented during construction period to minimise the risk of pollution events occurring. The application of good practice construction methodology, through the implementation of a CEMP to control the use and storage of potentially contaminating materials and litter, will further avoid any likely significant effects on coastal habitats during the construction phase.	
<b>Isles of Scilly MCZ</b>	Direct damage to maritime habitats via pollution and run-off.	Temporary negative effect at international scale.	<p>Industry standard construction practices as detailed in the CEMP.</p> <p>All machinery to be in good condition and to be checked daily to prevent pollution incidents.</p> <p>Drip trays will be used to prevent oil leaking from machinery when parked/ stored, and during refuelling of machinery. If fuel spillages happen due to refuelling, they will be carefully contained, to ensure they will not be released into the waters. Where there is potential for pollutants to be escape in drainage water, this will be collected, passed through settlement and oil interception facilities to remove pollutants before being discharged to the sea.</p> <p>All waste will be carefully contained within the site compound and taken off site by appointed waste management companies. A CEMP will be produced during the pre-construction period and implemented during construction period to minimise the risk of pollution events occurring. The application of good practice construction methodology, through the implementation of a CEMP to control the use and storage of potentially contaminating materials and litter, will further avoid any likely significant effects on coastal habitats during the construction phase.</p> <p>An ECoW will be appointed to oversee implementation of the CEMP.</p>	No significant negative effect on conservation status of the site.
<b>Higher Moors and Porth Hellick Pool SSSI</b>	Disturbance to breeding and migratory bird species.	Temporary negative effect to national scale.	The works will not require vegetation removal and therefore the potential to disturb nesting bird species is considered minimal. However, given the importance of surrounding habitats for bird species the following actions will be carried out:	No significant negative effect on conservation status of the site.



			<p>A nesting bird check is to be carried out by a suitably qualified ecologist prior to any enabling works taking place between March and September. The ecologist will make a professional judgement on suitable mitigation measures (e.g. exclusion zones) for any nests identified.</p> <p>Works and compound areas should be clearly demarcated to avoid suitable habitat for bird nesting prior to the commencement of the works, this should be communicated to all site staff and visitors regularly.</p> <p>Access track will utilise existing unvegetated tracks and the limits of the track clearly demarcated to avoid all vegetated areas. All plant and delivery drivers will be fully briefed on the importance of adhering to the track limits.</p>	
	Direct damage to freshwater habitats via pollution and run-off.	Temporary negative effect at international scale.	<p>Industry standard construction practices as detailed in the CEMP.</p> <p>All machinery to be in good condition and to be checked daily to prevent pollution incidents.</p> <p>Drip trays will be used to prevent oil leaking from machinery when parked/stored, and during refuelling of machinery. If fuel spillages happen due to refuelling, they will be carefully contained, to ensure they will not be released into the waters. Where there is potential for pollutants to be escape in drainage water, this will be collected, passed through settlement and oil interception facilities to remove pollutants before being discharged to the sea.</p> <p>All waste will be carefully contained within the site compound and taken off site by appointed waste management companies. A CEMP will be produced during the pre-construction period and implemented during construction period to minimise the risk of pollution events occurring.</p> <p>The application of good practice construction methodology, through the implementation of a CEMP to control the use and storage of potentially contaminating materials and litter, will further avoid any likely significant effects on coastal habitats during the construction</p>	No significant negative effect on conservation status of the site.

			phase. An ECoW will be appointed to oversee implementation of the CEMP.	
<b>Coastal grassland habitats</b>	Direct loss through the planting of <i>Fascicularia bicolor</i> .	Permanent small-scale negative effect.	The planting of the bromeliad will result in the permanent small-scale loss of Coastal Grassland habitat in the footprint of the works. However, within the footprint of the works the habitat is already in poor condition due to erosion from natural causes and visitor footfall. Part of the works will include the removal of Hottentot Fig. The plant is not considered invasive; however, it is recommended that a monitoring programme is implemented following the works to ensure that this is the case.	No significant effect on the wider habitat. Potential for positive impact if spread of Hottentot Fig is halted.
<b>Breeding birds</b>	Disturbance during construction works.	Temporary negative effect at national scale.	No habitats suitable for breeding bird species will be directly impacted upon. Works and compound areas will be clearly demarcated prior to the commencement of works this will be communicated to all site staff and visitors regularly. Given the amount of disturbance from visitors it is considered unlikely that birds will choose to nest within close proximity to proposed works, however, a nesting bird check will be carried out by a suitably qualified ecologist prior to any enabling works taking place. This will identify any nests that are present and advise suitable mitigation should there be potential for disturbance. Access track will utilise existing unvegetated tracks and the limits of the track clearly demarcated to avoid all vegetated areas. All plant and delivery drivers will be fully briefed on the importance of adhering to the track limits.	No significant effect on the wider bird populations or conservation status of breeding bird species.
<b>Invasive non-native species</b>	Further spread of non-native invasive species.	Small scale negative effect at local scale.	Hottentot Fig and Three-cornered Garlic is present immediately adjacent to the proposed works. A detailed CEMP will be produced detailing measures to be implemented that will ensure that these species are not further spread as a result of the works.	No significant negative effect on conservation status of adjacent habitats.

**Table 5-10: Details on potential impacts at South Dunes**

Ecological feature	Potential impact	Effect without mitigation	Mitigation	Significance of residual effect
<b>Isles of Scilly SPA and Ramsar site</b>	Disturbance to breeding birds. However, this site has not been identified as an important stronghold for the species associated with the SPA and Ramsar and disturbance to SPA protected species is considered very unlikely as habitats suitable for these species to breed was not recorded within the site boundaries.	Disturbance to breeding bird populations which may utilise the islands Temporary negative effect at national scale.	Works and compound areas will be clearly demarcated prior to the commencement of the works; this will be communicated to all site staff and visitors regularly. Given the existing amount of disturbance from visitors and maintenance traffic it is considered unlikely that birds will choose to nest within close proximity to the access track. However, it is recommended that a nesting bird check is carried out by a suitably qualified ecologist prior to any enabling works taking place between March and September. This will identify any nests that are present and advise suitable mitigation (e.g. exclusion zones) should there be potential for damage, destruction or disturbance. Access track will utilise existing unvegetated tracks and the limits of the track clearly demarcated to avoid all vegetated areas. All plant and delivery drivers will be fully briefed on the importance of adhering to the track limits.	No significant negative effect on conservation status of the site.
<b>Isles of Scilly Complex SAC</b>	Direct damage to maritime habitats via pollution and run-off.	Temporary negative effect at international scale.	Industry standard construction practices as detailed in the CEMP. All machinery to be in good condition and to be checked daily to prevent pollution incidents. Drip trays will be used to prevent oil leaking from machinery when parked/stored, and during refuelling of machinery. If fuel spillages happen due to refuelling, they will be carefully contained, to ensure they will not be released into the waters. Where there is potential for pollutants to be escape in drainage water, this will be collected, passed through settlement and oil interception facilities to remove pollutants before being discharged to the sea. All waste will be carefully contained within the site compound and taken off site by appointed waste management companies. A CEMP will be	No significant negative effect on conservation status of the site.

			produced during the pre-construction period and implemented during construction period to minimise the risk of pollution events occurring. The application of good practice construction methodology, through the implementation of a CEMP to control the use and storage of potentially contaminating materials and litter, will further avoid any likely significant effects on coastal habitats during the construction phase.	
<b>Great Pool SSSI</b>	Disturbance to breeding and migrant bird species. Direct damage to freshwater habitats via pollution and run-off.	Temporary negative effect at national scale.	The works will not require vegetation removal and therefore the potential to disturb nesting bird species is considered minimal. However, given the importance of surrounding habitats for bird species the following actions should be carried out: A nesting bird check is to be carried out by a suitably qualified ecologist prior to any enabling works taking place between March and September. The ecologist will make a professional judgement on suitable mitigation measures (e.g., exclusion zone) for any nests identified. Works and compound areas should be clearly demarcated to avoid suitable bird nesting sites prior to the commencement of the works, this should be communicated to all site staff and visitors regularly. Access track will utilise existing unvegetated tracks and the limits of the track clearly demarcated to avoid vegetated areas. All plant/delivery drivers will be fully briefed on the importance of adhering to the track limits.	No significant negative effect on conservation status of the site.
<b>Pentle Bay, Merrick and Round Islands SSSI</b>	Disturbance to breeding sea birds. Damage to nationally rare dune species and heathland lichen.	Temporary negative effect at national scale.	Access tracks will utilise existing unvegetated tracks and the limits of the track clearly demarcated to avoid vegetated areas. All plant/delivery drivers will be fully briefed on the importance of adhering to the track limits.	No significant negative effect on conservation status of the site.
<b>Invasive non-native species</b>	Further spread of non-native invasive species.	Small scale negative effect at local scale.	Hottentot Fig and Three-cornered Garlic is present immediately adjacent to the proposed works. A detailed CEMP will be produced detailing measures to be implemented that will ensure that these species are not further spread as a result of the works.	No significant negative effect on conservation status of adjacent habitats.



## 5.4 Cumulative effects

Should all of the mitigation measures detailed in Tables 5-1 to 5-4 be put in place, it is not considered that there will be a cumulative impact from the works at each site, irrespective of timings.

## 5.5 Mitigation measures

Given the small-scale nature of the works at each site and the utilisation of existing tracks or roads for access, it is considered that impacts to designated sites, important habitats or protected species will be through the indirect impact arising from poor site practices and management.

Appropriate mitigation measures will therefore be implemented to ensure that habitats within proximity of the works are not degraded as a result of pollution events during the construction phase, and notable species populations are not disturbed. Mitigation will include:

- Abiding by relevant pollution prevention measures e.g. CIRIA Guidance: Control of water pollution from construction sites. Guidance for consultants and contractors (C532D) (Masters-Williams, 2001). Information useful for Toolbox Talks on working near water and pollution prevention can be found at: [https://www.ciria.org/Resources/All\\_toolbox\\_talks/Env\\_toolbox\\_talks/Working\\_on\\_or\\_near\\_watercourses.aspx](https://www.ciria.org/Resources/All_toolbox_talks/Env_toolbox_talks/Working_on_or_near_watercourses.aspx) [site accessed: 4/1/17].
- Preventing oil and fuel leaks can be achieved by the following actions:
  - Any chemical, fuel and oil stores should be located on impervious bases within a secured bund with a storage capacity 110% of the stored volume.
  - Biodegradable oils and fuels should be used where possible.
  - Drip trays should be placed underneath any standing machinery to prevent pollution by oil/fuel leaks. Where practicable, refuelling of vehicles and machinery should be carried out on an impermeable surface in one designated area well away from any watercourse or drainage (at least 10m).
  - Emergency spill kits should be available on site and staff trained in their use.
  - Operators should check their vehicles on a daily basis before starting work to confirm the absence of leakages. Any leakages should be reported immediately.
  - Daily checks should be carried out and records kept on a weekly basis and any items that have been repaired/replaced/rejected noted and recorded. Any items of plant machinery found to be defective should be removed from site immediately or positioned in a place of safety until such time that it can be removed.
- The application of good practice construction methodology, through the implementation of a CEMP to control the use and storage of potentially contaminating materials and litter, will further avoid any likely significant effects on coastal habitats during the construction phase.

To avoid impacts upon intertidal habitats, open dune habitats, coastal grassland, and the associated marine and terrestrial invertebrate species, no vegetation clearance works will be required; there is therefore no requirement for the works to impact upon any of the terrestrial habitats outlined in the above sections. Furthermore, the following mitigation will be implemented:

- Works and compound areas will be clearly demarcated prior to the commencement of works and this will be communicated to all site staff and visitors regularly.

- At Porth Hellick and South Dunes existing tracks will be utilised, and areas already utilised for industry will be used for site compounds.
- Access tracks will utilise existing unvegetated tracks and the limits of the track clearly demarcated to avoid all vegetated areas. All plant and delivery drivers will be fully briefed on the importance of adhering to the track limits.

The works will not require vegetation removal and therefore the potential to disturb nesting bird species is considered minimal. Furthermore, the four sites are not within areas identified as important strongholds for the species associated with the SPA and Ramsar and habitats suitable for these species to breed were not recorded within the site boundaries.

However, to avoid impacts on all bird species the following actions will be carried out:

- A nesting bird check is to be carried out by a suitably qualified ecologist prior to any enabling works taking place between March and September. The ecologist will make a professional judgement on suitable mitigation measures (e.g. exclusion zones) for any nests identified.
- Works and compound areas will be clearly demarcated to avoid suitable bird nesting sites prior to the commencement of the works; this will be communicated to all site staff and visitors regularly.
- Access track will utilise existing unvegetated tracks and the limits of the track clearly demarcated to avoid all vegetated areas. All plant and delivery drivers will be fully briefed on the importance of adhering to the track limits.

A Toolbox Talk detailing the sensitivities of the surrounding sites and the need to adhere to the above practices should be developed for all site staff and visitors.

It is recommended that a Habitat Regulations Assessment (HRA) Appropriate Assessment is completed to assess potential impacts to the SPA, SAC and Ramsar site.

## 5.6 Residual effects

If the mitigation outlined above is followed it is concluded that residual impacts will be limited to the temporary disturbance of intertidal sand habitat.

It is therefore concluded that the works will have no significant effect on the identified important ecological features, including on internationally and nationally designated sites in the area.

## 6 Landscape

### 6.1 Introduction

This chapter presents the Landscape and Visual Impact Assessment (LVIA) for the proposed developments. Three of the sites – Porth Mellon, Porthloo and Porth Hellick – are located on St Mary’s island, whilst the fourth site at South Dunes is located on the island of Tresco. All four sites are accessible to the public and are popular with local residents and with day trippers and holiday makers during the high season due to the wide expanse of clean beaches (see Appendix G).

This LVIA provides an assessment of the effects of the proposed development on the landscape of each site and its context and visual resource of these areas. The design of the proposed development and the identification of mitigation measures incorporated within the design to minimise adverse effects is informed by the findings of the assessment. During the assessment, effects on features identified as important to the scenic quality, or effects on the landscape character of the site and its setting are assessed. Effects on peoples’ views of the site and its setting, or visual amenity, are also assessed. The assessment has involved the following key stages:

- Desk-based research to determine the scope of the study;
- Field survey to capture viewpoints from pre-determined locations and ascertain how the landscape and visual resource would change;
- Desk-based research to establish the landscape and visual baseline and identify potential receptors; and
- Assessment and reporting of potential effects.

For the purposes of assessing the landscape and visual effects of this development proposal, study areas have been defined as shown in Appendix G.

The objectives of the assessment are to:

- Describe and evaluate the landscape of each site and surrounding landscape context and visual amenity of the surrounding areas, which might be affected by the proposed development;
- Examine the development proposals and analyse the potential effects on the landscape and visual amenity associated with the scheme’s design or operation; and
- Provide an assessment of the landscape and visual effects of the proposed development with integral mitigation measures in place.

Landscape and Visual Impact Assessment is an important part of the planning and design evolution process for a development. The LVIA provides a landscape and visual appraisal of the sites, based on a desk-based review of relevant literature followed by ground truthing through field appraisals and analysis of views of the site.

This LVIA has been carried out using the recommendations in *Guidelines for Landscape and Visual Appraisal* (3rd Edition) published by The Landscape Institute and the Institute of Environmental Management & Assessment in 2013 (GLVIA3).

### 6.2 Legislative and planning policy context

#### 6.2.1 National Planning Policy

##### ***National Planning Policy Framework (NPPF) 2019***

The NPPF must be considered in the determination of planning applications. The NPPF sets out the Government’s planning policies and how these are expected to be applied.



NPPF details the land use planning policies and is supported by Planning Practice Guidance (PPG).

Under Section 2 *Achieving sustainable development*, Paragraph 7 states:

*'The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs.'*

Underpinning the NPPF is the importance of the planning system to contribute to the achievement of sustainable development. Within Section 2 – Achieving sustainable development, three overarching objectives are outlined (so that opportunities can be taken to secure net gains across each of the different objectives): an economic objective, a social objective and an environmental objective.

Section 14 outlines the objectives for *Meeting the challenge of climate change, flooding and coastal change*.

Paragraph 166 states, *'in coastal areas, planning policies and decisions should take account of the UK Marine Policy Statement and marine plans. Integrated Coastal Zone Management should be pursued across local authority and land/sea boundaries, to ensure effective alignment of the terrestrial and marine planning regimes.'*

Paragraph 168 also states that *'Development in a Coastal Change Management Area will be appropriate only where it is demonstrated that:*

- a) it will be safe over its planned lifetime and not have an unacceptable impact on coastal change;*
- b) the character of the coast including designations is not compromised;*
- c) the development provides wider sustainability benefits; and*
- d) the development does not hinder the creation and maintenance of a continuous signed and managed route around the coast'*

Section 15 deals with *'Conserving and enhancing the natural environment.'*

Paragraph 170 states that *'Planning policies and decisions should contribute to and enhance the natural and local environment by:*

- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
- b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*
- c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
- d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
- f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.'*

Paragraph 172 deals with conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty and states that *'The conservation and enhancement of wildlife and cultural heritage are also important considerations in these areas.*

*Consideration of such applications should include an assessment of:*

- a) the need for the development, including in terms of any national considerations, and the impact of permitting it, or refusing it, upon the local economy;*
- b) the cost of, and scope for, developing outside the designated area, or meeting the need for it in some other way; and*
- c) any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated.'*

Paragraph 170 states that within areas defined as Heritage Coast, *'planning policies and decisions should be consistent with the special character of the area and the importance of its conservation. Major development within a Heritage Coast is unlikely to be appropriate, unless it is compatible with its special character.'*

#### ***Planning Practice Guidance: Flood Risk and Coastal Change (2014)***

Planning Practice Guidance: Flood Risk and Coastal Change provides advice about how to reduce risk from coastal change by avoiding inappropriate development in vulnerable areas or adding to the impacts of physical changes to the coast.

Guidance can also be found on the application of an integrated Coastal Zone Management, in which it outlines the key guiding principles in implementing an integrated approach to the management of coastal areas. These are:

- A long term view;
- A broad holistic approach;
- Adaptive management;
- Working with natural processes;
- Support and involvement of all relevant administrative bodies;
- Use of a combination of instruments;
- Participatory planning;
- Reflecting local characteristics;

It also states that, in coastal areas, local planning authorities should collaborate with the Marine Management Organisation (MMO) to ensure that plans and policies across the land/sea boundary are coordinated.

#### ***Planning Practice Guidance: Natural Environment (2016)***

Landscape is covered within this guidance as it refers to the principle that planning should recognise the intrinsic character and beauty of the countryside and indicates that local plans should have policies for the conservation and enhancement of the natural environment, including landscapes, both designated and the wider countryside. The guidance refers to the use of landscape character assessment at a national and local level as a tool to help inform, plan and manage change.

The guidance also refers to the duty of considering development proposals that are situated outside National Park or Area of Outstanding Natural Beauty boundaries, but which might have an impact on the setting of, and implementation of, the statutory purposes of these protected areas.

With reference to Areas of Outstanding Natural Beauty (AONB) it states that *'Planning policies and decisions should be based on up-to-date information about the natural environment and*

*other characteristics of the area. As part of this, local planning authorities and neighbourhood planning bodies should have regard to management plans for National Parks and Areas of Outstanding Natural Beauty, as these documents underpin partnership working and delivery of designation objectives. The management plans highlight the value and special qualities of these designations to society and show communities and partners how their activity contributes to protected landscape purposes.'*

National Parks and Areas of Outstanding Natural Beauty (AONB) management plans may also be material considerations in making decisions on individual planning applications, where they raise relevant issues.

With reference to Heritage Coasts, it states the following:

*'Local planning authorities should maintain the character of the undeveloped coast, protecting and enhancing its distinctive landscapes, particularly in areas defined as Heritage Coast, and improve public access to and enjoyment of the coast. Heritage Coasts are stretches of our most beautiful, undeveloped coastline which are managed to conserve their natural beauty and, where appropriate, to improve accessibility for visitors. Most of the defined Heritage Coast is covered (on land) by either Area of Outstanding Natural Beauty or National Park designations. Natural England has published advice on Heritage Coasts. The Marine Management Organisation produces guidance on marine planning which may also be relevant to protecting Heritage Coasts.'*

### **Marine Planning**

Marine plans are intended to manage the seas around England. They will set out the priorities and directions for future development with the plan area, inform sustainable uses of resources and inform the best location for activities and development.

The MMO is responsible for preparing Marine Plans in England. Each of the 11 Marine Plan areas will have a 20-year plan that will be reviewed every 3 years. The proposal sites are within Area 8, South West inshore.

### **UK Marine Policy Statement 2011 (MPS)**

The Marine Policy Statement (MPS) is the framework for preparing Marine Plans and taking decisions affecting the marine environment. It will contribute to the achievement of sustainable development on the United Kingdom marine area, and defines how marine planning will:

- Achieve integration between different objectives
- Enable the co-existence of compatible activities wherever possible
- Integrate with terrestrial planning

The Statement highlights importance of the landscape, seascape and historic environment of coastal areas, with reference to potential effects that might arise from activities and developments in the marine and coastal areas.

### **South West Marine Plan**

Marine Plan development follows a 12-stage process, from Plan area selection to implementation and monitoring.

The South West Plan is currently at the draft policy stage and concluded online engagements in March 2019 on the iteration 3 products. Statutory consultation on the draft marine plans are due to be held in late 2019.

## 6.2.2 Local Planning Policy

### **Isles of Scilly Area of Outstanding Natural Beauty (AONB)**

Applications for planning permission are primarily considered against policies set out in the Isles of Scilly Area of Outstanding Natural Beauty Management Plan 2015-2020, produced by the Isles of Scilly AONB Partnership on behalf of the CIOs, Duchy of Cornwall, The Isles of Scilly Wildlife Trust, Tresco Estate, Islands' Tourism and Business Partnership, Natural England, English Heritage, Royal Society for the Protection of Birds (RSPB) and the Isles of Scilly Inshore Fisheries and Conservation Authority (IFCA).

### **Isles of Scilly Local Development Plan (2005)**

The current Isles of Scilly Local Plan – A 2020 Vision was adopted in November 2005 and is currently being updated with the draft local plan 2015-2030 scheduled to be adopted in late 2019.

The Local Plan complements existing strategies for economic development, transport, heritage and culture, as well as the Area of Outstanding Natural Beauty Management Plan. Several policies have been 'saved' and continue to form the Local Development Plan, until they are replaced by the emerging New Local Plan in 2019.

The saved policies of relevance to the proposed development include:

Policy 1 - Environmental Protection, which states:

*'To ensure that all relevant future development proposals respect and protect the recognised quality of the islands' natural, archaeological, historic and built environment, they will be permitted only where, as applicable, they:*

- (a) Conserve or enhance the natural beauty, wildlife and cultural heritage of the Area of Outstanding Natural Beauty and protect the unspoilt character and good appearance of the Heritage Coast;*
- (b) Preserve nationally important archaeological remains and their settings;*
- (c) Preserve or enhance the character or appearance of the Conservation Area and preserve the architectural or historic interest of all listed buildings, including their features and settings;*
- (d) Safeguard the integrity and nature conservation objectives of Special Protection Areas (SPAs), Ramsar Sites and Special Areas of Conservation (SACs); The Isles of Scilly Local Plan Adopted November 2005*
- (e) Protect a statutorily-protected plant or animal species and the wildlife, geological and geomorphological interest and features of designated Sites of Special Scientific Interest; and locally important biodiversity habitats, species and landscape features; and*
- (f) Secure the future character, appearance and setting of any Parks and Gardens of Special Historic Interest included in the English Heritage Register.*

*The environment of the Isles of Scilly underpins all life on the islands. The presumption is to protect it and keep development to the minimum required for sustaining viable communities.*

*Our environment embraces the built and historic environment, archaeology, landscape, air and sea and everything that lives in it i.e. its biodiversity, including the human community.*

*Planning decisions must ensure that proposals are in character with the islands. The environment is central to the quality of life experienced by both the islands' communities and visitors alike and forms the basis for our economy. The exceptional quality of the environment means that new development should be generally restricted to that which makes a positive contribution to the sustainable future of the islands.'*

Policy 2 – Sustainable development states that:

*'Development will be permitted in situations where a proposal would, where practicable and appropriate, contribute to the sustainability of the islands' environment, economy or local communities through:*

*(a) Conserving or enhancing the landscape, coastline, seascape and existing buildings of the islands through appropriate design including siting, layout, density, scale, external appearance (i.e. details and materials) and landscaping;*

*(b) Ensuring or facilitating the re-use of previously developed land and existing buildings for the economic, social and environmental benefit of the islands and local communities taking into account any environmental designations set out in Policy 1; and*

*(c) Utilising natural resources efficiently in the design, construction and future use of land and buildings, including where appropriate, energy conservation and the use of renewable sources of energy generation, minimising the consumption and discharge of water and waste and by securing the recovery and re-use of suitable building materials.'*

### **Cornwall and Isles of Scilly Shoreline Management Plan 2011 (SMP2)**

Shoreline Management Plan (SMP2) provides a large-scale assessment of the risks associated with coastal evolution and presents a policy framework to address these risks to people and the developed, historic and natural environment in a sustainable manner

The objectives of the SMP process (as distinct from the objectives for management of the coast) are as follows:

- To provide an understanding of the coast, its behaviour and its values;
- To define, in general terms, the risks to people and to the developed, natural and historic environment within the SMP area over the next century;
- To identify the likely consequence of different management approaches;
- To identify the preferred policies for managing those risks or creating opportunity for sustainable management;
- To examine the consequences of implementing the preferred policies in terms of the objectives for management;
- To set out procedures for monitoring the effectiveness of the SMP policies;
- To inform others so that future land use and development of the shoreline can take due account of the risks and preferred SMP policies; and
- To comply with international and national nature conservation legislation and biodiversity obligations.

Within management area MA42 St Mary's the three site locations are referenced and summarised as follows:

*42.5 Porth Mellon: 'Significant pressure on the Thomas Porth frontage from sea level rise and increasing storminess dictate that a careful management approach is required. The hinterland behind is low-lying and provides a route for flood waters into the Lower Moors area. Therefore, the future management strategy needs to accommodate the increases in sea level rise and avoid coastal squeeze and foreshore narrowing where possible but at the same time realignment beyond epoch 1 needs to consider management of the increasing flood risk.'*

*42.7 Porthloo: 'No active intervention should be a suitable approach at Porthloo during epoch 1 but given the local importance of the Porthloo Lane for access to properties, it is likely to be necessary to consider realignment of the road beyond epoch 1, when erosion risks start to pose a more significant risk to the route. Would satisfy objectives relating to the AONB and Heritage Coast designations.'*

*42.10 Porth Hellick: 'Porth Hellick provides a route through which storm surge and wave overtopping driven flooding can inundate a significant area adjacent to Carn Friars Farm and the Higher Moors (also affecting Carn Friars Lane). However, holding the defence in its current*

*position will become increasingly unsustainable beyond epoch 1. Given that the embankment provides defence only to a low-lying wet area, consideration should be given to realignment of the embankment to provide an area of managed realignment, providing opportunity for new intertidal habitat in the longer term and accommodation of sea level rise, preventing coastal squeeze pressures building along the Porth Hellick frontage. Would satisfy objectives relating to the AONB and Heritage Coast designations.'*

Within management area MA44 Tresco, reference to the South Dunes locations is summarised as follows:

*44.6 South Beach/Pentle Bay: 'Erosion of the shoreline may exceed 30m over 100 years. Re-routing of coastal footpaths will be necessary but there is seen to be no active justification for continuing with the advance the line policy advocated in SMP1. A no active intervention approach is preferred, as it allows natural evolution of the coast and will continue to provide new sediment inputs to the beaches and dunes, helping to maintain their stability and healthy response to sea level rise. Would satisfy objectives relating to the AONB and SPA / SAC designations.'*

### 6.3 Baseline conditions

This section provides a description of the baseline landscape character and visual amenity, along with an assessment of the potential effects of the proposed development. Figures included within Appendix G show relevant landscape designations and viewpoints used for the assessment.

#### 6.3.1 Landscape character: baseline

The landscape baseline is a description and analysis of the existing landscape, against which the effects of the proposed development are assessed, first, by reference to landscape character assessments for the area in which the site is located, at national and local levels and, then, from site-specific surveys and analysis carried out for the purposes of this assessment. Several published studies relate to the area under consideration and provide a basis for the assessment of the landscape character and impacts.

#### **National Character Areas (NCA)**

England has been divided into areas with similar landscape character, called National Character Areas (NCAs). The resulting map subdivides England into 159 NCAs and provides an overview of the differences in landscape character at the national scale. Each NCA is accompanied by a character description explaining the influences and features which determine the character of the area.

The site lies within NCA 158, Isles of Scilly

The key characteristics of the area which are considered relevant to the proposals are as follows:

- The area is made up of low-lying granite islands with a strong maritime influence.
- The area is isolated from the UK mainland, with a strong sense of remoteness and tranquillity.
- White sandy beaches, embryonic sand dunes and unenclosed areas of maritime heath and grassland fringe the islands; some heathland is dominated by gorse and bracken.
- The sea is a dominant influence that both unites and divides the islands; the crystal white sand and the turquoise sea of summer contrasts with a grey thundering sea that is typical of autumn and winter in the western rocks.

The NCA profile defines four Statements of Environmental Opportunity (SEO), of which SEO2 have relevance to this proposal:

SEO2: *'Understand, plan for and manage the impact of climate change on the Isles of Scilly, especially securing sustainable management of biodiversity and the historical, marine and coastal environments. In particular, consider the implications on the islands' water and use.'*

SEO2 examples cited include:

- Adapting to identified threats, including engineering works in accordance with the Shoreline Management Plan, strategic coastal realignment and conservation of natural and cultural resources.
- Recognising that planning for change due to natural processes, such as sea level rise and increased rainfall events and periods, may also be required, though some losses may be offset by habitat creation.

The NCA 158 characteristics and statements of environmental opportunity highlighted above are helpful in determining landscape baseline at the national level and in helping to frame local and site-based landscape baselines to be described and assessed in.

However, NCAs are high-level, strategic assessments which cover a comparatively wide area. They would not normally be assessed in relation to a proposal of this scale. It is considered unlikely that the proposed projects would have an influence on landscape character at an NCA scale. This study therefore focuses on the local landscape character and assessment described below.

### ***County and District level landscape assessments***

The most recently published Landscape Character assessment of relevance to the site is the Cornwall and Isle of Scilly Character Assessment, which was published in 2007. Although a Local Landscape Character Assessment was completed and subsequently published for Cornwall and the Isles of Scilly in 2007, no findings are available for the Isles of Scilly. Cornwall Council refers to the following note on the publication of the 2007 local character assessment for Cornwall and the Scilly's:

*'Please note that at this stage the work for the Isles of Scilly has not been completed and therefore the Landscape Description Unit Profiles and Landscape Character Area Descriptions for the Isles of Scilly are not yet available'.*

This has been requested, and at the time of writing, is yet to be made available.

However, a draft of the Conservation Area Character Statement was prepared and issued for consultation in 2015. To our knowledge, this is the current version of this document. Within the Conservation Area Character Statement, details of the landscape character can be found for the islands of St Mary's and Tresco.

Part 1 chapter 7 of the Conservation Area Character statement lists the understanding from the 1996 Isles of Scilly Historic Landscape Assessment and Management Strategy as follows:

- *'Scilly is predominantly rural, and a post war decline in land management with a reduction in livestock numbers and agricultural production has led to abandonment of much farmland. The early years of the 21st century have witnessed a rise in herd numbers in Scilly. A number of individual farmers have contributed to the rise in stock numbers as have the Isles of Scilly Wildlife Trust through the introduction of conservation grazing on the heathland. The result of this programme has been a marked improvement in bio-diversity and historic environment management within the Wildlife Trust's tenanted land.*
- *An isolated archipelago, the character of Scilly is hugely influenced by its maritime surroundings. Each of the islands has its own unique character and distinctive feel derived from its position, shape, topography, landscape and relationship to the other islands and the sea. Subtle differences create the distinctiveness of each island and the richness and diversity to be found within the Isles of Scilly. The headlands can be broadly divided into exposed heathland, low lying southern headlands and on St*

*Mary's fortified headlands (the main example of this being the Garrison with 17th and 18th century defensive walls). The coastal edge generally breaks down into rocky shore, cliffs and sandy or boulder beaches. The extent of the tidal range creates a constantly changing landscape, atmosphere and character. Other coastal habitats include sandflats, dune systems and coastal heathland. The interior of the Islands is a mosaic of unenclosed hills supporting heathland and gorse scrub, a small number of wooded hills such as those on Tresco and agricultural land typified by small enclosed strips surrounded by evergreen hedges or by larger pasture fields enclosed by native hedgerows.'*

The Conservation Area Character statement describes the following relevant Island Characters for the Islands of St Mary's and Tresco. Below we outline the key points from each section:

#### St Mary's

- *'Scilly's main island is St Mary's. It is the largest island and contains Scilly's only sizeable settlement, Hugh Town. There are several other settlement areas including Old Town, Telegraph, Porthloo, Higher Newford and Normandy. There are numerous dispersed farmsteads and small clusters of houses connected by narrow winding lanes. This island supports the local airport and the principal harbour, St Mary's Pool.*
- *The main part of the island comprises an undulating interior landscape of comparatively large fields (although still small compared to mainland locations), wooded valleys and low-lying marshy areas. There are some places on St Mary's from which the sea cannot be seen. The coastal strip is made up of exposed headland heaths, rocky coast with heathland and areas of sandy shore. On the southern part of the island the small airport has a significant visual impact as it is situated on high ground and is therefore very prominent. To the north at Halangy Down there are a number of very tall communication masts which are visible from around the islands. These developments impact negatively on the intimate scale of the Scillonian landscape. However, they provide some of the vital infrastructure necessary to support the islands' community and economy.*



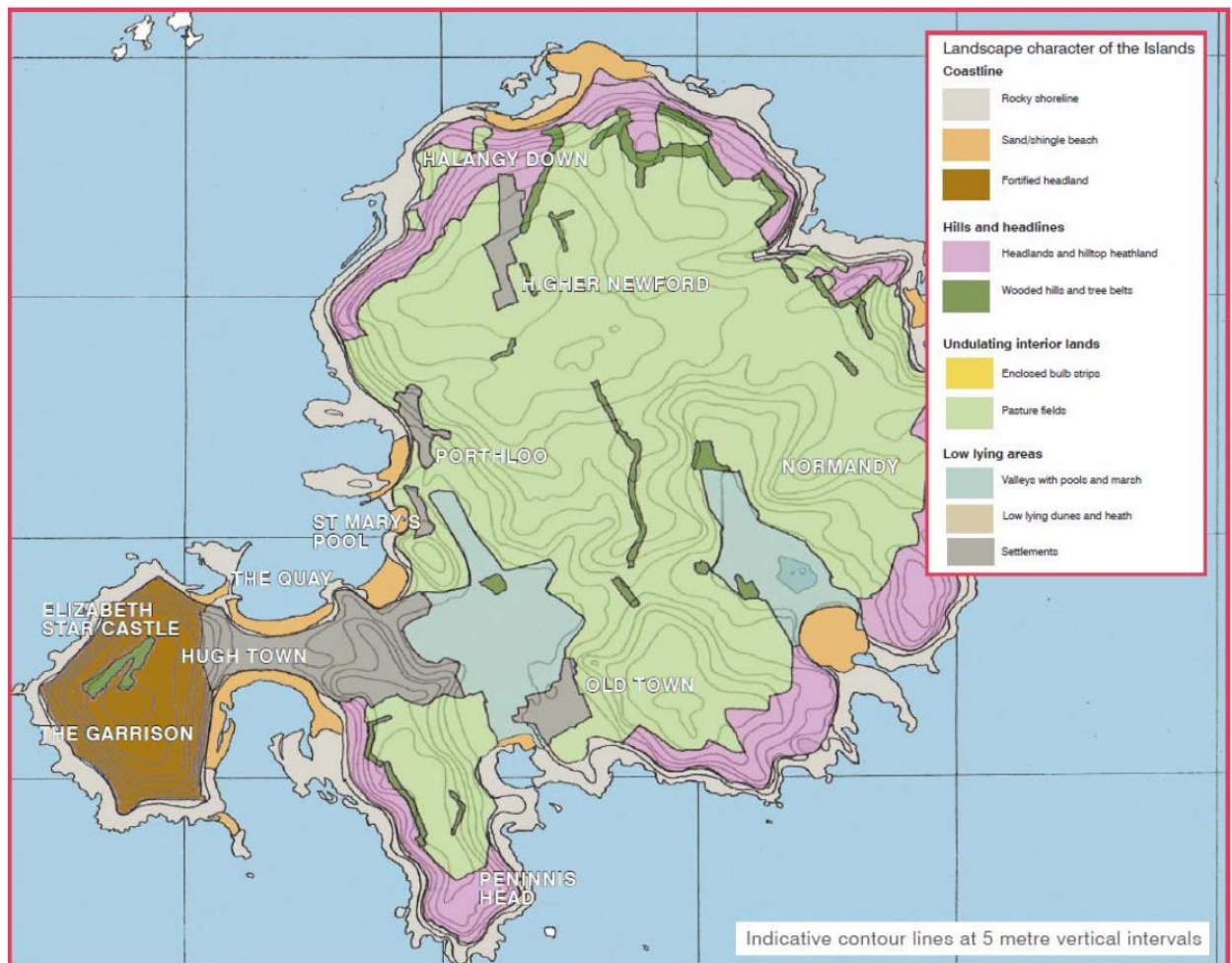


Figure 6-1: Landscape Character on St Mary's

- Throughout St Mary's there are clustered settlements including Holy Vale, Porthlloo and Normandy, the latter having been recently augmented by a development of six local needs houses. There are numerous other settlement clusters perhaps originating with individual farms some of which still have associated agricultural buildings. Some of these settlements may have medieval beginnings. The hamlet at Holy Vale is said to have originated with a religious settlement that no doubt had a farm attached. Associated field patterns are largely unchanged with subdivision for flower farming having left the previous field patterns largely intact.
- The road system on St Mary's comprises narrow sunken lanes some of which may be medieval in origin and later roads that are more open in character dating to the post-medieval period with modern road widening in evidence as well. Areas that are not accessible by road are largely accessible by tracks and footpaths.
- The unenclosed land on St Mary's has numerous areas of heathland including Peninnis and Salakee Down to the south of the island, Porth Hellick and Normandy Downs to the west, the outer edges of the Garrison and Carn Morval to the east and various other areas along the coast. The heathland is characterised by the survival of entrance graves, prehistoric field systems and cairns in addition to later sites such as kelp pits and the extensive military remains from the Civil War to World War II. Areas of blown sand can be found to the west of St Mary's Pool and along the north coast of the island in addition to other smaller pockets on the coast. Higher and Lower Moors now provide an important wildlife habitat and in times past were traditionally grazed with some areas of peat cutting also. The Moors are also an important source

*of paleo-environmental data for the islands. The coastal edge is mainly rocky foreshore with smaller areas of sandy foreshore around Bar Point, Porth Hellick, Town Beach, Porthcressa, Porthloo and occasional other beaches*

- *St Mary's has experienced the most growth on the Isles of Scilly. Much of the new development has been the result of funding opportunities including the building of a new school, gym and sports hall, enclosure and improvement of the swimming pool, regeneration of the Porthcressa bank and surrounding area to provide flats, work units, library, register office and replacement of the Schiller shelter and toilets, building of the Porthmellon Innovation and Enterprise centre and various units of affordable housing. The re-surfacing of the airport runways, extension and improvement to the airport terminal, extension to St Mary's quay and improvement of the facilities there should ensure that these two gateways to the islands are adequate for future use.'*

Section 3 of the St Mary's Island Character outlines Significant views and vistas:

- *'The main entry points to the Isles of Scilly are the airport at Salakee Down, St Mary's, St Mary's Harbour and Tresco Heliport. The airport is situated on high ground affording extensive views across the islands including views of Old Town, Hugh Town and St Mary's Quay as well as distant views of Samson. Arrival to Scilly by boat or ship is primarily into St Mary's Harbour. The harbour and Town Beach are the main views on arrival. Note should be taken of the waterways of the islands as all coastal areas are highly visible with main routes being between the islands' quays as well as the route south of St Mary's most commonly taken by Scillonian III. In addition, private boats can be landed in numerous locations around Scilly dependent on tide and mariner's ability.*
- *On the Garrison there is an important view from the area in front of Star Castle over roof tops to St Mary's Harbour and Town Beach as well as fine views of Samson, Bryher and Tresco. On the other side of Hugh Town Buzza Hill offers a significant vantage point for viewing Hugh Town and offers a fine view across to Gugh and St Agnes. Some of these views highlight much of the development on the St Mary's and particularly in Hugh Town that is now often considered unsympathetic to the traditions of the island. The introduction of block built walls, picture windows and off-the-peg designs has led to a mismatch of building styles and materials that are not considered to have architectural merit.'*

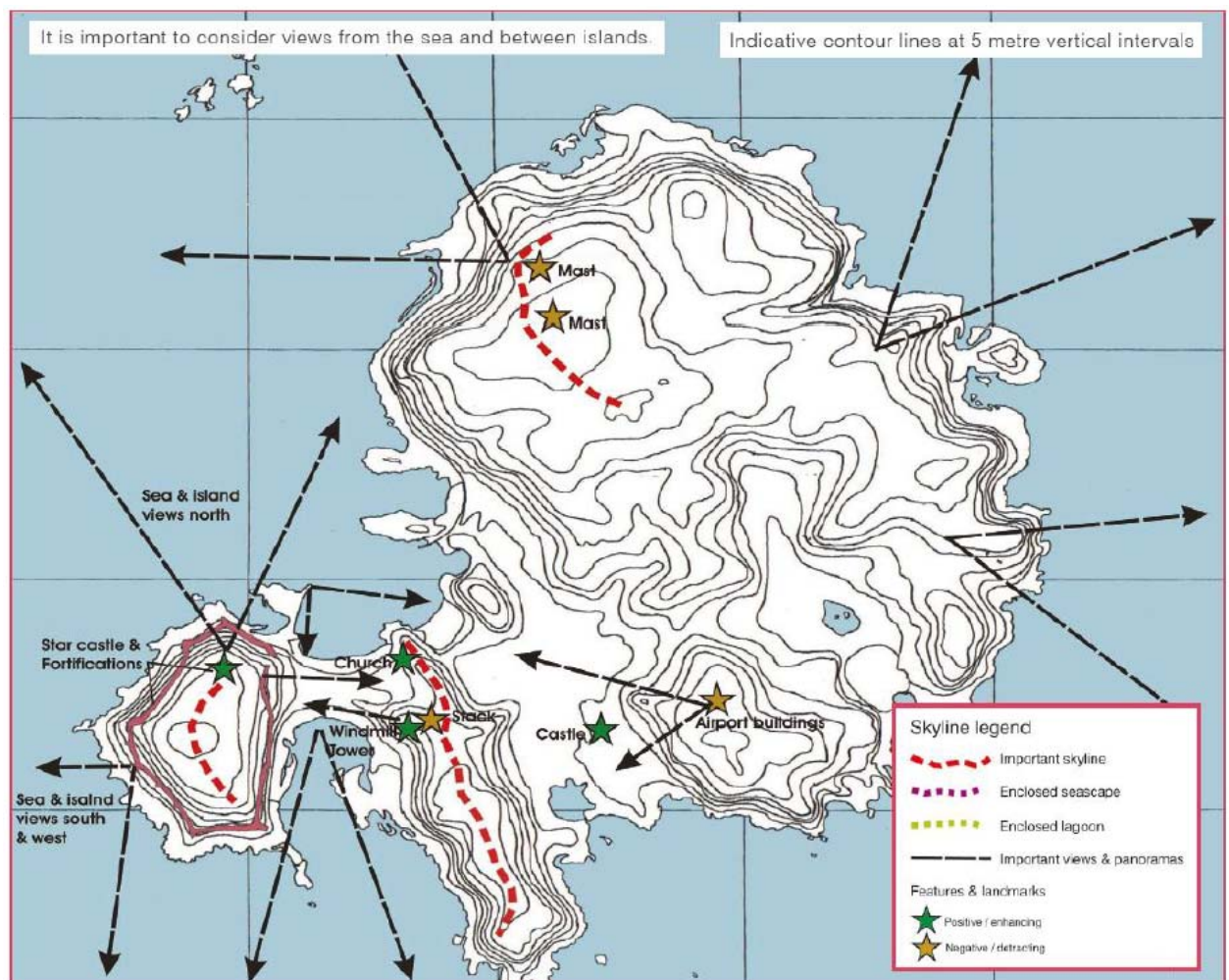


Figure 6-2: Significant views and vistas on St Mary's

### Tresco

- 'Tresco, like Bryher, has a roughly linear north / south orientation. The northern headland known as Castle Down features two important castles: the remains of King Charles' Castle on high ground overlooking the channel and the prominent round tower of Cromwell's Castle on the western shoreline. The southern end of Tresco is dominated by the wooded upland of Middle Down and Abbey Wood which shelters the house and gardens of Tresco Abbey. The valley between Middle Down and Abbey Hill contains the scenic 'Great Pool', a linear brackish lake surrounded by marshes that almost divides the island in two.
- The shoreline around Tresco is generally characterised by sandy beaches and coastal dune systems. It also has the island's most dramatic cliffs at its northern end.
- Since the nineteenth century the island has been leased to the Dorrien-Smith family who have managed the landscape to create much of its current character. Larger more regular fields were created. Extensive woodlands predominantly of Monterey Pine which were planted on the hills and as shelter belts have long since matured.'

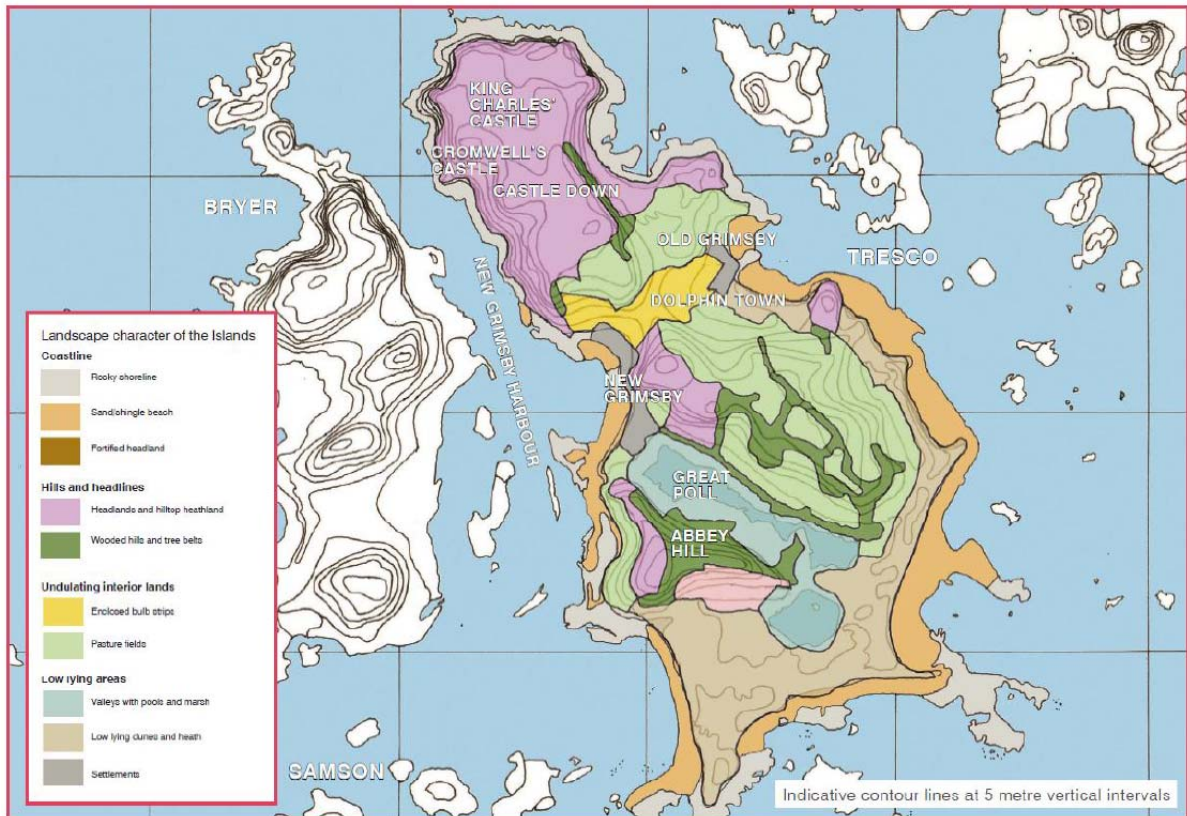


Figure 6-3: Landscape character on Treviso

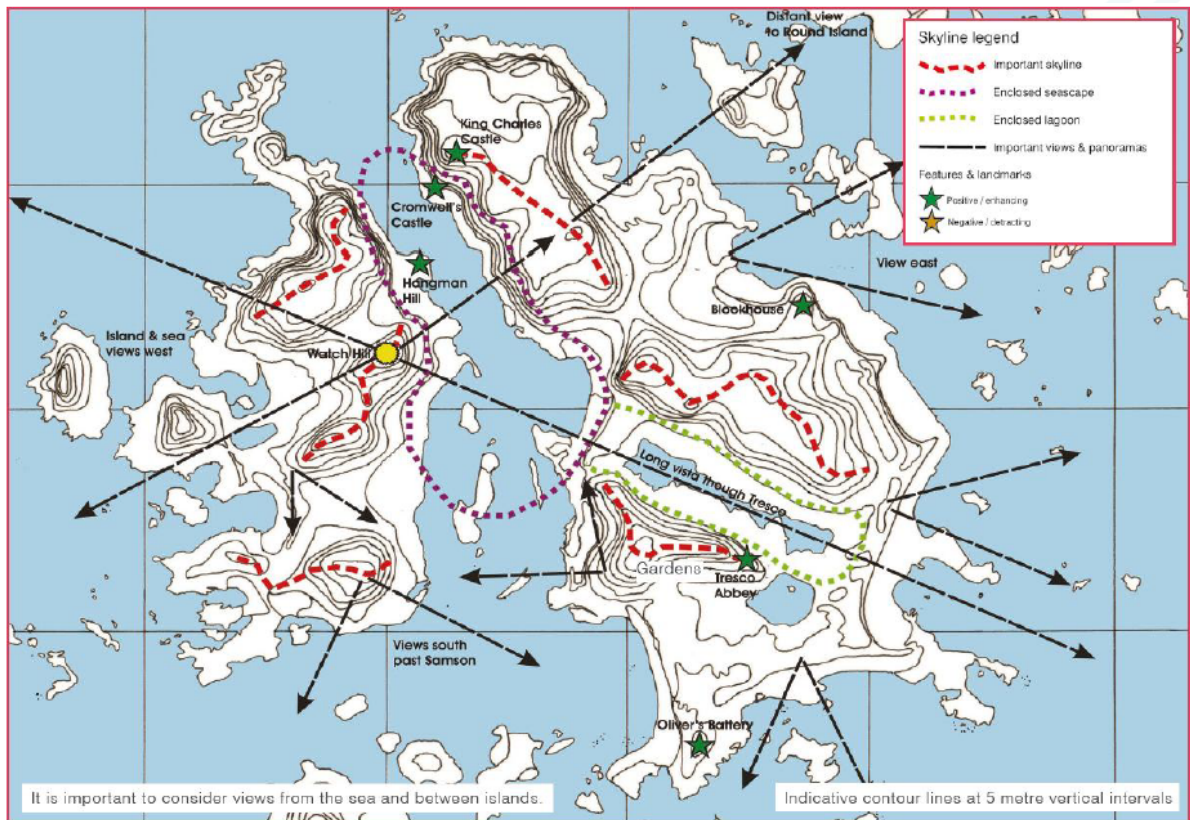


Figure 6-4: Significant views and vistas on Treviso

Section 7 of the Tresco Island Character outlines Significant views and vistas:

- *'Significant views and vistas identified in the Isles of Scilly Design Guide include Tregarthen Hill on Castle Down to the north of the island offering impressive views of Round Island, Tean and St Martin's to the east and of Bryher to the west. Abbey Hill provides a great vantage point with views to the west.'*

### **Marine Character Areas (MCA)**

Commissioned by the MMO, a desk-based seascape character assessment for the south west inshore and offshore marine plan area was completed.

The Isles of Scilly are located within MCA 47 and are described by the following key characteristics:

- *'Complex seascape made up of the exposed seas around the islands, islets and reefs of the Isles of Scilly archipelago.'*
- *'Isolated in the Atlantic the deep seas of the outer MCA contrast with the shallow interior seas between the islands.'*
- *'The severe wave and weather conditions combined with the submerged rocks and ledges are a formidable hazard to shipping and have led to numerous wrecks.'*
- *'Due to the exceptionally high diversity of habitats and species, the MCA includes 11 MCZs as well as a Marine SAC covering the islands and their surrounding reefs, including the Seven Stones, a rocky reef 11km east-north-east of the Isles of Scilly which shares the same granite bedrock as the islands.'*
- *'There is a remarkable abundance of archaeological remains, especially of later prehistoric features, including some intertidal and below current sea levels which can be seen during the low spring tides.'*
- *'The area has a rich history of maritime trade with the mainland, changing over time from pilotage, smuggling, fishing to shipbuilding.'*
- *'Most of the maritime economy today is based around tourism with small amounts of local fishing.'*
- *'The perceptual character of the MCA is influenced by the sense of remoteness from the UK mainland and the insignificance of the low lying islands against the expanse of sky and sea.'*
- *'Views out to the Atlantic are only broken by the large-scale cargo ships using the deep water shipping lanes offshore.'*

### **Landscape designations, policies and heritage designations**

#### Area of Outstanding Natural Beauty (AONB)

The Isles of Scilly AONB is a designation which covers the whole of the Isles of Scilly. The Isles of Scilly are the smallest AONB designation in the UK measuring only 16km<sup>2</sup>; however, the islands possess a diversity of scenery and designations that belies their small scale. The archipelago combines granite cliffs and headlands, sandy bays, hidden coves, shifting dunes and saline lagoons.

#### AONB Management Plan 2015

AONB Management Plans are being prepared and revised in a 5-year cycle. The current management plan is for the period 2015-2020.

Relevant sections to this project are:

- *'Climate Change: 'The biggest threat to the Isles of Scilly is the impact of storm damage and sea level rise. Two primary approaches, of adaptation and mitigation, are typically used to address these.'*

- *Landscape, Biodiversity and Geology: 'A landscape character study was completed in 2007. Over 84% of the land area was identified as having very high ratings for ecological and cultural aspects. The most sensitive areas lie on the coast and envelop the smaller islands while the less sensitive areas form the interior of the five larger and inhabited islands. The key elements of the landscape preservation included; the maintenance of the fieldscapes and associated stone hedges and shelter fences; the character of the rural and coastal dwellings, farmsteads and associated farm buildings; the main settlements and pressure for development; the heritage sites; coastal erosion including from footpath use.'*
- *Issues and Forces for Change: 'Climate Change and Coastal Erosion; with sea level rise, storm surge, saline intrusion into water supplies and coastal loss being of principal concern.'*

### Heritage Designations

Over 6,000 years of human occupation has led to the development of lowland heath, enclosed pasture, hedged bulb-strips, small harbours and quays, and scattered rural settlement punctuated by tiny townships. Overall there are a total of 238 Scheduled monuments in 250 locations, some of these covering extensive areas including entire islands such as Samson, and 129 Listed Buildings. Many of these scheduled sites are multiple sites and scheduling affords protection to over 900 individual sites.

Heritage designations although considered while doing this assessment, will be detailed in a separate chapter within the ES.

### **6.3.2 Visual baseline**

This section provides a description of the baseline conditions for the key visual receptors identified, along with an assessment of the potential effects of the proposed development. Where visual receptors are expected to have *'effects judged unlikely to occur or so insignificant that it is not essential to consider them further'* (GLVIA3), these are 'scoped out' of the assessment with reasons given.

No Zones of Theoretical Visibility (ZTVs) were carried out as part of this LVIA as the extent of the proposed works are anticipated to be localised to the beaches and adjacent areas. Views from further afield are deemed to be too distant to appreciate the change.

During the field study desk-based analysis was used as a starting point and features such as vegetation, buildings or localised topographic variation, which define actual visibility, were identified. Representative viewpoints were then selected for the visual impact assessment.

Visual receptors are people that may experience views of the landscape. These may include residents and visitors to settlements, roads, footpaths, promoted routes, visitor facilities or particular viewpoints. Desktop study and site studies have been used to identify the key visual receptors likely to be affected by the proposal, to include the following:

- Coastal Footpaths and other recreational receptors
- Roads
- People in settlements and residential properties

Observations made during the site visit coupled with the localised topography immediately around the proposed development site suggest it is highly unlikely any notable visual effects would occur outside the immediate vicinity of the four proposed sites.

### ***Visual qualities of the proposal sites***

#### Porth Mellon

The proposed site development is visually contained at beach level, with minimum visual intrusion from the footpath across the bay. It is anticipated that there will be no views from

the Telegraph Road, as the site is screened by the existing roadside bund and lower topography. No views of the proposals are visible from Hugh Town as the site is screened by the local topography and vegetation of the rocky outcrop and RNLI St Mary's Lifeboat Station. Framed long distance views are experienced towards the open sea and Samson Island, as well as the Bay, Ferry Terminal and the Quay.

#### Porthloo

Development at Porthloo is visually limited to the beach area and a small section of Porthloo Lane. It is anticipated that the proposal will be partially visible from both Porthlow Farm to the North East and Annet Cottage to the East. There are long distance views towards Hugh Town the quay to the South west and towards the open sea and Samson Island to the North West. These views are partially framed by Taylor's Island to the North and Newford Island to the South.

#### Porth Hellick

Porth Hellick is a very secluded beach within a bay on the South East of St Mary's. The proposals are limited to the North Eastern stretch of the beach and part of the lower access track and thus views are limited to the local area.

Views into the site can be experienced from either side of the higher heathland and coastal paths. Sea views from the beach are very constrained by the rising topography either side of the bay and the main focal point being 'Camel Rock' a distinct rock formation to the north of the bay. No views of the beach are perceived from the Higher Moors and Porth Hellick Pool SSSI due to the lower topography and vegetation.

#### South Dunes

The interventions on South Dunes at Tresco are limited to an approximately 150m stretch at the foot of the dunes and is limited to the immediate vicinity of the beach.

Views from the coastal path are very restricted due to its elevated position and not within the field of view. Long distance views can be experienced from Southern Slipway to the South West of the island and the main maritime route south of the island; however, due to the distance, any interventions will likely be not be perceived due to the distance.

### ***People in settlements and residential properties***

#### Porth Mellon

Likely residential receptors living within the vicinity of Porth Mellon are situated around the beach area, with the majority being situated on the eastern side of Telegraph Road. Some views of the beach can be appreciated from a handful of properties to the southern end of Telegraph road these are situated at the foot of the old school site.

There is also a small cluster of properties at the foot of Harry's Wall, which enjoy a slightly elevated view over the beach and harbour area.

#### Porthloo

Residential receptors within the area are situated along the eastern side of Porthloo Lane. These are a row of terraced cottages, including Annet Cottage to the east and Porthlow Farm and chalets to the north east.

Properties situated on higher ground of Porthloo Lane are screened by vegetation and the site topography.

#### Porth Hellick

Porth Hellick is situated in a remote part of St Mary's and although there are a few farms within the area, it is assumed that none have a direct view of the site due to topography and localised vegetation.

### South Dunes

South Dunes beach, being situated on the southern end of Tresco, is very remote and as such, there are no residential properties within the area.

### **Recreational receptors and promoted routes**

#### Porth Mellon

##### *Porth Mellon Beach*

This is a locally valued beach with users including locals and visitors; it is likely to be well used as the existing boatshed houses a local beach café and a water sports business. The beach is designated under the AONB and should be treated as a high value landscape; however, due to the built-up area and proximity of the Porth Mellon Industrial Estate and Waste Management Facility, it is considered that the value should be medium-high.

The existing structures already strongly inform the character of the beach; therefore, it is considered that the susceptibility is moderate, and sensitivity is medium. Views from the beach are limited to the bay, while the ones out to sea are framed by the rocky coastline on either side. Long distance views out towards the sea and the distant Samson Island can be enjoyed. Views inland are limited by localised sand dune and boatshed, while the rising topography either side of the bay restricts visibility further.

##### *St Mary's Coastal Path*

St Mary's is criss-crossed with over 30 miles of nature trails; probably the most interesting route being the 10-mile coastal path, passing picturesque beaches, pretty villages and rocky cliff-tops. The coastal path passes the Porth Mellon site by following Telegraph Road, before splitting off to the north at the boathouse and following the coast around the northern headland. Whilst there is local development within the vicinity of the beach, sensitivity is considered to remain high.

Views over Porth Mellon beach can be enjoyed from higher ground of Telegraph Road, before being screened by the sea wall, sand dune and boathouse complex. Views then re-emerge further north, overlooking Porth Mellon beach, the RNLI Lifeboat Station, perched atop the southern 'Carn Thomas' headland, before sweeping over the bay within the distance the settlement of Hugh Town and the Quay/Ferry Terminal further west. Sensitivity is considered to be medium.

##### *Hugh Town and Town Beach*

No views of the interventions on Porth Mellon beach are expected to be visible from Hugh Town or Town Beach due to the topography of the 'Carn Thomas' headland and RNLI Lifeboat Station. Views over the way are sweeping and vast. These views are highly valued and set the scene for many arrivals on the islands. Sensitivity is high.

##### *Harry's Wall*

An unfinished two artillery bastion dating back to 1551 and designated as a Scheduled Monument is situated on higher ground, north-east of Porth Mellon beach.

There are high valued long ranging panoramic views over Hugh Town and the Harbour, as well as the mainland to the north-east. Interventions to Porth Mellon are within these views, however they do not form part of the main focal points of this view and thus it is considered that sensitivity is medium.

#### Porthloo

##### *Porthloo Beach*

The beach is locally valued with users including locals and visitors; it is reasonably well used due to the location of the boatyard situated to the south of the beach. The beach is designated



under the AONB and should be treated as a high value landscape; however, due to the proximity of the boatyard facility, it is considered that the sensitivity should be medium-high.

The existing rock revetment and timber flood wall structure already strongly inform the character of the beach; therefore, it is considered that the susceptibility is moderate-low, and sensitivity is medium. There are long distance views towards Hugh Town, the quay to the South West and towards the open sea and Samson Island to the North West. These views are partially framed by Taylor's Island to the North and Newford Island to the South. Views into the site can be enjoyed from nearby Porthlow Farm to the North East and Annet Cottage to the East of the site.

Views inland are limited by rising topography and localised vegetation to the north and east, while views to the south are restricted by the built form of the boatyard.

#### *St Mary's Coastal Path*

The coastal path passes the Porthloo site by cutting through the boatyard and following the timber sea defence wall beyond which dune type grassed vegetation screens any views of the beach and sea. Views over the sea and bay open up as the footpath joins Porthloo Lane, before heading inland and uphill. The road becomes increasingly enclosed by farm buildings, low walls and hedgerows. Elevated views of the site and sea are only perceived from Porthlow Farm and are framed by the road in a southern direction. Sensitivity is medium.

#### *Hugh Town and Town Beach*

Long distance views of the interventions on Porthloo are possible from Hugh Town; most notably Holgate's Green and Lower Strand Road, where the coastal defences would be visible between Newford Island and the mainland; however, due to the distance and type of intervention, it is considered that this would blend within the background of the boatyard and existing defences. The view is highly valued and set the scene for many arrivals on the islands. Sensitivity is medium-high.

#### Porth Hellick

##### *Porth Hellick Beach*

The beach is locally valued with users including locals and visitors; it is well used as it is situated on the intersection of numerous footpaths and within proximity to designated features, such as the Port Hellick Down Burial Chamber or the Porth Hellick Pool SSSI. The beach is designated under the AONB and should be treated as a high value landscape. The area is remote and only the occasional take off from the nearby airfield disrupt the tranquillity. Sensitivity is high.

#### *St Mary's Coastal Path*

The coastal path passes the site as it drops down from higher heathland to the North and sweeps around Porth Hellick, before then rising through groupings of sporadic pine trees back to higher ground, around the perimeter of St Mary's Airport. A secondary footpath route leads from the beach area, through the Porth Hellick Pool SSSI onto the A3110 'Carn Friars Lane'. Sensitivity is high.

#### South Dunes

##### *South Dunes beach*

South Dunes beach is locally valued by visitors to the island; however, it is unlikely to be well used as it is remote from the main point of interest of the island. The beach is designated under the AONB and should be treated as a high value landscape. The area is remote and tranquil. Sensitivity is high.

### *Tresco Coastal Path*

The coastal path runs partially to the North footing of the South Dunes beach dune network, and in sections on top of the dunes, overlooking the sea and St Mary's northern shoreline. Coastal interventions being situated at the foot of the sand dunes to the seaward side, will be outside the immediate field of view of the footpath users. Sensitivity is considered to be high.

### **Road network and maritime routes**

#### Porth Mellon

##### *Telegraph Road*

Views over Porth Mellon Bay are experienced from higher ground of Telegraph Road, looking in a northern direction. It is anticipated that there will be no views of the proposed rock armour, as this is situated in the southern corner of the beach, well below the wall and vegetated bund forming the boundary to Telegraph Road.

##### *The Quay/Ferry Terminal*

Views of the northern side of Porth Mellon are possible from the Quay; however, with the proposed development taking place on the southern side, views are screened by 'Carn Thomas' headland.

#### Porthloo

##### *Porthloo Lane*

Views of the site are perceived from either side of Porthloo Lane. Views from the boatyard and Annet Cottage looking north west have glimpses of the sea and further distant islands of Samson and Bryher. Partial views of the top of rock revetment will be visible. Elevated views of the site and the proposed revetment are only perceived from Porthlow Farm and are framed by the road and built form in a southern direction.

##### *The Quay/Ferry Terminal*

Long distance views of Porthloo are possible from the Quay/Ferry Terminal; however, most of the site is screened by Newford Island.

#### Porth Hellick

##### *A3110 'Carn Friars Lane'*

The nearest Road to Porth Hellick is the A3110 'Carn Friars Lane', situated 300m North of the site. No views into the site are experienced from the roadside due to the lower topography, the roadside walls and vegetation.

#### South Dunes

##### *Carn Near Road*

The nearest road to the south Beach site is 'Carn Near Road', leading from the Southern Slipway to the Heliport and Tresco Abbey further to the north. Long distance views to the site are only perceived along the slipway; however, due to the distance, any interventions will likely to be not be perceived due to the distance.

##### *Penzance-St Mary's Ferry Route*

It is anticipated that long distance views to the South Beach are possible from the main ferry route leading in and out of St Mary's Island, however due to the distance (1Km) any interventions on the beach will most likely not be noticed as they blend in to the overall perception of the Tresco coastline.

### 6.3.3 Selection of viewpoints

Potential viewpoints have been selected through desk and field-based research. Twelve of these views are represented as part of this report with descriptions and illustrated extents of the development, shown in Appendix G.

**Table 6-1: Viewpoints from Porth Mellon**

Name of Viewpoint	Distance and direction from proposed development	Reason	Viewpoint and figure number
<b>VPA1: Telegraph Road</b>	VP is situated at the foot of the old school site on the eastern side of Telegraph Road. The site is situated 15m north on the other side of the road.	Specific Viewpoint – Views gained by residents, walkers and road users to Telegraph road and St Mary’s coastal path.	Viewpoint 1
<b>VPB1: St Mary’s Coastal Path</b>	VP is situated north of Porth Mellon, 0.2Km north of the site.	Representative Viewpoint – representative of views from residences at the foot of Harry’s wall battery and walkers along the coastal path.	Viewpoint 2
<b>VPC1: Hugh Town Quay</b>	VP situated across the harbor. Site is situated 0.5Km East, but screened by ‘Carn Thomas’ headland	Representative Viewpoint – representative of views of visitors arriving to the islands via the Ferry terminal. The site is screened by ‘Carn Thomas’ headland and the RNLI lifeboat station.	Viewpoint 3

**Table 6-2: Viewpoints from Porthloo**

Name of Viewpoint	Distance and direction from proposed development	Reason	Viewpoint and figure number
<b>VPA2: Porthloo Beach</b>	VP is on the slipway, 0.08km south of the site.	Representative Viewpoint – View from the beach.	Viewpoint 4
<b>VPB2: Annet Cottage, Porthloo Lane</b>	VP situated approx. 0.04km south east of the site.	Viewpoint – representative of views from residences along Porthloo Lane.	Viewpoint 5
<b>VPC2: Porthlow Farm and chalets, Porthloo Lane</b>	VP situated on higher ground, approx. 0.07km north of site.	Representative Viewpoint – representative of views gained by walkers along the coastal path on Porthloo Lane and by residents and visitors at Porthlow Farm.	Viewpoint 6
<b>VPD2 – Holdgate’s Green</b>	Situated off Lower strand, Hugh Town. Situated 0.8 Km south west of Porthloo.	Specific viewpoint – Chosen for being a key open space area within Hugh Town. View overlooking harbour and St Mary’s coastline in the background	Viewpoint 7

**Table 6-3: Viewpoints from Porth Hellick**

Name of Viewpoint	Distance and direction from proposed development	Reason	Viewpoint and figure number
VPA3: St Mary's Coastal path	VP is along footpath within higher ground heathland, overlooking Porth Hellick site. Approx. 0.24km south east of site.	Representative Viewpoint – approaching Porth Hellick from the east on St Mary's Coastal path. View overlooking bay with Porth Hellick Pool SSSI in the background.	Viewpoint 8
VPB3: Access track to Porth Hellick	VP situated along Porth Hellick access track. Approx. 0.18Km east of the site.	Viewpoint – representative of views experienced by walkers using the main access track to Porth Hellick, with Porth Hellick Pool SSSI further North.	Viewpoint 9
VPC3: St Mary's Coastal path	VP situated along Coastal Path, approx. 0.25Km to the west of the proposal site, overlooking Porth Hellick bay.	Representative Viewpoint – approaching Porth Hellick from the west on St Mary's Coastal path. View overlooking bay with proposed site further back of the beach.	Viewpoint 10

**Table 6-4: Viewpoints from South Dunes**

Name of Viewpoint	Distance and direction from proposed development	Reason	Viewpoint and figure number
VPA4: Tresco coastal path	VP situated approx. 0.25Km west of the proposed site, along the coastal path.	Representative Viewpoint – View along the southern coastline of Tresco.	Viewpoint 11
VPB4: Southern Slipway	VP situated approx. 0.8Km south-west of the South Dunes site.	Viewpoint – representative of arrivals arriving on Tresco island via the southern slipway.	Viewpoint 12

## 6.4 Assessment methodology and assessment criteria

### ***Outline of assessment process***

The assessment of landscape and visual effects has been prepared with reference to *Guidelines for Landscape and Visual Impact Assessment*, 3rd edition (GLVIA3), published by the Landscape Institute and the Institute of Environmental Management and Assessment in 2013.

The assessment process is supported using viewpoints to illustrate and evaluate effects at key sites relevant to the proposal; however, the assessment of effects is not confined to these key viewpoints.

### ***Best practice guidance***

GLVIA3 (as noted above) is the principal guidance document, but other reports are also referenced and have been used to inform the methodology if appropriate. Whilst these may relate to larger or smaller scale developments than that covered by this assessment, the principles and guidance may be of relevance. These include:

- National Planning Policy Framework (2012), Department for Communities and Local Government;
- Use of photography and photomontage in landscape and visual assessment (2011), Landscape Institute; and

- Landscape Character Assessment – Guidance for England and Scotland (2002), Scottish Natural Heritage and The Countryside Agency.

### ***Assessment terminology***

Where such effects are considered to be of relevance or importance within the planning process, these are described as significant.

In order to determine the scale of effects, two key aspects should be established. These are nature of the landscape or visual receptor likely to be affected, often referred to as its sensitivity and the nature of the effect likely to occur, which is often referred to as the magnitude of the likely change. These two results are combined to form a judgement of the scale of the effect. Consideration of the scale of the effect then enables a judgement to be made as to whether the effect is significant.

### ***Professional judgement***

GLVIA3 recognises that professional judgement is an important concept within LVIA. Whilst there is scope for quantitative measurements of some factors, in many situations the assessment must rely on qualitative judgements that are based on reasoned and informed justifications.

### ***Limitation of the assessment***

The assessment and the prediction of effects during the life-span of the development are based on the available background information and supplied drawings of the proposal and involve a degree of informed professional judgement.

### ***Assessment of residential receptors***

The assessment of visual effects on residential receptors is an outline assessment only, it is not a detailed Residential Amenity Assessment.

### ***Timing of surveys***

The site visit was carried out in April 2019.

### ***Glossary***

Some of the terms used within the assessment have a specific meaning. A glossary of these terms is provided in Section 6.3. The definitions are based on those provided within GLVIA 3.

## ***6.4.1 Determining the scope of the study***

The scope of the LVIA was defined through desk-based research. Key matters reviewed in determining the scope were:

- The extent of the study area.
- Sources of relevant landscape and visual information.
- The nature of the possible landscape and visual effects.
- The main receptors and any specific viewpoints.
- The extent and appropriate level of detail for the baseline studies to be proportionate to the scale and type of development proposed.
- Methods to be used in determining the significance of effects.
- Methods to be used for the production and presentation of photomontages.

## ***6.4.2 Viewpoints***

A viewpoint is a location from where a view of the proposal may be gained; several viewpoints have been chosen in order to support the assessment of landscape and visual effects and illustrate effects at key locations.

The viewpoints are carefully selected to be either:

- Representative viewpoints: those selected to represent the experience of different types of visual receptors, where a large number of viewpoints cannot all be included individually and where significant effects are unlikely to differ. For example, viewpoints may be chosen to represent views of users of several footpaths or bridleways. Viewpoints may also be selected to reflect visual elements that inform the landscape resource.
- Specific viewpoints: important key viewpoints within the landscape. Examples of these may include local visitor attractions, settlements, routes valued for their scenic amenity, or places with cultural landscape associations.
- Illustrative viewpoints: those chosen specifically to demonstrate a particular effect or specific issues, e.g. restricted visibility at certain locations.

Viewpoints are initially selected as those places from where a proposed development is likely to be visible and would result in significant effects on the view and the receptors. This is informed by maps, fieldwork observations and information on other relevant issues such as access, landscape character and popular vantage points.

A range of views and viewers are represented through the choice of viewpoints. Factors which were considered in selecting the final viewpoints to be used for the assessment include:

- Landscape character type (separate and combinations of type).
- The presence of nationally designated landscapes and/or Areas of High Landscape Value within local planning policy, recreational routes, local amenity spaces.
- Visual composition, for example focused or panoramic views, simple or complex landscape pattern, vistas or glimpses.
- Distance from the proposed development (short, medium and long-range views).
- Aspect and elevation.
- Viewer type (resident, tourist, walkers, etc.)
- Activities of the receptors, for example those at home, work, travelling in various modes or carrying out recreation.
- Modes of movement, for example those moving through the landscape or stationary.

For this study a series of viewpoints have been identified to aid the assessment of effects. Four of these have been selected and illustrated to show the site location and surrounding features within the view to give a more realistic illustration of the visibility of the proposal.

For all viewpoints, photographs were taken with a digital SLR camera with a 50mm equivalent lens. The camera was tripod mounted in a portrait orientation to minimise distortion and enable an accurate location to be determined. A series of images suitable to stitch together to form a panoramic image was taken in accordance with the SNH guidance and the following information was recorded and is supplied:

- Precise location 12 figure OS grid reference.
- Viewpoint altitude in metres Above Ordnance Datum (m AOD) interpolated from DTM/OS mapping.
- Viewing height in metres.
- Horizontal field of view (in degrees).
- Distance to development.
- Date of assessment.
- Weather conditions and visual range.

The following information is described in the assessment:

- Description of location (receptor).

- Description of nature of existing view and likely change during development life-span.
- Description of magnitude of impact and sensitivity of visual receptors.
- Summary of the significance of the potential impact.

Each viewpoint is displayed on two pages and illustrated by two images: the first image is a panorama containing the extent of the proposal, the second image is the panorama and additional markers to highlight both horizontal and vertical extents of the proposal.

### 6.4.3 *Baseline studies: landscape*

#### ***Introduction***

For the purposes of LVIA, the landscape is a resource in its own right, The European Landscape Convention (2000)—which is noted in GLVIA3—provides the following definition of landscape:

*'Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.'*

The assessment of landscape effects considers the effects the proposed development or change will have on this landscape resource.

Landscape effects that may arise include a change, loss or addition of elements; features, aesthetic or perceptual aspects that contribute to the distinctiveness or character of the landscape.

#### ***Establishing the landscape baseline***

To enable the assessment of the effects of a proposed development or change, the landscape baseline, or starting point must be established. This enables the identification of landscape receptors and the effects of the proposed changes on these landscape receptors can then be considered. In this study the landscape baseline studies consider the following:

**Landscape character:** the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement but also encompasses its perceptual and aesthetic qualities. It creates the particular sense of place of different areas of the landscape. Assessment of the effect of the development on landscape character is a crucial element of the landscape assessment.

**Landscape designations:** sites with landscape designations are considered in addition to the overall landscape character areas, to enable site specific judgements of effects on particularly valued sites.

These studies can then be considered in conjunction with the desk-based research, to enable a list of potential landscape receptors to be compiled.

#### ***Determining landscape sensitivity***

The next stage is to determine the sensitivity of the landscape receptors to the type and scale of development proposed. In order to do this, the susceptibility and value of the receptor are considered, although within the assessment these may not always be explicitly noted. In many cases, it is considered sufficient to describe only the sensitivity, which is informed by an overall professional judgement.

Susceptibility is the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline and/or the achievement of planning policies and strategies (GLVIA3).

Where noted, susceptibility is described as follows:

**High** – where undue negative consequences are expected to arise from the proposal.

**Medium** – where undue negative consequences may arise from the proposal.

**Low** – where undue negative consequences are unlikely to arise from the proposal.

Susceptibility may be informed by existing Landscape Character Assessments, which often note sensitivity. However, this is frequently 'intrinsic' or 'inherent' sensitivity, which may not directly relate to the type of development proposed. In such cases, a judgement must be made as to how this sensitivity might relate to the development in question.

The *value* of a landscape receptor is informed by designations, planning policy and documents, the contribution of special (cultural, historic or conservation) contributors or associations, scenic quality, rarity, recreational value and aesthetic, perceptual and experiential qualities. These are again reinforced by judgements, particularly where no designations are established. Conversely, care should be taken not to rely on designations as the sole indicator of value; this should be reinforced by rationale where necessary. Where noted, value is described as follows:

**High** – landscapes with national or international designations on account of landscape value, such as National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts or World Heritage Sites.

**Medium** – landscapes of local value, subject to additional policy protection (such as Areas of High Landscape Value), or where it is considered that particular features or appreciation of the landscape is of greater value than other nearby areas.

**Low** – landscapes that are not subject to designation but may be valued at a community or local level.

**Minimal** – landscapes that are degraded or exhibit little or no community or local value.

*Sensitivity* combines the judgements made for susceptibility and value, as described above. Three levels of sensitivity are recorded:

**High** sensitivity – a landscape of high value and a particularly distinctive character that is susceptible to relatively small changes of the type proposed;

**Medium** sensitivity – a landscape of valued characteristics reasonably tolerant of change of the type proposed; and

**Low** sensitivity – a landscape of relatively low value or importance which is potentially tolerant of substantial change of the type proposed.

Within the assessment, an overall assessment of sensitivity is only provided, through professional judgement, where this is considered sufficient to allow an informed assessment of the receptor.

### ***Other landscape considerations***

The considerations noted above are further informed by general observations regarding the condition and quality of the landscape. These support the overall narrative and judgement of sensitivity. Landscape quality or condition may relate to the level of management, distinctiveness, number of detracting features, pattern, unity, structure, sense of place, function, definition and aesthetic value.

Areas of landscape quality may not necessarily correlate directly with landscape character areas or designated sites as defined by statutory agencies or local planning authorities. Where it is considered that this is the case, mention is made within the description and sensitivity evaluation.

### **Magnitude of landscape change**

Effects on landscape receptors are assessed in terms of their magnitude of change. This is a combination of the size or scale, geographic extent of the area influenced and the duration and reversibility of the impact. Within the assessment, size and scale or extent may not



always be noted. In many cases, it is considered sufficient to describe only the magnitude of change, which is informed by an overall professional judgement.

Size and scale concern the amount of existing landscape elements that will be lost, the extent to which these represent or contribute to the character of the landscape. It also relates to the degree to which aesthetic or perceptual aspects of the landscape are altered through removal or addition of new features, such as hedge loss or introduction of tall features on skylines.

**Size and scale**, where noted, may be rated as follows:

**Large** – major change to the existing landscape including key elements, characteristics and qualities.

**Medium** – partial or noticeable change to key elements, characteristics and qualities.

**Small** – some discernible but largely minor change to key elements, characteristics and qualities.

**Negligible** – very minor or virtually imperceptible change to key elements, characteristics and qualities.

The **geographical extent** over which landscape effects are felt is distinct from the size or scale. For example, large scale effects may be limited to the immediate site area. Again, extent is subject to a degree of professional judgement, but where noted these may be rated as follows:

**Wide** – influencing several landscape types or areas, beyond around 5km.

**Medium** – generally within the local character area or up between 1 and 5km.

**Local** – the site and immediate surrounds, up to around 0.75 to 1km.

**Site** – within around 0.75km of the site.

The **duration** of the effect relates to the time period during which the changes to the landscape will occur. This is rated as follows:

**Long-term** – beyond 10 years.

**Medium-term** – 2 to 10 years.

**Short-term** – up to 2 years.

The **magnitude** of change is a product of the size/scale, extent and duration of the impacts. This is judged as a four-point scale:

**High** – significant and long-term change in landscape characteristics over an extensive ranging to a very intensive, long term change over a more limited area.

**Medium** – moderate, short term change over a large area or moderate long-term change in localised area.

**Low** – slight long term or moderate short-term change in landscape components.

**No change/negligible** – no discernible/virtually imperceptible change to the landscape's resources.

Within the assessment, size and scale or extent may not always be noted. In many cases, it is considered sufficient to describe only the magnitude of change, which is informed by an overall professional judgement.

#### 6.4.4 *Baseline studies: visual*

Visual effects relate to how the development may affect the views available to people and their visual amenity. Visual amenity is the visual quality of a site or area as experienced by residents, workers or visitors. Visual receptors are people that experience the view.

Development can change people's direct experience and perception of the view depending on existing context, the scale, form, colour and texture of the proposals, the nature of the activity associated with the development, and the distance and angle of view. Visual effects can be experienced through development intruding into existing views experienced by residents and day to day users of the area, and the views of tourists and visitors passing through or visiting the area.

### ***Establishing the visual baseline***

Identification of potential visual receptors is informed by desk and field studies, to identify places where people might be expected to receive a view of the proposed development. Once receptors have been identified, it is necessary to document the following information, though the degree of detail required will vary depending on the nature of the receptor and the view experienced:

Type, relative numbers and activities of potential receptors.

The nature, composition and characteristics of the existing views, for example the nature and extent of the skyline, aspects of vertical scale and proportion, key foci, and elements which interrupt, filter or otherwise influence the view.

### ***Determining visual receptor sensitivity***

In order to determine the scale of visual effects, it is necessary, as with the assessment of landscape effects, to determine the sensitivity of the receptor. This is achieved through the consideration of the susceptibility of the receptor and the value of the view. Within the assessment, susceptibility and value may not always be noted. In many cases, it is considered sufficient to describe only the sensitivity, which is informed by an overall professional judgement.

Visual receptor susceptibility is a function of receptor type, location and activity. In assessing visual receptor susceptibility, factors such as the following have been accounted for with a degree of professional judgement:

Receptor activities – for example, relaxing at home, undertaking leisure, recreational and sporting activities, at work.

Movement/duration – whether receptors are likely to be stationary or moving, which influences how long they will be exposed to the change.

Orientation – of receptors in relation to the development.

Purpose/expectation – of receptors at that location.

Context – the quality of the landscape.

Importance of the view/location – popularity of location as indicated by existence of designations or local value.

The *value* of the view that is experienced may relate to associated landscape or planning designations, cultural references or the presence of facilities (car parking, interpretation boards, signage) that may emphasise importance.

In this assessment, sensitivity is judged as a combination of susceptibility and value and is ranked as follows:

**High** – visitors to promoted or valued viewpoints especially those with panoramic views; visitors to heritage or tourism sites where views are important; viewpoints noted within planning guidance or policy; receptors to public rights of way particularly those receiving high numbers of visitors or signposted trails; receptors in residential properties.

**Medium** – receptors travelling along cycle routes or local roads particularly those in rural areas where speeds are slower.

**Low** – receptors that are fast-moving (due to speed on roads and motorways) or because they are engaged in an activity not concerned with the landscape or view (such as work or sport).

As with all aspects of the methodology, these definitions are not rigid; where professional judgement has been applied, this would be noted in the narrative.

### ***Visual receptor magnitude of change***

The assessment of the magnitude of change on visual receptors follows similar principles to landscape assessment in terms of size or scale, the geographic extent of the area influenced and its duration and reversibility. Within the assessment, size and scale or extent may not always be noted. In many cases, it is considered sufficient to describe only the magnitude of change, which is informed by an overall professional judgement.

Size and scale concern the relative change in the elements, features, qualities and characteristics that make up the view.

**Size and scale**, where noted, are rated as follows:

**Large** – major change to the existing view including key elements, characteristics and qualities.

**Medium** – partial or noticeable change to elements, characteristics and qualities within the view.

**Small** – some discernible but largely minor change to key elements, characteristics and qualities within the view.

**Negligible** – very minor or virtually imperceptible change to key elements, characteristics and qualities such that the view essentially remains unchanged.

Where specifically noted, the **geographical extent** over which visual effects is described as follows:

**Wide** – influencing most of a view or receptor (over half).

**Medium** – generally between one quarter or one half of a view or receptor.

**Small** – generally less than one quarter of a view or receptor.

**Limited** – generally affecting only a small part of the receptor.

The **duration** of the effect relates to the time period during which the changes to the landscape will occur. This is rated as follows:

**Long-term** – beyond 10 years.

**Medium-term** – 2 to 10 years.

**Short-term** – up to 2 years.

The **magnitude of change** is a product of the size/scale, extent and duration of the impacts. These are judged as a four-point scale:

**High** – where the development causes a very significant change in the existing view for a sensitive receptor.

**Medium** – where the development would cause a very noticeable change in the existing view.

**Low** – where the development would cause a noticeable change in the existing view.

**Negligible/no change** – where the development would cause a barely perceptible change in the existing view.

### 6.4.5 Assessment of effects

The next step is to determine the scale of effects. This is evaluated by combining the sensitivity (or nature) of the landscape or visual receptor and the magnitude (or nature) of change. The following matrix provides an objective rationale for determining the scale of effects, in order to provide consistency and transparency to the process; however, a degree of professional judgement is a key element of the evaluation.

**Table 6-5: Scale of effects matrix**

		Sensitivity to change (nature of receptors)		
		Low	Medium	High
Magnitude of Change resulting from impacts identified	No Change/ Negligible	Negligible	Negligible	Negligible
	Low	Slight	Slight - Moderate	Moderate
	Medium	Slight - Moderate	Moderate	Moderate - Substantial
	High	Moderate	Moderate - Substantial	Substantial

The scale of effects detailed above can be classed as Beneficial, Neutral or Adverse

#### **Classification of landscape effects**

Adverse landscape effects occur when features or key landscape characteristics such as established planting, old buildings or structures which—when considered singularly or collectively—help to define the character of an area are lost, or where new structures out of scale or character with the surroundings are introduced.

**Substantial adverse** landscape effects occur where the proposals are at considerable variance with the landform, scale and pattern of the landscape and would be a dominant feature, resulting in considerable reduction in scenic quality and large-scale change to the intrinsic landscape character of the area.

**Moderate adverse** landscape effects occur where proposals are out of scale with the landscape, or inconsistent with the local pattern and landform and may be locally dominant and/or result in a noticeable reduction in scenic quality and a degree of change to the intrinsic landscape character of the area.

**Slight adverse** landscape effects occur where the proposals do not quite fit with the scale, landform or local pattern of the landscape and may be locally intrusive but would result in a minor reduction in scenic quality or change to the intrinsic landscape character of the area.

**Negligible** landscape effects arise when the change proposed results in little or no discernible improvement or deterioration to the landscape resource. The proposals sit well within the scale, landform and pattern of the landscape and / or would not result in any discernible reduction in scenic quality or change to the intrinsic landscape character of the area.

**Beneficial** landscape effects occur where derelict buildings, land or poorly maintained landscape features are repaired, replaced and maintained or where new features are introduced such as new tree planting which helps to define landscape structure where none currently exists. Beneficial landscape effects can be slight, moderate or substantial.

#### **Classification of visual effects**

**Adverse Visual Effects** occur when the proposed development will introduce new, non-characteristic, discordant or intrusive element/s into views.

**Substantial adverse** visual effects occur where the proposed development would cause a considerable deterioration in the existing view or visual amenity.

**Moderate adverse** visual effects occur where the proposed development would cause a noticeable deterioration in the existing view or visual amenity.

**Slight adverse** visual effects occur where the proposed development would cause a barely perceptible deterioration in the existing view or visual amenity.

**Negligible** visual effects occur where the change proposed results in little or no discernible improvement or deterioration to views or visual amenity.

**Beneficial** visual effects occur when the proposed development would enhance the quality of the receptor's view e.g. by creating a new focal point in a degraded landscape that includes a range of existing detractors. Beneficial visual effects can be slight, moderate or substantial.

The scale indicates the importance of the effect, taking into account the sensitivity (or nature) of the receptor and the magnitude (or nature) of the effect. It is usually rated on the following scale of effects:

**Substantial** indicates an effect that is very important in the planning decision making process.

**Moderate - substantial** indicates an effect that is, in itself, material in the planning decision making process.

**Moderate** indicates a noticeable effect that is not, in itself, material in the planning decision making process.

**Slight** indicates an effect that is trivial in the planning decision making process.

**Negligible/No Change** indicates an effect that is akin to no change and is thus not relevant to the planning decision making process.

#### ***Overall importance of the effects***

The final step is to judge the overall importance of the effects. Effects may be described as significant in projects that are subject to EIA. Significant effects are defined as those that are moderate-substantial or substantial. However, whilst an effect may be significant, it does not necessarily mean that such an effect would be unacceptable. Account is taken of the effect that any mitigation measures—for example planting or landform—may have in terms of minimising potentially detrimental effects or improving the landscape composition of the area.

## **6.5 Potential impacts and significant effects**

### **6.5.1 Porth Mellon**

These changes have the potential to impact the landscape fabric through the partial removal of the vegetated embankment and the introduction of large granite rocks onto the southern section of the beach. The placement of rock armour onto the beach will introduce a new element of sea defence and result in a localised loss of accessible sandy beach within the area. There will be a visible change from a largely vegetated embankment to one composed largely of natural rock material.

The change in site character will be in the context of a sandy beach with associated sea defences and on shore boathouse. The proposed rock armour, although engineered would be seen as a continuation of the natural granite rock formation along the 'Carn Thomas' headland.

Susceptibility is considered to be medium. Value is considered to be medium-high to account for the amenity and recreational value of the beach and seafront. Overall, sensitivity is considered to be **medium**.

Due to the localised topography and the localised extent of the proposals, the influence of the development on the surrounding landscape is limited.

Greater effects on landscape character will occur during construction stage due to the presence of plant and equipment, deliveries by landing craft, material stockpiling and other associated activities. Access onto the site area will include a large area of the beach will be restricted during work hours, although connectivity between Telegraph Road and areas of beach will be maintained.

The effect on landscape character locally is considered to be **moderate** adverse during construction and localised to the beach, seafront and immediate surroundings.

Landscape effects arise through a small-scale permanent change from removal or change in landscape features. The proposals will represent a discernible but largely minor change in the qualities and characteristics of the site. The intertidal nature of the site means that changes will be most apparent at low tide. The magnitude of change is slight-moderate at a local scale, decreasing rapidly with distance (limited to around 0.5km of the site and often much less due to screening by built up areas).

Overall, the effect of the completed scheme on local landscape character is considered to be **neutral**.

#### 6.5.2 Porthloo

Potential impacts on the landscape fabric could be perceived through the removal and replacement of existing low-quality ad-hoc revetment by more substantial and engineered placement of granite rocks onto the roadside section of the beach. Additionally, a localised extension of timber clad sea wall is proposed, matching the existing one in height and appearance. The placement of rock armour onto the beach will not introduce a new element of sea defence but rather replace an existing similar feature. There will be a visible change from the 28m extension of timber clad sea wall; however, it is anticipated that the additional length will have minimum influence in the overall perception.

The site character will be in the context of the current beach with associated sea defences. The proposed rock armour, although engineered, would be similar in appearance to the existing features.

Susceptibility is medium. Value is considered to be medium-high to account for the amenity and recreational value of the beach and seafront. Overall, sensitivity is **medium**.

Due to the localised topography and the localised extent of the proposals, the influence of the development on the surrounding landscape is limited.

Greater effects on landscape character will occur during construction phase due to the presence of plant, deliveries by landing craft, material stockpiling and other associated activities. Access onto the site area which includes a substantial area of the beach will be restricted during work hours, although connectivity between Porthloo Lane and areas of beach will be maintained.

The effect on landscape character locally is considered to be **moderate** adverse during construction and localised to the beach, seafront and immediate surroundings.

Landscape effects arise through a small permanent change from a replacement of landscape features. The proposals will represent a discernible but largely minor change in the qualities and characteristics of the site. The intertidal nature of the site means that changes will be most apparent at low tide. The magnitude of change is slight at a local scale, decreasing rapidly with distance (limited to around 0.5km of the site and often much less due to screening by built up areas).

Overall, the effect of the completed scheme on local landscape character is **neutral**.

### 6.5.3 Porth Hellick

The proposals for Porth Hellick, by extending the current dune network to the whole extent of the beach area and providing ramped access over the extended dune area. The placement of crushed granite to expand the dune area and subsequent planting would blend the extension into the existing landscape fabric. The access proposal, although uncommon to the area, will blend in by using neutral Dycel blocks and provide necessary access for local fisheries to their boats.

The site character will be in the context of the current beach and associated fishing hut.

Susceptibility is considered to be low. Value is considered to be high to account for the amenity and recreational value of the beach and surrounding area. Overall, sensitivity is **high**.

Due to the localised topography and the localised extent of the proposals, the influence of the development on the surrounding landscape is limited to the immediate beach and bay area.

Greater effects on landscape character will occur during construction due to the presence of plant, deliveries by landing craft, material stockpiling and other associated activities. Access onto the site will be undertaken via the existing track and would include provision of temporary erosion control matting.

The effect on landscape character locally is **moderate/substantial** adverse during construction and localised to the beach, seafront and immediate surroundings. Any impact arising from the construction operations would be partly mitigated by undertaking the works outside the main visiting period May-September.

Landscape effects arise through a small permanent change from provision of an access ramp. The proposals will represent a discernible but minor change in the qualities and characteristics of the site. The intertidal nature of the site means that changes will be most apparent at low tide. The magnitude of change is **negligible** at a local scale, decreasing rapidly with distance (limited to around 0.3km of the site and often much less due to vegetative screening).

Overall, the effect of the completed scheme on local landscape character is **neutral**.

### 6.5.4 South Dunes

These changes have the potential to impact the landscape fabric through introduction of rock rolls at the footing of some of the dune network and erosion protection to the dune surface with buried geotextile. There will be a visible change in the short term as new elements will be exposed, however it is anticipated that these would become less visible with the accumulation windblown sediment. The proposed works are temporary in nature and expected to be for a 5–10year trial period.

The site character will be in the context of the current beach.

Susceptibility is considered to be high. Value is considered to be high to account for the amenity and recreational value of the beach and surrounding area. Overall, sensitivity is considered to be **high**.

Due to the localised topography and the localised extent of the proposals, the influence of the development on the surrounding landscape is limited to the immediate beach.

Greater effects on landscape character will occur during construction due to the presence of plant, deliveries by landing craft, material stockpiling and other associated activities. Access onto the site will be undertaken via the existing track and ramp, while material would be stockpiled near the southern slipway.

The effect on landscape character locally is considered to be **moderate** adverse during construction and localised to the beach, seafront and immediate surroundings. Any impact arising from the construction operations would be partly mitigated by undertaking the works outside the main visiting period May-September.

Landscape effects arise through a small permanent change from provision of an access ramp. The proposals will represent a discernible but minor change in the qualities and characteristics of the site. The intertidal nature of the site means that changes will be most apparent at low tide. The magnitude of change is **negligible** at a local scale, decreasing rapidly with distance (limited to around 0.5km of the site).

Overall, the effect of the completed scheme on local landscape character is **neutral** adverse.

#### **6.5.5 Visual impact: assessment of effects**

This section provides an assessment of the potential effects of the proposed development.

##### ***Residential receptors and settlements***

The following assessment provides an indication of potential visibility from residential properties only. It is not intended as a Residential Amenity Assessment. Assessments were made from publicly accessible locations and aerial mapping. Given that these were not from private properties or garden areas, it is not possible to ascertain the exact nature or use of a room, nor the value attributed to a view.

Property addresses are based on those indicated on opensource data; accuracy cannot be guaranteed. Distances are approximate and given from the edge of the property (or nearest property for groups) to the site boundary.

##### *Porth Mellon*

Residential receptors along Telegraph Road are orientated with their primary facades facing seaward, although only those located at the southern and elevated end of Telegraph Road have an actual view onto the beach and sea.

Existing sea views will be unaffected by the proposal however temporary disruption during the construction phase might occur with the movement of plant and construction related operations. The effect is considered to be **moderate** adverse during construction and **negligible** during operation.

Properties situated on the Northern side of Porth Mellon, at the foot of Harry's Walls, enjoy direct views over the beach and harbour area. The effect is anticipated to be **moderate** adverse during construction and **slight-moderate** adverse during operation, as the extent of the site only forms a small portion of the overall view.

##### *Porthloo*

Residential receptors in the area have been identified as Porthlow Farm to the North of Porthloo Lane and a row of terraced cottages, including Annet Cottages.

During the construction, views from Porthlow Farm would be affected by temporary disruption, relating to plant and construction related operations. The terraced cottages would be affected by construction operations and establishment of the contractor's compound on the green space immediately opposite. The effect is considered to be **moderate-substantial** adverse in the short term.

Views from both sets of properties would remain unaffected by the proposals during operation and effects would be largely **negligible**.

##### ***Recreational receptors***

##### *Porth Mellon*

##### *Porth Mellon Beach*

The presence of construction operations on the beach will result in restricted access during working hours. There will be an effect during construction from the presence of plant, landing craft deliveries, vehicular traffic and material stockpiling and other associated activities. The



hours of construction will however be limited due to tides and so will the visibility of stockpiled materials. During operation the proposals will represent a medium change from a localised removal of vegetated embankment to a bank of rock armour. Views along the coast are limited and will be affected to a lesser degree and views out to sea will be not be affected. The visual effect is considered to be **moderate** adverse during construction and **slight** adverse during operation.

#### *St Mary's Coastal Path*

The development will be more visible at low tide, although some of the rock armour is likely to be visible at high tide when the sea state is calm. Users will be slow moving through this section of footpath and will experience sequential views of the proposals, most notable when moving from north to south, with views across the beach.

Locally, during operation, the magnitude of change is considered to be low due to variable visibility linked to the tide times as well as the relatively small extent of the route from which views are experienced.

Effects during construction will result from construction access and operations. Overall the effect during construction is **moderate** adverse. The effect during operation is considered to be **slight** adverse although localised to the immediate area.

#### *Hugh Town and Town Beach*

The development area is not visible from Hugh Town and will have no permanent effect during operation. Effects during construction will be limited to the delivery of rock armour by landing craft; however, in the context of a harbour area, this could be classed as negligible and thus effects during construction being **slight** adverse.

#### *Harry's Wall*

Situated on higher ground to the north, offering panoramic views over the proposed site, harbour area, Hugh Town and the open sea. During operation, the magnitude of change would be considered as low due to the small extent of the overall view.

Effects during construction would be as a consequence of construction operations and landing craft deliveries onto the beach and would be **moderate** adverse.

Effects during operation would be limited to a small extent of the overall perception and be **slight** adverse, limited to the immediate area.

#### *Porthloo*

##### *Porthloo Beach*

The presence of construction operations on the beach will result in restricted public access during working hours. There will be an effect during construction from the presence of plant, landing craft deliveries, vehicular traffic and material stockpiling and other associated activities. The hours of construction will, however, be limited due to tides and so will the visibility of stockpiled materials. During operation, the proposals will represent a slight but positive change from removal of ad hoc accumulated rock protection, containing concrete blocks to an engineered rock armour consisting of granite blocks. Additionally, a short extension of timber clad sea wall and dune is proposed to the south of the proposal area. Views along the coast are limited and will be affected to a lesser degree and views out to sea will be not be affected. The visual effect is considered to be **moderate** adverse during construction and **negligible** during operation.

#### *St Mary's Coastal Path*

The development will be more visible at low tide, although some of the rock armour is likely to be visible at high tide. Users will be slow moving through this section of footpath and will

experience sequential views of the proposals whilst traveling in both directions along circa 150m section of the footpath.

Locally, during operation, the magnitude of change is considered to be low due to variable visibility linked to the tide times as well as the relatively small extent of the route from which views are experienced.

Effects during construction will be caused through construction access and operations. Overall, the effect during construction is **moderate** adverse. The effect during operation is **negligible** and localised to the immediate area.

#### *Hugh Town and Town Beach*

With long distance views of the development area visible from Hugh Town, changes to the landscape would be visible, although negligible due to like for like replacement of rock armour and the distance involved. Effects during construction, will be limited to the delivery of rock armour by landing craft and movement of construction machinery; however, in the context of a harbour area, this could be considered a typical activity and thus effects during construction are **slight** adverse. Overall, the effect during operation would be **negligible**.

#### *Porth Hellick*

##### *Porth Hellick Beach*

The presence of construction operations on the beach will result in restricted access during working hours. There will be an effect during construction from the presence of plant, vehicular traffic and material stockpiling and other associated activities. The hours of construction will, however, be limited due to tides. During operation, the proposals will represent an extension of the current dune network and be a negligible change in appearance, blending in over the short-medium term. A more discernible change would be in the formalisation of ramped access onto the beach. Views along the coast are limited and will be affected to a lesser degree and views out to sea will be not be affected. The visual effect is **moderate** adverse during construction and **slight** adverse during operation.

#### *St Mary's Coastal Path*

The development will be more visible from higher ground, although would blend into the existing surroundings over time. Users will be slow moving through this section of footpath as they approach the site from both directions and will experience sequential views of the proposals over a section of circa 0.5km.

Locally, during operation, the magnitude of change is low due to variable visibility as well as the relatively short extent of the route from which views are experienced.

Effects during construction will result from construction access and operations. Overall, the effect during construction is **moderate** adverse. The effect during operation is **negligible** and localised to the immediate area.

#### *South Dunes*

##### *South Dunes Beach*

The presence of construction operations on the beach will result in restricted access during working hours. There will be an effect during construction from the presence of plant, vehicular traffic and material stockpiling on the site of the southern slipway. The hours of construction will, however, be limited due to tidal ranges. During operation the proposals will represent a discernible change in the short-term, blending in over the short-medium term through accumulation of windblown sediment. The proposals are temporary in nature and would form part of a localised trial area for the protection of the South Dunes. Views along the coast are limited to the southern stretch of coastline and will be affected to a lesser degree and views out to sea will be not be affected. The visual effect is considered to be **moderate**

adverse during construction and **slight** adverse during operation in the short term and **negligible** in the medium term.

#### *Tresco Coastal Path*

Long distance views of the proposal are gained from the footpath, although this would be limited due to topography at closer range. Users will be slow moving through this section of footpath and will experience sequential views of the proposals.

Locally, during operation, the magnitude of change is low due to variable visibility as well as the relatively small extent of the route from which views are experienced.

Effects during construction will be influenced by construction access and operations. Overall, the effect during construction is **moderate** adverse. The effect during operation is **slight** adverse and localised to the immediate area.

### **Road and maritime routes**

#### Porth Mellon

##### *Telegraph Road*

Views over Porth Mellon Bay are experienced from higher ground of Telegraph Road, looking in a northern direction. No views of the proposed rock armour are anticipated from the roadside, and thus no effects are experienced during operation. During construction, views of landing craft landings, material stockpiling and construction operations are anticipated from higher ground and have effects would be **slight-moderate** adverse.

##### *The Quay/Ferry Terminal*

Views of the Northern side of Porth Mellon are possible from the Quay; however, with the proposed development taking place on the southern side, views are screened by 'Carn Thomas' headland and thus, will have no effect during operation. Effects during construction, will be limited to the delivery of rock armour by landing craft; however, in the context of a harbour area, this could be classed as a common activity and thus effects during construction being **slight** adverse.

#### Porthloo

##### *Porthloo Lane*

Views of the site are experienced from both sides of Porthloo Lane and within close proximity of the site. Effects will be most noticeable during construction, with material stockpiling, movement of plant and other construction related activities. These would be **slight-moderate** adverse, with effects during operation anticipated to be **negligible**.

##### *The Quay/Ferry Terminal*

Long distance views of the development area are partially visible from the Quay/Ferry Terminal; changes to the landscape would be visible, although negligible due to like for like replacement of rock armour and the distance involved. Effects during construction will be limited to the delivery of rock armour by landing craft and movement of construction machinery; however, in the context of a harbour area, this could be a common activity and thus effects during construction being **slight** adverse. Overall, the effect during operation would be **slight** adverse.

#### Porth Hellick

##### *A3110 'Carn Friars Lane'*

No views into the site are experienced from the roadside due to the localised topography, the roadside walls and vegetation; thus, negligible effects experienced during operation. During

construction, a slight increase of construction related traffic could have a **slight-moderate** adverse effect, although this would be restricted to site deliveries by small flatbed style truck.

### South Dunes

#### *Carn Near Road*

No views of the proposal are anticipated from Carn Near Road; however, effects during construction will be experienced by deliveries and stockpiling of materials near the southern slipway. This area being regularly used to stockpile deliveries onto the island, effects would be **slight** adverse.

#### *Penzance-St Mary's Ferry Route*

It is assumed that long distance views onto the south dunes beach are visible; however, due to the distance and scale of development, that effects resulting from the proposed changes would have a **negligible** effect both during construction and operation.

### 6.5.6 Viewpoints

The impact on receptors at specific viewpoints are summarised in Table 6-6. Full details and descriptions are provided in the LVIA viewpoint analysis in Appendix G.

**Table 6-6: Impacts on all viewpoints**

Name of Viewpoint	Distance and direction from proposed development	Reason	Viewpoint and figure number	
<b>Porth Mellon</b>				
<b>VPA1: Telegraph Road</b>	VP is situated at the foot of the old school site on the eastern side of Telegraph Road. The site is situated 15m north on the other side of the road.	Specific Viewpoint – Views gained by residents, walkers and road users to Telegraph road and St Mary's coastal path.	Viewpoint 1	Impact on landscape character: Moderate adverse during construction, otherwise slight adverse. Impact on views: Moderate adverse during construction, otherwise negligible.
<b>VPB1: St Mary's Coastal Path</b>	VP is situated north of Porth Mellon, 0.2Km north of the site	Representative Viewpoint – representative of views from residences at the foot of Harry's wall battery and walkers along the coastal path.	Viewpoint 2	Impact on landscape character: Moderate adverse during construction, otherwise slight adverse. Impact on views: Moderate adverse during construction, otherwise slight-moderate adverse.
<b>VPC1: Hugh Town Quay</b>	VP situated across the harbor. Site is situated 0.5Km East, but screened by 'Carn Thomas' headland	Representative Viewpoint – representative of views of visitors arriving to the islands via the Ferry terminal. The site is screened by 'Carn	Viewpoint 3	Impact on landscape character: Slight Adverse (During construction only) Impact on views: Slight Adverse (During construction only)
<b>Porthloo</b>				
<b>VPA2: Porthloo Beach</b>	VP is on the slipway, 80 m south of the site.	Representative Viewpoint – View from the beach.	Viewpoint 4	Impact on landscape character: Moderate adverse during construction, otherwise neutral.

				Impact on views: Moderate adverse during construction, otherwise negligible.
<b>VPB2: Annet Cottage, Porthloo Lane</b>	VP situated approx. 40m south east of the site.	Viewpoint – representative of views from residences along Porthloo Lane.	Viewpoint 5	Impact on landscape character: Moderate adverse during construction, otherwise neutral. Impact on views: moderate-substantial during construction, otherwise negligible.
<b>VPC2: Porthlow Farm and chalets, Porthloo Lane</b>	VP situated on higher ground, approx. 70m north of site.	Representative Viewpoint – representative of views gained by walkers along the coastal path on Porthloo Lane and by residents and visitors at Porthlow Farm.	Viewpoint 6	Impact on landscape character: Moderate adverse during construction, otherwise neutral. Impact on views: moderate during construction, otherwise negligible.
<b>VPD2 – Holdgate’s Green</b>	Situated off Lower strand, Hugh Town. Situated 0.8km south west of Porthloo.	Specific viewpoint – Chosen for being a key open space area within Hugh Town. View overlooking harbor and St Mary’s coastline in the background	Viewpoint 7	Impact on landscape character: Moderate adverse during construction, otherwise neutral. Impact on views: slight adverse during construction, otherwise negligible.
<b>Porth Hellick</b>				
<b>VPA3: St Mary’s Coastal path</b>	VP is along footpath within higher ground overlooking Porth Hellick site. Approx. 240m south east of site.	Representative Viewpoint – approaching Porth Hellick from the east on St Mary’s Coastal path. View overlooking bay with Porth Hellick Pool SSSI in the background.	Viewpoint 8	Impact on landscape character: moderate-substantial adverse during construction, otherwise neutral. Impact on views: moderate adverse during construction, otherwise negligible.
<b>VPB3: Access track to Porth Hellick</b>	VP situated along Porth Hellick access track. Approx. 0.18Km east of the site.	Viewpoint – representative of views experienced by walkers using the main access track to Porth Hellick, with Porth Hellick Pool SSSI further North.	Viewpoint 9	Impact on landscape character: moderate-substantial adverse during construction, otherwise neutral. Impact on views: moderate adverse during construction, otherwise negligible.
<b>VPC3: St Mary’s Coastal path</b>	VP situated along Coastal Path, approx. 250 m to the west of the proposal site, overlooking Porth Hellick bay.	Representative Viewpoint – approaching Porth Hellick from the west on St Mary’s Coastal path. View overlooking bay with proposed site further back of the beach.	Viewpoint 10	Impact on landscape character: moderate-substantial adverse during construction, otherwise neutral. Impact on views: moderate adverse during

				construction, otherwise negligible.
<b>VPA4: Tresco coastal path</b>	<b>South Dunes</b>			
	VP situated approx. 250m west of the proposed site, along the coastal path.	Representative Viewpoint – View along the southern coastline of Tresco.	Viewpoint 11	Impact on landscape character: moderate adverse during construction, otherwise neutral. Impact on views: moderate adverse during construction, otherwise slight adverse.
<b>VPB4: Southern Slipway</b>	VP situated approx. 0.8KM south-west of the South Dunes site.	Viewpoint – representative of arrivals arriving on Tresco island via the southern slipway.	Viewpoint 12	Impact on landscape character: moderate adverse during construction, otherwise neutral. Impact on views: moderate adverse during construction, otherwise slight adverse.

## 6.6 Cumulative effects

There are no anticipated cumulative impacts on landscape assets associated with the sea defences and associated works.

## 6.7 Mitigation measures

The most notable adverse effects of the proposals will occur during the construction phase of the project. This would be partly mitigated by careful site and construction planning and by executing the works outside the main tourist periods of May-September.

### ***Porth Mellon***

The proposed rock armour will be visible from locations along the bay, as well as from the beach itself. It will not be appropriate to introduce vegetation to help mitigate these views, as this would be considered more incongruous than the proposed interventions.

The interventions will be consistent with other rock formations on the development site. It is anticipated that over the short to medium term the proposed revetment will assimilate into its surroundings with a reduction in visual effect.

### ***Porthloo***

The proposed rock armour is visible from the roadside, as well as from the beach. The proposed granite rock revetment would be more congruous with its surroundings than the current ad-hoc accumulation of stones, concrete and other building materials. In the short to medium term it will be more noticeable; however, over time it will assimilate into the surroundings through weathering and accumulating windblown sand. The extension of the timber flood wall will be similar in appearance to the existing one, and over time will weather to form one unifying structure in the landscape.

It will not be appropriate to introduce any vegetation to screen these views, as this would be more incongruous than the development itself.

### ***Porth Hellick***

The proposed extension of the dune will be visible from within the bay area and beach itself. Consisting a similar type of crushed granite to the existing dune, and together with the

proposed planting to match the existing vegetation, it is anticipated that this extension would blend seamlessly into its surrounding within the short to medium term.

The construction of the access ramp to the beach will have a localised footprint; however, this will weather with time and is typical of a maritime feature.

### ***South Dunes***

It is the intention that the proposed rock rolls placed at the foot of the existing dunes and the placement and burying of protective geotextile over the embankment will, with time, allow for windblown sediment to accumulate, and as such, further bury the embankment protection. The proposals are part of trial area and it is currently envisaged to have a limited lifespan of 5-10 years.

## **6.8 Residual effects**

Although no mitigation measures are possible for the works associated with the sea defences, it can be stated that none of the effects on the landscape or visual amenity are considered to be significant.

The proposed sea defences will weather over time into their marine environment and blend further into the landscape of the Isles of Scilly.

## 7 Historic environment

### 7.1 Introduction

This chapter sets out the heritage significance of the proposed development areas (PDA) and assess the impact that the proposed works would have on that significance. The assessment is in line with Paragraph 189 of the NPPF which states:

*'In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance.'*

The significance of a heritage asset is defined as:

*'The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance.'* (NPPF Glossary).

### 7.2 Legislative and planning policy context

The assessment aims to address the requirements of relevant legal frameworks and planning policy pertinent to the site and its proposed development. The following apply:

- Ancient Monuments and Archaeological Areas Act, 1979;
- Town and Country Planning (Listed Buildings and Conservation Areas) Act, 1990;
- National Planning Policy Framework (NPPF) 2018; and
- The Isles of Scilly Local Plan 2005.

#### 7.2.1 Ancient Monuments and Archaeological Areas Act 1979

The Ancient Monuments and Archaeological Areas Act 1979 provides statutory protection for archaeological sites and historic structures of national importance. The Act states that any works affecting a scheduled monument require permission from the Secretary of State in the form of scheduled monument consent.

#### 7.2.2 Planning (Listed Buildings and Conservation Area) Act 1979

The Planning (Listed Building and Conservation Areas) Act 1990 provides statutory protection for build heritage. In considering whether to grant planning permission for a development that affects a Listed Building or its setting, Sections 16 and 66 of the Act require authorities to have special regards to the desirability of preserving the Listed Building or its setting or any features of special architectural or historic interest that it possesses.

The whole of the Isles of Scilly was designated a Conservation Area 1975. It is the duty of the Council to preserve and enhance the character of the Conservation Area and to protect features of special architectural or historic interest. Responsibility for conservation lies with the Planning Department of the Council of the Isles of Scilly.

#### 7.2.3 National Planning Policy Framework (2018)

The NPPF set out the Government's planning policies for England and how these are expected to be applied. At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The purpose of the planning system is to encourage sustainable development that contribute to protecting the built, natural and historic environment, and contributes to the overall quality of people's lives and community cohesion.



To this end, economic, social and environmental gains should be sought jointly and simultaneously through the planning system.

#### **7.2.4 The Isles of Scilly Local Plan – A 2020 Vision (2005)**

The Local Plan states that the following core policy is to be applied to all proposals.

##### ***Policy 1 Environmental Protection (extracts)***

To ensure that all relevant future development proposals respect and protect the recognised quality of the islands' natural, archaeological, historic and built environment, they will be permitted only where, as applicable, they:

- (a) Conserve or enhance the natural beauty, wildlife and cultural heritage of the Area of Outstanding Natural Beauty and protect the unspoilt character and good appearance of the Heritage Coast;
- (b) Preserve nationally important archaeological remains and their settings;
- (c) Preserve or enhance the character or appearance of the Conservation Area and preserve the architectural or historic interest of all listed buildings, including their features and settings
- (f) Secure the future character, appearance and setting of any Parks and Gardens of Special Historic Interest included in the English Heritage Register

The Local Plan for 2015-2030 is currently in its final draft.

##### ***Guidance***

The assessment has also been undertaken with reference and regard to the following guidance documents:

- National Planning Practice Guidance (NPPG): Conserving and Enhancing the Historic Environment (2014).
- Historic England (2015a) Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision-Taking in the Historic Environment;
- Historic England (2015b) Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets;
- English Heritage (2008a) Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment;
- English Heritage (2011) Seeing the History in the View: A Method for Assessing Heritage Significance with Views; and
- Historic England (2017) Historic Environment Good Practice Advice in Planning: 3 (2<sup>nd</sup> Edition)

### **7.3 Baseline conditions**

A baseline assessment identified evidence for potential archaeological remains and heritage assets close to and/or within the individual PDAs and that these works would be visible from a number of designated heritage assets and may, therefore, potentially impact upon their settings.

A study area of 250m radius of each of the development sites has been examined to assess the nature of the surrounding heritage sites and to place the recorded sites within their context.

This study has taken into consideration the historical and archaeological background of the PDA. The sources consulted were:

- Cornwall Historic Environment Record (HER);
- National Record of the Historic Environment (NRHE);

- Historic England and Local Planning Authority for designated sites;
- Aerial photographs;
- Historic mapping including relevant Ordnance Survey Maps (Online); and
- Appropriate documentary sources and archaeological journals;
- Site Visit by the Landscape Architect.

### 7.3.1 Porthloo

#### ***Designated Assets***

There are no designated assets within the limits of the PDA or within the site boundary. Within the study area there are two Scheduled Monuments. These are depicted on Figure 7-3 in Appendix H. The monuments comprise a Civil War battery and breast works on Newford Island (1015667) and a WWII pillbox on the headland to the south of the PDA (1016517).

#### ***Non-Designated Assets***

There are no non-designated assets with the limits of the PDA or site boundary.

Within the study area, there are twelve non-designated assets. These non-designated assets comprise the structural remains of a post medieval house on Newford Island (MCO30878) and post medieval quays extending from the islands north shore (MCO41965 & MCO41966). An early medieval field boundary (MCO41967) identified by aerial photography is located towards the north of the study area.

Two prehistoric flint find spots (MCO31165 & MCO31166) have been found in the intertidal zone of Porthloo beach. An undated socketed stone was found on Newford Island (MCO30879).

The HER also holds a record for a stone broadly dated between the Medieval and post medieval periods that was recovered among rocks (MCO31248) to the north of the study area. The find is generally accepted to be out of context. Of similar provenance is a complete millstone and fragments of two others (MCO31247) also recorded as medieval. The remains of an earthwork (MCO31246) which was initially interpreted as a Civil War earthwork has recently been interpreted as the footings for a house that was never built.

Palaeo-archaeological investigations were undertaken within the study area by Cornwall Council Archaeological Unit as part of the Porthloo boat park improvement scheme in 2014 (CAU 2014) (Event number ECO4734). Two test pits were archaeologically excavated. Test Pit 2 was excavated in the location of the boat park behind the dunes and recorded windblown deposits of sand to depths of 2.3m at which point peat was encountered. It concluded that any buried archaeological remains would be protected by sand to this depth.

Test Pit 1 was located on the beach next to the slipway. This test pit encountered beach sand deposits to a depth of 0.83m followed by 0.37m of peat. Peat was again encountered 1.45m BGL and continued to a depth of 2.8m. Radiocarbon dating determined these deposits started to develop towards the end of the end of the Early Bronze age and the start of the Middle Bronze Age (1260-1030 cal BC).

Three geotechnical test pits were excavated to a depth of 2m along the length of the PDA. The pits recorded archaeologically sterile deposits of sand to a depth of 2m (ARCADIS 2019).

Map regression offers little in the way of further information. The post medieval remains of boundary walls on Newford Island are first depicted on OS Edition maps from 1879-1890. A post-medieval quay is also depicted which extends from the northeast corner of the island. A further quay to its west, has been identified via aerial photographs.

#### ***Significance and Archaeological Potential***

The Scheduled Monuments within the study area are the remains of defensive works that reflect the history and development of fortifications, methods and technology, dating from

the mid-16th to the 20th centuries. These sites, as indicated by their scheduled status, have High importance through their evidential and historical values.

The findspots of prehistoric flint, pottery and stone tools that have been recovered within the intertidal zone are of low heritage value due to a lack of associative context within the surrounding area. As a group these finds contribute towards local research objectives. As they are difficult to provenance, they cannot be used to prove the presence of buried prehistoric archaeology at Porthloo.

These non-designated assets have evidential value that could contribute to local research objectives. The assets poor preservation gives them a Low heritage value and they are of Local importance.

### **7.3.2 Porth Mellon**

#### ***Designated Assets***

There are no designated assets within the limits of the Porth Mellon PDA. Within the wider study area, which covers a minimum of 250m buffer of the PDA, there are two Scheduled Monuments. A post-medieval smugglers cache (1015668) located to the northwest; and a 16th century artillery castle with adjacent prehistoric standing stones that is partially within the study area (1013274).

There are eight Listed Buildings within the study area. These range from residential properties to ecclesiastical structures. All of the Listed Buildings within the study area are Grade II Listed. The closest Listed Building to the PDA is the Church of St Mary (1328823), 155m to the southwest.

The location of all the designated and non-designated heritage assets within the Porth Mellon study area is depicted on Figure 7.2 in Appendix H.

#### ***Non-Designated Assets***

There are no non-designated assets with the limits of the PDA. Records for fourteen non-designated assets within the study area are held by the HER.

In the intertidal zone of Porth Mellon beach, there is a prehistoric landscape which features prehistoric field systems, the stone remnants of hut circles and peat deposits that were identified and recorded in 1995.

Asset MCO31154 comprises prehistoric field boundaries, a possible hut circle and parallel stone walls forming a possible track. Assets MCO31155 and MCO31156 are deposits of intertidal peat that was exposed during a storm in 1992. The deposits were examined by Cornwall County Council Archaeological Unit (CCCAU) in 1992 (Event ECO537). The results of the radiocarbon dates confirmed they began forming in the Late Neolithic period (CCCAU 1996) (Event ECO1842).

A fish bone needle was recovered from the beach in 1970 (MCO31153). There is clear potential for prehistoric remains to survive in areas outside of those already recorded in the intertidal areas, including the site boundary. Early medieval find spots including ceramic sherds (MCO31157 & MCO31606) have also been recorded off the headland at Porthloo.

Most of the non-designated assets identified around the beach at Porth Mellon relate to modern military installations. Structural remains of a WWI seaplane base (MCO31158) are located to the east of the beach and approximately 140m from the PDA in a northeast direction. To the northwest of the PDA a series of WWII pillbox defences (MCO31588, MCO42807, MCO42808 & MCO42813) are located on the cliffs around the headland overlooking St Marys Pool. The last asset located on the headland is MCO30270 which was a lifeboat station built in 1899. It ceased operations in 1981.

As part of pre-development works, Arcadis undertook geotechnical investigations within the PDA in May 2017. Three trial pits were excavated along the length of the proposal. Deposits

of loose sand, and sand/gravel and clay were recorded to depths of between 1.4m and 2.2m below ground level. The test pits did not identify any archaeological features.

The archaeological unit also produced an Archaeological Impact Report for proposed coastal protection scheme works which contained information and conclusions that relate to Porth Mellon (CCCAU 1995). The conclusion identified the potential to negatively impact prehistoric remains in the intertidal zone by construction, which included haulage routes and the delivery of materials along the beach.

### ***Significance and archaeological potential***

The area around Porth Mellon and St Marys Pool has heritage remains that relate to defensive positions dating from the 16th century through to the mid-20th century. The largest defensive structure is the 16th century Harrys Wall at Mount Flagon that overlooks St Marys Pool which is a Scheduled Monument (1013274).

This Scheduled Monument is of High significance and is of National importance. This significance is based upon the evidential and historical values of the remains. The monument is a partially surviving example of some of the earliest defensive structures that were built exclusively for the use of artillery in warfare. It can be attributed to a relatively short time span in English history (HE 2019). The architecture of Harrys Wall is specific in terms of date and function and represents an important stage in the development of defensive structures.

A standing stone is located within the boundary of the scheduled area, located adjacent to the fortification. Standing stones are prehistoric monuments and this example it is suggested dates to a period around the later Neolithic to Early Bronze Age. It is suggested that these megaliths had a ritual function, but may also have acted as markers for routeways, territorial boundaries, graves and meeting points. Standing stones are important for our understanding of land use, cosmology and identity among prehistoric communities.

The Smugglers Cache (1015668) is a Scheduled Monument located above rocks at the north end of the beach. It is a rare surviving example of a concealment storage cave for contraband dating to the 19th century.

Smugglers caches provide one of the few surviving and tangible sources of remains that relate to an activity which demonstrates the interplay of developing trade and law enforcement during the post-medieval period. The smugglers' cache at Porth Mellon is well preserved and, retains clear evidence that relates to its method of construction. It is 5m long and 1m high constructed of stone slabs and with a stone roof and is the largest example on Scilly. It is the only known surviving example located in such close proximity to the main anchorage and centre of population on the islands. It has a High importance for both its evidential and historical value.

The remains of the non-designated sea plane base and the defensive pillbox sites around the Porth Mellon study area have Local importance due to their evidential and historical value.

Prehistoric field systems, hut circles, find spots and palaeoenvironmental remains have been recorded in the intertidal zones of Porth Mellon beach following exposure during storm events in the early 1990's. Remains such as these have the potential to be of Regional importance and provide a finite resource that can aid in the understanding of the prehistoric development of the Scilly Isles. These assets are assessed as having Medium heritage value. There is potential for hitherto unrecorded remains of prehistoric date to survive in areas other than those recorded. These remains would also have Regional importance and would be of Medium value.

The potential for hitherto unknown archaeological remains to be encountered or disturbed in the location of the proposals is considered Low. The potential for prehistoric remain to survive in the intertidal zone within the site boundary is high.

### 7.3.3 Porth Hellick

#### **Designated Assets**

There are no designated assets within the PDA.

Seven Scheduled Monuments fall within the 250m study area. The locations of these Scheduled Monuments are shown on Figure 7.1 in Appendix H.

The closest Scheduled Monument to the development site is a Civil War defensive breastwork (1011942) which extends above the upper shoreline at Dick's Carn overlooking Porth Hellick, approximately 120m southeast of the PDA. A second breastwork and battery position (104242) is located 41m to the southeast of breastwork 1011942.

The southwest extent of Scheduled Monument 1011950 is within the study area. This monument consists of a grouping of prehistoric entrance graves and an ancient field system extending over the northwest of Porth Hellick Down. Due to the rising gradient of the landscape from the shoreline and a ridgeline line on Porth Hellick Down, there are no views to and from the PDA to the monument.

To the west of the bay, a series of Scheduled Monuments occupy elevated positions that overlook the PDA. These monuments comprise; Two Neolithic to Mid-Bronze Age entrance graves and a cairn grouped as Scheduled Monument 1011936 located at the southern limit of the study area; a scheduled WWII pillbox (1016516) located above the west curve of the bay to the north of Drum Rock; two entrance graves on the northern edge of Salakee Down grouped as Scheduled Monument 1011937; and beyond this, a platform cairn is Scheduled as monument 1011938. There are no listed buildings within the study area.

#### **Non-Designated Assets**

There are two non-designated assets that fall within the limits of the PDA; a grave marker for 'Sir Cloudseley Shovel' (MCO31403) and a putative Bronze Age cairn (MCO31137). The location of these and a further seven non-designated assets located within the study area are depicted on Figure 7.1 in Appendix H.

The location of cairn MCO31137 is identified by the HER to the immediate north of the grave marker. The HER details for this monument state are labelled 'Kistvaen (tomb/burial chamber)' on the OS 1908 Edition map. A review of the 1908 map does not show such a monument in this location. A site visit also failed to identify the monument in this location. It is suggested that the location of a cairn has been wrongfully identified within the HER and the reference is likely to refer to one of the mortuary monuments upon Porth Hellick Down to the east of the PDA.

To the southeast of the PDA, in the intertidal zone, are the remains of a post medieval stonework jetty (MCO41979). This feature has been recorded via the aerial National Mapping Programme (NMP). Above the line of the bay, are the structural remains of a post medieval building (MCO41981) and slipway (MCO41980).

A single findspot of two prehistoric flints and a spindle was discovered on Porth Hellick beach in the intertidal zone in the late 1970s (MCO31132). Two trackways of undetermined date (most likely early medieval-modern) are also identified within the HER (MCO41982 & MCO41978).

There have been no archaeological investigations within the limits of the Porth Hellick study area.

#### **Significance and archaeological potential**

The Scheduled Monuments around the Porth Hellick study represent two distinct characteristics of the island's heritage: firstly the early settlement of the land and the introduction of monumental funerary architecture during the Late Neolithic to Middle Bronze

Age; and secondly, the development of the Isles of Scilly as a strategic fortified military position between the 16th - 20th centuries.

The most prevalent funerary monuments around the coastal area of Porth Hellick are identified as entrance graves. This style of mortuary monument comprises a circular mound of heaped rubble and earth. Set within this was a rectangular stone chamber, capped with stone slabs and accessible by a passage in the mound. Excavations in entrance graves have revealed cremated human bone and funerary urns.

Historic England state that the national distribution of entrance graves is heavily weighted towards the Isles of Scilly which contain 79 of the 93 surviving examples recorded nationally, the remaining 14 being located in Western Cornwall (HE 2019).

These funerary monuments have considerable evidential value relating to prehistoric funerary practice and can contribute to research objective in this area. The rarity of these monuments within a national context and their designation mean they are considered to be of High value.

Two scheduled areas which contain Civil War breastworks, located above the east shoreline of Porth Hellick bay, form part of a range of defensive earthworks and battery positions, built between 1642 and 1651 along the coastal areas to repel seaborne attack. The Porth Hellick breastworks are turf covered earth and rubble banks, approximately 2m in width and 1m in height, with remnants of a ditch on the landward side. The defence 1011942 extends 50m along the cliff top. The section to the southeast (1014242) continues the defensive line around the mouth of the bay, culminating in the earthwork remains of a coastal gun battery.

There is a single, WWII defensive position overlooking Porth Hellick above the upper shoreline at the northwest corner of the bay (1016516). This is the only modern defensive position covering this bay and forms part of a wider system of anti-invasion defences erected on Scilly between January and April 1941 by 14th Battalion of the Royal Fusiliers stationed on the islands.

The value of the Civil War and WWII defensive positions is high. This value is determined through the considerable evidential values that the surviving structures and earthworks provide as physical remains of these monument forms and the historical values that they retain through their associations with major historical events.

The significance of the two post-medieval, non-designated, slipway and building assets (MCO41980 and MC041981) located on an elevated position along the eastern shoreline is Low. They have some limited evidential value.

The grave marker, which is said to mark the temporary grave site of Admiral of the Fleet Sir Cloudesley Shovell prior to his reburial at Westminster Abbey, retains a level of significance through its historical association with the Admiral, his part in the War of Spanish Succession and the Scilly naval disaster of 1707, in which the Admiral lost his life. The marker has a Low to Medium significance; however, its contextual associations have been removed and the marker has limited potential to inform further research objectives. The grave site is annotated on the Edition OS map of 1890.

The site boundary, which curves west to east around the beach does not include any other known heritage assets other than the grave marker.

#### **7.3.4 South Beach**

##### ***Designated Assets***

There are no designated heritage assets within the limits of the PDA. There are five Scheduled Monuments close to the study area. These include Crabs Ledge (1016422) in the intertidal area, Southern Pentle Bay (1017782) located to the northeast and at Bathinghouse Porth (1016423) which is split into two areas. The larger area is located to the southwest of the study area, with a smaller area located 135m to the northeast. These areas, which contain remains of prehistoric field systems and settlement are designated because they are

nationally important examples with considerable evidential potential to yield information about prehistoric settlement, land use and economy.

The proposed delivery route will see materials delivered via sea. The haulage route will pass close to Scheduled Monument 1016180 which contains a prehistoric field system and settlement and, Scheduled Monument 1016181 which is the location of Oliver's Battery of mid-17th century date.

The southern tip of Grade I Listed Tresco Abbey Registered Park and Garden (1000427) falls within the northwest limit of the study area. Tresco Abbey gardens are a mid-19th century designed landscaped which comprises woodland and ornamental pleasure gardens covering an area of 30ha.

### ***Non-Designated Assets***

Three non-designated assets are recorded to the east of the study area. Asset MCO41948 is a section of a track that runs perpendicular to an existing track and is broadly dated to a period between the early-medieval and post-medieval period. A long, thin, three-sided enclosure initially detected by aerial photography is present to the west of the site boundary. No further information relating to its function is present and the asset is broadly dated to the early-medieval to modern period. No further information is available, and the site has unknown evidential value. At Bathinghouse Porth are the remains of a stone working site (MCO30180). The site comprises boulders that have been split by drilling and is of post-medieval. The slipway used to offload materials delivered by sea is a non-designated asset (MCO41930).

There are two non-designated assets (MCO31243 and MCO31242) that are located within Scheduled Monument 1016422. The assets comprise post-medieval walls and the remains of a building and are included in the scheduled area within 1016422. The collective value of the Scheduled Monument is High, and the monument as a whole has National importance.

### ***Significance and archaeological potential***

The two Scheduled Monuments at Crabs Ledge (1016422) and Bathing house Porth (1016423), contain the remains of prehistoric field systems and hut circles. Many of these assets have been identified in the intertidal zones via aerial survey. These assets may have the potential to contribute to national research objectives regarding the development and management of early farming landscapes through their evidential value. All Scheduled Monuments through their designation are considered to have High value, particularly Evidential value and are of National significance. The significance of the three-sided enclosure is difficult to determine as no further information is available. The remaining non-designated sites have Low heritage value.

## **7.4 Assessment methodology and assessment criteria**

An assessment of effects has been carried out through the consideration of baseline conditions and relation to the elements of the scheme that could cause impacts on cultural heritage. Baseline conditions are defined as the existing environmental conditions and in applicable cases, the conditions that would develop in the future without the scheme.

The assessment of effects has been carried out in accordance with the methodology outlined in Chapter 3, however it is modified to include a 'negligible' and 'very high' receptor sensitivity. No standard method of evaluation and assessment is provided for the assessment of significance of effects upon cultural heritage, therefore a set of evaluation and assessment criteria have been developed using a combination of the Secretary of State's criteria for Scheduling Monuments (Scheduled Monument Statement), Design Manual for Roads and Bridges (DMRB), Volume 11, Part 3, Section 2, HA 208/07. Professional judgement is used in conjunction with these criteria to undertake the assessment of effects.

### 7.4.1 Assumptions and Limitations

This assessment comprises a desk-based review of information derived from the Cornwall Historic Environment Record (HER), Historic England and other published and unpublished sources. Whilst assumed to be accurate, this information is not a complete record of the historic environment and does not preclude the potential for the presence of unrecorded heritage assets, including below ground remains of archaeological interest, within the application boundary.

The undertaken site visit which provided a photographic record for the compilation and assessment of the baseline was undertaken by a JBA Landscape Architect. Heritage specialists did not attend the site. Effects on the setting and character of the detailed heritage assets have been reached from the sources consulted and the record provided by the site visit.

There are no other apparent limitations, beyond the inherent uncertainty of the accuracy of archaeological records from antiquarian periods.

### 7.4.2 Assessment of significance and impact

The importance of heritage and archaeological remains is assessed against the criteria set out in this section.

The criteria for assessing the significance of heritage values is established through Historic England’s Conservation Principles, Policies and Guidance (2008) according to the four key value themes (evidential, historical, aesthetic and communal). Table 7-1 outlines the values.

**Table 7-1: Inter-related heritage values**

Value	Description
<b>Evidential value</b>	The potential capacity of an asset to yield primary evidence about past human activity (including potential archaeological remains)
<b>Historic value</b>	The potential capacity of an asset to form a connection between the present and the past through association with people, events and aspects of life
<b>Aesthetic value</b>	The potential for people to derive sensory and intellectual stimulation from a place, through design, art, character and setting
<b>Communal value</b>	The potential for people to relate to a site in terms of a collective experience of memory (often closely related to historical and aesthetical values)

The criteria for establishing the importance of heritage assets and archaeological remains are detailed in Table 7-2 below. This is based on the criteria set out in the DMRB cultural heritage guidance.

**Table 7-2: Criteria for establishing the importance of archaeological remains**

Value	Description
<b>Very High</b>	World Heritage Sites (including nominated sites). Assets of acknowledged international importance. Assets that contribute significantly to acknowledged international research objectives.
<b>High</b>	Scheduled Ancient Monuments (including proposed sites). Undesignated assets of schedulable quality and importance. Upper tier Archaeological Priority Areas, where used by LPA. Assets that can contribute significantly to acknowledged national research objectives.
<b>Medium</b>	Designated or undesignated assets that contribute to regional research objectives. Remaining tier Archaeological Priority Areas, where used by LPA.
<b>Low</b>	Designated and undesignated assets of local importance. Assets compromised by poor preservation/survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives.
<b>Negligible</b>	Assets with very little or no surviving archaeological interest.
<b>Unknown</b>	The importance of the resource has not been ascertained.



The impact of development upon the significance of a heritage asset may be adverse or beneficial. 'Impact' refers to a predicted change to the baseline environment arising from either the construction or operation of the scheme. Impacts can be both negative or positive, and reversible or irreversible. Table 7-3 below sets out the criteria adopted for this assessment and is based on the criteria set out in the DMRB cultural heritage guidance.

**Table 7-3: Criteria for establishing the magnitude of an impact**

Value	Description
Major Change	Change to most or all key/fundamental archaeological materials, such that the resource is totally altered. Where adverse, this would equate to destroyed or left completely illegible. Comprehensive changes to setting.
Moderate	Changes to many key archaeological materials, such that the resource is clearly modified, if adverse, it would be substantial harm or loss of legibility. Considerable changes to setting that affect the character of the asset.
Minor	Changes to key archaeological materials, such that the asset is slightly altered. In terms of adverse impact. This would be minor or less than substantial harm or loss to the asset or slight loss of legibility. Slight changes to setting.
Negligible	Very minor changes to archaeological materials or setting.
No Change	No change to fabric or setting of historic building.

The significance of the effect of the proposals on heritage assets is determined by the interaction of receptor value/sensitivity and impact magnitude. Effects can be positive (i.e. enhance the heritage asset) or negative (i.e. detrimental to the resource). Table 7-4 below sets out the criteria adopted for this assessment and is based on the criteria set out in the DMRB cultural heritage guidance.

**Table 7-4: Heritage Assets – Significance of effects matrix**

		Magnitude of Impact				
		No Change	Negligible	Minor	Moderate	Major
Value Sensitivity	Very High	Neutral	Minor	Moderate / Substantial	Substantial	Substantial
	High	Neutral	Minor	Minor / Moderate	Moderate / Substantial	Substantial
	Medium	Neutral	Negligible	Minor	Moderate	Moderate / Substantial
	Low	Neutral	Negligible	Negligible	Minor	Minor / Moderate
	Negligible	Neutral	Neutral	Negligible	Negligible	Minor

## 7.5 Potential impacts and significant effects

### 7.5.1 Porthloo

There will be no direct impacts upon any identified heritage assets within the PDA or wider study area.

The setting of the coastal defensive Scheduled Monuments at Porthloo provide long views out towards St Marys Pool. The PDA makes no contribution to this setting due to vegetation screening and therefore no contribution to the significance of the assets. The development therefore has no impact on the setting or significance.

The construction of the proposed revetment will require intrusive groundwork to a depth of approximately 2.5m BGL. Although there is potential for relict buried landscapes within the

site boundary area, the three geotechnical test pits targeting the line of the new defensive works did not record any buried remains or relict landscapes within the PDA. The potential to impact any hitherto unknown archaeological remains or relict landscapes within the PDA is therefore considered Low.

The required materials will be transported to site by landing craft and offloaded at high tide before being transported by excavator to a storage area and the PDA. There are no known heritage assets that will be impacted upon by this methodology.

Although peat deposits have been recorded in a single test pit at Porthloo, this is outside the PDA. Based on the evidence, which suggests that deposits of sand will be present, there is low potential for any hitherto unknown archaeological remains to be impacted using this method of delivery.

### 7.5.2 Porth Mellon

There will be no direct impacts on any designated heritage assets within the PDA or the wider study area. The outlined proposals have the potential to directly impact upon non-designated prehistoric remains within the intertidal zone or have the potential to impact remains of similar nature that may survive in the intertidal zone. No heritage assets listed on the HER fall within the current site boundary (Figure 7.2 in Appendix H).

The current proposal will allow for revetment rock armour to be delivered to the foreshore by landing craft and offloaded at high tide. When sea levels subside, the construction material will be loaded into dumpers by an excavator and taken to the PDA. The proposed offloading area is in the intertidal zone which contains remains of prehistoric field systems, material culture and hut circles (MCO31153-MCO31156). The mode of delivery and supply on Porth Mellon Beach has the potential to damage archaeological remains. The magnitude of this change has the potential to result in a **moderate negative impact**. Impacted remains could be of regional potential. Any change would be permanent.

The majority of the non-designated assets within the intertidal zone are concentrated towards the north and eastern sections of the beach. There are several heritage assets within the study area that have views towards the PDA most notably these are the Scheduled Monuments 1015668 and 1013274 and WWII pillbox remains in their elevated positions located on higher ground on the headland to the west. During the construction works there will be a change in the visual setting and intervisibility of these assets, less so the Smugglers Cache (1015668) due to its subterranean properties. The visibility of construction traffic, site compounds will have a **temporary minor negative impact** on settings on views from to and from Scheduled Monuments and non-designated assets.

Therefore, the significance of effect of the development upon the heritage assets during the construction phase will be Minor negative to the Scheduled Monuments and negligible to the non-designated asset sites. There are no views of the PDA from any of the Listed Buildings within the study area. There will therefore be no change to their individual and group setting or character by the proposals.

The proposed revetment will be constructed at the southwest corner of the beach and tie in with the existing rock face to the west. The construction of the foundations will require excavation in this area of approximately 3.5m of material to formation level. Excavation will become shallower on a one in three gradient. The potential for encountering archaeological remains during this excavation, based on the results of the Arcadis test pitting suggests that the disturbance of any archaeological deposits or remains during the excavation of foundations is considered Low.

### 7.5.3 Porth Hellick

There will be no direct impacts on any designated assets within the PDA by the proposed dune extension and reprofiling works at the northeast corner of the beach. The current proposal

would require the removal and re-siting of the non-designated grave marker of Sir Cloudeley Shovell (MCO031403). This movement would constitute a **major negative impact** on the setting leading to a substantial significance of effect on the asset and its setting. The sympathetic re-siting of the monument in the former location, albeit on the reprofiled dunes, will help to minimise the impact and help retain its historical connection and the evidential value of the asset.

As the provenance of cairn MC031137 is in doubt and cannot be located, the assessment concludes there is **no impact** upon this designation.

There are open views of the PDA from Scheduled monuments, and heritage assets along the east and west upper shorelines of the cove. During construction, the proposed works, associated plant and welfare compounds are considered to have a Minor adverse significance of effect on the setting Scheduled Monuments and a neutral significance of effect on non-designated heritage assets. This effect will be temporary.

Materials for the construction of the defensive dune will be unloaded from a landing craft at Porthloo and driven by truck to Porth Hellick. Two access proposals have been suggested for materials delivery and plant access to the work site and both are currently used as access for farm vehicles and fishermen. One route is located to the east and is along a trackway from Carn Friars Lane which falls within the boundary of the Scheduled Monument 1011950. There is some screening by trees which restricts views to the Porth Hellick Down burial chamber. The trackway already provides vehicle access to the beach, however its suitability to accommodate construction traffic is dependent upon the ground surface conditions and size and weight of the vehicles.

Any disturbance to the trackway or deviation from the trackway could result in a negative effect on the Scheduled Monument and has the potential to impact unidentified archaeological remains. The Scheduled Monument (1011950) has High value and any Minor negative magnitude of impact would be assessed as Minor to Moderate adverse significance of effect depending on which element of the Scheduled Monument it would affect.

The second route to the site also uses an existing trackway which is between fields and is bordered by shrubs and tree cover. Use of this route will not cause any impact to heritage assets and is the preferred route from a heritage perspective and avoids any interface with the scheduled area of Carn Friars.

The proposed work to construct the defensive dune will not require any intrusive groundworks as new materials will be placed over the existing line of dunes.

#### **7.5.4 South Dunes**

Access to the PDA will be via a trackway off Carn Near Road and will pass along the foreshore. The proposed development will also see materials delivered via sea and offloaded using a slipway which is a non-designated asset (MCO41930). The haulage route will pass close to Scheduled Monument 1016180 which contains a prehistoric field system and settlement and, Scheduled Monument 1016181 which is the location of Oliver's Battery of mid-17th century date. The haulage route is not within either scheduled areas. There will be some negative visual impacts on the settings of these monuments during haulage operations. However, these impacts will be Minor and temporary. The track from the slipway is approximately 4m wide. Provided construction related traffic remains on the track, there will be **no physical impact** on any of the heritage assets.

During the construction phase, work within the PDA and movement of vehicles and materials to the site will result in a negative temporary change in the visual setting of the scheduled areas. This change constitutes a **temporary minor negative impact**.

The site boundary, which stretches east to west across part of the beach does not include any designated or non-designated assets within the site boundary. There are no views of the PDA

from within the limits of the Tresco Abbey Parks and Gardens. There will be no change to the character or setting of this designated asset.

Three trial pits were excavated along the beach front by Arcadis in June 2017 (ARCADIS 2017). The test pits identified loose sands at depths between 1.6 and 3.7m BGL. Although prehistoric remains do survive on South Beach at Tresco, the test pit results suggest these buried landscapes may be restricted to the scheduled area. The test pits did not encounter any buried landscape and there is Low potential for the proposals to impact upon any unidentified buried archaeological remains.

The potential for **direct negative impacts** that would arise from the excavations for construction of the rock-roll sea defence on any hitherto unknown archaeology is Low.

## 7.6 Cumulative effects

There are no cumulative effects anticipated from any of the proposals.

## 7.7 Mitigation measures

### 7.7.1 Porthloo

There are no impacts from the construction of the defences that require mitigation. Deposits of peat do survive within the site boundary. However, the results from test pitting indicate these are not present in the area to be impacted by excavation. It is unlikely a watching brief maintained during deliveries by landing craft and plant movement will record any relict landscape or archaeological remains within the intertidal zone; however, consultation with the Planning Archaeologists for Cornwall County Council is recommended to confirm this.

### 7.7.2 Porth Mellon

The delivery of materials within the site boundary will cause a **moderate negative impact** upon prehistoric intertidal remains. The impact on remains diminishes the further up the beach materials are delivered due to increasing sand cover.

To help negate the potential negative impacts during the offloading and movement of materials and plant, consideration should be given to relocating the offloading area to the south where there are no identified heritage assets present on the HER. Offloading as close as possible to the PDA would also help lessen the impact. Delivery by road, if possible, would not impact any heritage assets.

Micrositing the site boundary away from known heritage assets to the southwest would protect the known assets. However, the potential impact on buried archaeological deposits from plant movement and associated construction activity remains.

Mitigation proposals such as a watching brief could be considered to monitor the impact of the delivery materials in the intertidal area. Proposals such as 'bog matting' may be considered, although any proposal would need to consider environmental impacts such as accretion and erosion of surrounding deposits. Delivery by road would not impact any remains. It is recommended that consultation with the Planning Archaeologist for Cornwall County Council is undertaken to confirm any mitigation requirements.

### 7.7.3 Porth Hellick

The grave marker MCO31403 will be directly impacted by the proposals, which would require the asset to be moved and re-sited. This movement would constitute a **major negative impact** on the setting leading to a substantial significance of impact on the asset and its setting. This impact will be minimised by the proposal to relocate the asset in its former location once the defences have been constructed. It is recommended the asset is recorded by field survey and a photographic record completed. A watching brief should be implemented during its removal to document the process and provide an opportunity to examine the asset and its footprint more closely. The final decision on any mitigation proposals rests with the Planning Archaeologist for Cornwall County Council.

If the track through Carn Friars will be used, it is recommended that consultation with Historic England is undertaken to discuss the proposal further. Use of the existing trackway, unaltered, should not require Scheduled Monument Consent. Measures to mitigate any damage or minimise deviation include bog-matting or Heras fencing is likely to require Scheduled Monument Consent. A photographic condition survey should be undertaken before work commences, during operations and after work is completed if this route is used. No mitigation is recommended if the alternative route to the east is used which is the preferred option from a heritage perspective and avoids any interface with scheduled area of Carn Friars.

### 7.7.4 South Dunes

The delivery of materials to the limit of the site boundary via the haulage route will not cause any direct physical impact on any heritage asset, provided vehicles remain on the track and do not deviate from this route. Deviation from the track has the potential to physically impact Scheduled Monuments 1016180 and 1016181. Other schedule areas include 1016422 which although are located outside the site boundary are in close proximity. The inclusion of a toolbox talk given to all operatives would help minimise any impact on heritage assets. The development should also consider the erection of temporary fencing, such as Netlon, to create a visible buffer for construction traffic and personnel. Any posts or pins would need to be positioned outside scheduled areas. The concrete slipway onto the beach should not be used as this will have the potential to impact the scheduled area on the intertidal zone.

A photographic condition survey should be initiated before the start of the project and maintained until construction at South Dunes is complete. The final decision on any mitigation proposals rests with the Planning Archaeologist for Cornwall County Council.

## 7.8 Residual effects

There are no anticipated residual impacts on designated heritage assets associated with the construction of sea defences and associated works across at Porthloo.

Removal of Sir Cloudesley Shovell grave marker (MCO31403) at Porth Hellick will have a **permanent, negative impact**. The sympathetic re-siting of the monument will help to offset this impact.

The implementation of archaeological monitoring within the intertidal zone at Porth Mellon has the potential to excavate and record archaeological remains if they are encountered. This will have a negative effect but would mitigate by preservation by record.

## 8 Land use, tourism and public amenity

### 8.1 Introduction

This chapter assesses the potential for the proposed coastal defence developments to result in likely significant effects on the local tourism industry, public amenity and land use.

### 8.2 Baseline conditions

#### 8.2.1 Land Use

Where humans have influenced the land use on inhabited islands in the Isles of Scilly, it is predominantly for agricultural purposes. There are smaller areas of urban/residential land, predominantly on St Mary's. Hugh Town on St Mary's forms the principal settlement on the islands, with other settlements on St Mary's consisting of small hamlets and isolated settlements. New Grimsby harbour on Tresco contains granite cottages, linking the largest settlements on the island<sup>31</sup>. In total, 86% of all residents of the Isles of Scilly live on either St Mary's or Tresco.

The Coastal Community Typology Report (2011) categorises the Isles of Scilly as a category A3 coastal community – Rural Chic. These areas are predominantly rural, with sparse populations in small settlements. Rural Chic areas are generally more prosperous, with low proportions of people receiving benefits relating to worklessness and poor health and a population with high levels of skilled workers. This offers some benchmarks against which to analyse the situation and trends relating to the Isles of Scilly, including local economic factors, issues for vulnerable groups and change factors.

#### ***Porth Mellon***

Around the Porth Mellon site, the Hugh Town urban area is present immediately to the south, and a small area of industrial land is adjacent to the south east. To the east of the site is a patchwork of agricultural fields and bulb strips.

#### ***Porthloo***

The area of land immediately east of the Porthloo site is a patchwork of agricultural fields and bulb strips, alongside the small settlement of Porthloo. To the north and south are rock escarpments, which are underwater at high tide.

#### ***Porth Hellick***

The area surrounding the bay at Porth Hellick is a mix of agricultural land to the north and bare heathland closer to the coastline. Approximately 80m inland of Porth Hellick is a freshwater pool, which constitutes the primary freshwater source on St Mary's.

#### ***South Dunes***

The site at South Dunes is in a large area of heathland, not utilised by humans for any purpose. There is a large freshwater pool approximately 150m inland. The closest artificial land use is approximately 400m inland, at Tresco Abbey.

#### 8.2.2 Tourism

The economy of the Isles of Scilly is relatively small, has very high levels of small businesses, unemployment is very low (10 individuals in the Isles of Scilly claim Out-Of-Work Benefits,

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<sup>31</sup> Council of the Isles of Scilly – Isles of Scilly Local Plan 2015-2030, Pre-submission Draft Local Plan Document. Published 22<sup>nd</sup> February 2019.

equating to 0.7% of the population, compared to a UK average of 2.7%<sup>32</sup>) and the cost of living is, on average, high. As a result of these factors, the economy of the islands has little space to expand and is very susceptible to patterns in the UK and global economies<sup>31</sup>. It is also dominated by tourism (85% of the Islands' economy is tourism related<sup>33</sup>), which as an industry, is susceptible to movements in the wider economy<sup>34</sup>.

In recent years, the islands' economy has begun to contract, partly due to a steady fall in visitor numbers. This fall is due to the fact that the tourist industry has been reliant on high numbers of return visitors, who are now becoming elderly, and these ex-visitors are not being replaced by younger people, who tend to be better travelled than their older counterparts, having higher expectations which Scilly cannot always meet. The Isles of Scilly hope to reverse this trend and transform the tourism economy on the islands to a year-round industry, rather than an industry that brings in a substantial majority of its income during the summer months<sup>31</sup>.

The Isles of Scilly Tourism Survey 2018 was published in April 2019<sup>35</sup>. It showed that 96% of visitors were UK residents (21% permanently residing in either Devon or Cornwall). 52% of all visitors to the islands were aged 55 or over. A substantial majority (71%) of visitors had holidayed in the Isles of Scilly before, with the average number of previous visits standing at 11<sup>35</sup>.

When asked what inspired them to visit the islands, the most popular answers were Scenery (84%) and Peace & Quiet (76%). Beaches (64%) and Wildlife (52%) were also popular.

Of the resident workforce in the Isles of Scilly, 20% were employed in the accommodation and food services industry, closely linked to tourism. There are also relatively high proportions of people working in Public Administration and Defence (8%) and Transportation and Storage (8%)<sup>32</sup>.

### 8.2.3 Public Amenity

Access across the islands is varied. A network of surfaced roads, tracks and about 200km of paths provide access to most parts of the archipelago. Inter-island boats transport residents and visitors between the islands. Freight boats also operate regularly between the islands, including the Royal Mail delivery boat.

To travel between the Isles of Scilly and the mainland, residents and visitors can either catch the Scillonian ferry between Hugh Town and Penzance, or fly into St Mary's Airport from either Penzance, Newquay or Exeter airports. Porth Hellick is the closest site to the airport, approximately 300m to the north-west. There is also a heliport on Tresco which intends to resume regular scheduled passenger flights in the Spring of 2020.

Hugh Town centre is approximately 500m from the Porth Mellon site. Hugh Town is the main shopping area on the islands and contains several pubs, restaurants and hotels, two banks and a post office. CIOs are also based here.

There are no public rights of way on the Isles of Scilly. There is no publicly owned land on the Isles of Scilly, as, until recently, all freehold on the archipelago was owned by the Duchy of Cornwall. As a result, all walking routes on the Isles of Scilly are 'Permissive footpaths' – footpaths along which the Duchy has permitted public use but holds the ability to withdraw

<sup>32</sup> Nomisweb (2017) – Labour Market Profile for the Isles of Scilly [Online]. Available at: <https://www.nomisweb.co.uk/reports/lmp/la/1946157350/report.aspx>

<sup>33</sup> National Character Area Profile for the Isles of Scilly [Available online] at: <http://publications.naturalengland.org.uk/publication/6566056445345792?category=587130>

<sup>34</sup> Porter *et al* (2012). *Economic resilience and tourism destinations: eco and cultural responses to turbulence contexts in coastal areas*. Journal of Tourism Development. Available online at: <https://estudogeral.sib.uc.pt/bitstream/10316/79778/1/Economic%20resilience%20and%20tourism%20destinations.pdf>

<sup>35</sup> The Islands Partnership (2019) – Isles of Scilly Visitor Survey Final Report

that permission at any time. Nonetheless, walking is a popular pastime on the islands for both tourists and residents.

There are permissive footpaths providing access to all four sites. For Porth Hellick and South Dunes, permissive footpaths are the only method of accessing the area, as they are not served by the public road network.

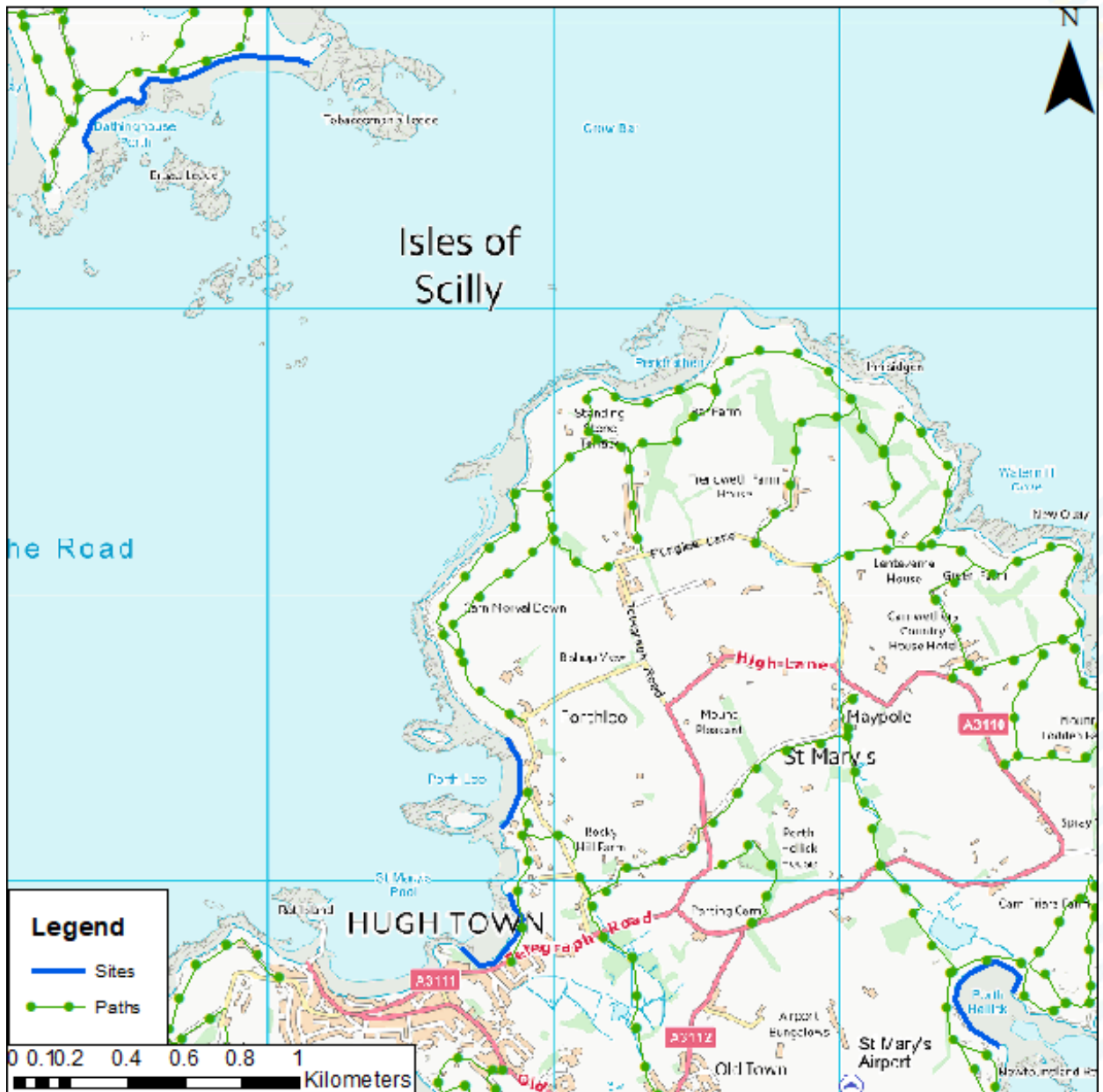


Figure 8-1: Permissive footpaths around the proposed development sites

### 8.2.4 Geodiversity

The Bedrock Geology of the Isles of Scilly comprises the Isles of Scilly Intrusion, a magmatic pluton forming part of the Cornubian Batholith. Formed from silica-rich magma intruded into



the Earth's crust approximately 252 to 359 million years ago in the Permian and Carboniferous Periods, these rocks cooled slowly to create a coarsely crystalline biotite granite<sup>36</sup>.

The exposed location of the archipelago has led to the formation of wave cut platforms around each island. The formation of these relates to wave direction, refraction between the major islands as and waves flowing over the island platforms themselves<sup>37</sup>. These conditions, together with the supply of sediment from the granite cliffs, provides the perfect environment for the formation of coastal tombolos between a number of the islands. The tombolo formations are recognised as being of national importance, particularly in the recognition of the coastal geomorphology association with flooded dune systems<sup>33</sup>.

The geodiversity of the Scilly Isles has given rise to a landscape character comprising sandy, boulder-strewn beaches on the main islands and hundreds of smaller islands. This geodiversity has given rise to unique landscapes upon which tourism in the Isle of Scilly is dependent upon<sup>38</sup>. 84% of respondents to the 2018 Isles of Scilly Tourism Survey stated that scenery was a reason for visiting the islands, which is created in part by its underlying granite geology (Figure 8-2).



**Figure 8-2: Granite cliff along Porthloo beach**

There are five SSSIs on the Isles of Scilly that are designated for their geological interests (Figure 8-3). Most are not within the proximity of the four sites assessed within this EIA; however, Porthloo SSSI does lie adjacent to the proposed scheme at Porthloo. This SSSI is designated for its exposures of quaternary sediments in the cliffs at Porthloo. The sequence of layers in the cliff shows the changes in the climates and environments of the Quaternary Period ranging from storm beaches deposited during the Ipswichian Interglacial through to the Late Devensian loess sheets<sup>39</sup>.

<sup>36</sup> <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

<sup>37</sup> Extracted from the Geological Conservation Review Volume 28: Coastal Geomorphology of Great Britain Chapter 8: Sand spits and tombolos – GCR site reports. <http://www.jncc.gov.uk/page-2731>

<sup>38</sup> Wheeler, P. (2005) Geodiversity Action Plan, Cornwall and the Isles of Scilly

<sup>39</sup> Citation for Porthloo SSSI. [Online] Available at: <https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/2000177.pdf>

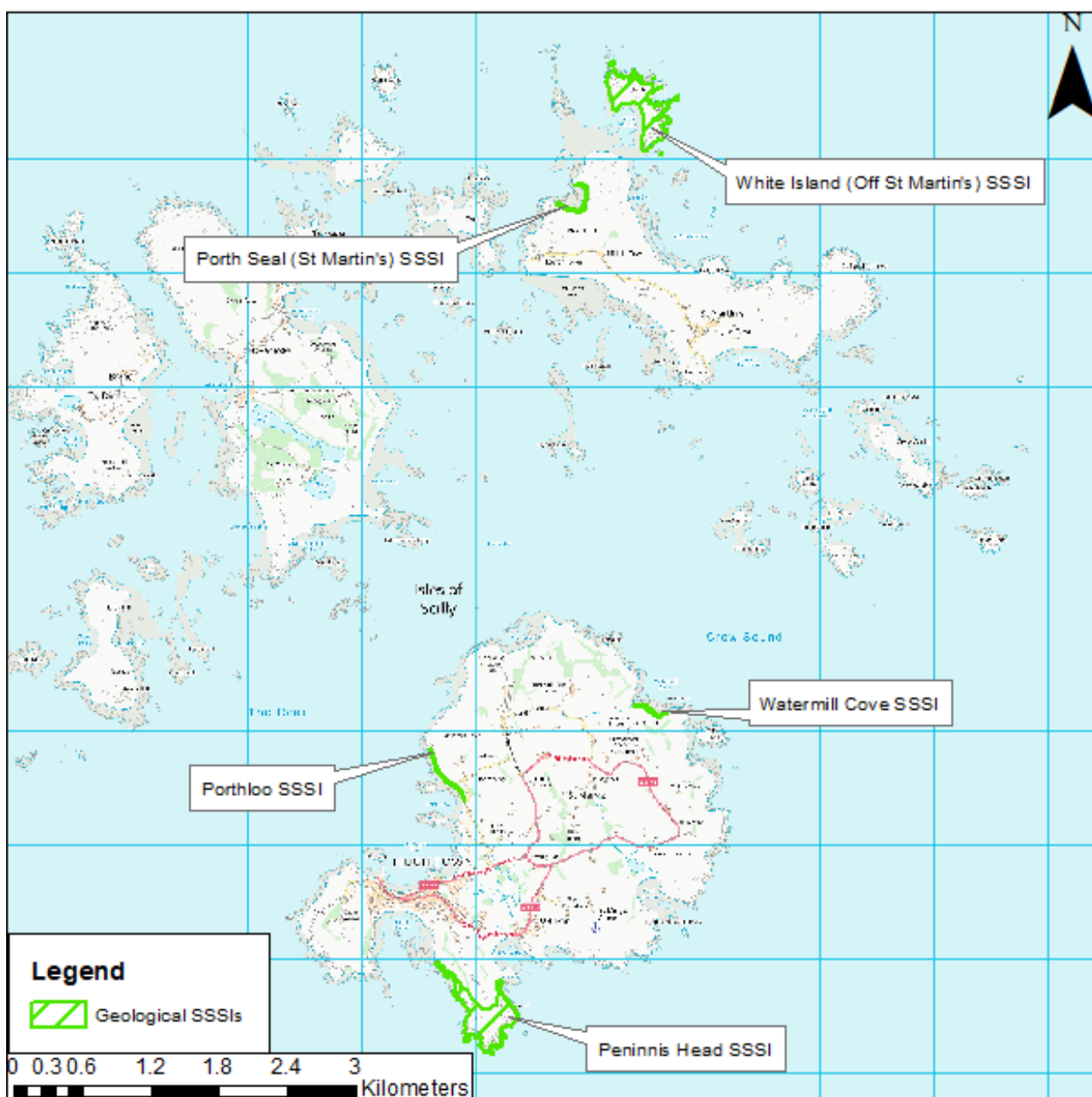


Figure 8-3: SSSIs on the Isles of Scilly, designated, in full or in part, for their geological interest

### 8.3 Assessment methodology and assessment criteria

A social impact assessment has been undertaken to assess the development proposals against the baseline presented. The assessment considers how the physical impacts of the proposed scheme may affect land use, geodiversity, tourism and public amenity.

Impacts have been quantified referencing the impact assessment matrix described in Table 3-4.

The EIA Scoping Response from CIOs stated that potential adverse amenity impacts associated with the development could occur during the construction phase and should be addressed by the ES. For example, impacts related to the amenity afforded by the adjacent footpaths. This will be assessed in Section 8.4.

## 8.4 Potential impacts and significant effects

### 8.4.1 Land Use and access

#### ***Porth Mellon***

The proposed rock revetment would be located in the southern corner of Porth Mellon beach and therefore would result in a change to approximately 0.06ha of beach area. This represents a loss of sand habitat at Porth Mellon equating to approximately 3%; such a loss of sandy beach area is not likely to have a significant impact upon the amenity value of the beach. Operation of the new structure would not affect access to the beach as the existing slipway, to the north of the proposed defence, would not be impacted. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

#### ***Porthloo***

The proposed rock revetment at Porthloo would be located on the landward boundary of the beach and would result in the loss of existing sand and rock rubble beach habitat and a small area of coastal grassland between the beach and Porthloo Lane. The area of the proposed revetment amounts to 0.12ha, representing 8.3% of the intertidal area at Porthloo. Some of this area already contains large stones due to the underlying granite geology, and thus addition of a revetment would not represent a substantial change in land use. The main access down to Porthloo beach is from a slipway from the boat park, on the southern end of the beach. Access to the beach will therefore not be significantly impacted by the proposed scheme. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

#### ***Porth Hellick***

The proposed artificial raised dune/bank at Porth Hellick would not represent a significant change in land use at the site, as the wider bay is already backed by an extensive low dune/bank system. The addition of bushes of *Fascicularia bicolor* would join together areas already colonised by this species and as a result would also not represent a significant change in land use. An access track forms part of the designs and therefore access to Porth Hellick beach would not be impacted. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

#### ***South Dunes***

The proposed rock roll defence is anticipated to become submerged with windblown sand over the short to medium term. As a result, it would not result in any change in land use on South Dunes beach. If it is not submerged by windblown sand, it would result in a loss of 164m<sup>2</sup> of sand beach, equating to approximately 0.2%. This is not considered to be a significant land use change. There are numerous access points down to the beach at South Dunes and as a result access to the beach would not be impacted. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

### 8.4.2 Tourism

According to the 2018 Scilly Visitors Survey, 84% of visitors to the islands cite scenery as a reason for visiting, 76% cite peace and quiet and 64% cite beaches. As all these could be compromised by the construction stages of the four schemes, there could be small, localised impacts on tourism at the four sites.

The tourist industry on the Isles of Scilly experiences a great deal of repeat business, with 71% of respondents of the 2018 tourist survey saying they had visited before, and the average number of previous visits standing at 11. This shows a degree of loyalty to the Isles of Scilly, meaning visitors could be less likely to be discouraged from visiting again, due to temporary construction work on the Isles of Scilly.

### ***Porth Mellon***

During construction, access to approximately 25% of the beach may be restricted; as a result, Porth Mellon beach may experience a reduction of visitors during the construction period. However, given the availability of other beaches in close proximity to Porth Mellon (Hugh Town beach and Thomas' Porth are both less than 200m from the site), it is likely that tourists would visit these areas rather than avoid the wider area altogether. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

There are some businesses local to the proposed site that could see a reduction in footfall and/or interest as a result of the scheme. For example, the Beach Restaurant and Porthmellon Holiday Cottage Isles of Scilly are both within 100m of the proposed scheme and could see a reduction in interest during construction. These impacts could be tempered if the construction period takes place between February and April 2020, as is currently programmed. Nonetheless, impacts on these small businesses may occur during construction. A **temporary slight adverse impact** is assessed to result from the proposals, as by the impact assessment matrix shown in Table 3-4.

### ***Porthloo***

Porthloo could see a reduction in visitors during the construction period. However, given the close proximity to Thomas' Porth beach (less than 200m from the site), it is likely that tourists would visit a different local beach rather than avoiding the area altogether. Given the high level of repeat business in the tourist industry of the Isles of Scilly, visitors who stay in Porthloo may be more likely to stay elsewhere on St Mary's. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

The hamlet of Porthloo contains tourist accommodation, mainly in the form of homes to rent. It is possible that these small businesses could see reductions in income during the construction period, as the serenity and the scenery of the local area would be adversely affected. For example, small businesses largely reliant on tourism in the area include many homes to rent (Newfort House, Glandore Apartments, Annet Cottage) and restaurants and farm shops (Juliet's Garden). These impacts could be lessened by the construction period taking place between February and May 2020, as is currently programmed. Nonetheless, impacts on these small businesses may occur during construction. A **temporary slight adverse impact** is assessed to result from the proposals, as by the impact assessment matrix shown in Table 3-4.

### ***Porth Hellick***

Given its remote location, close proximity to the airport, rocky shoreline and coarse sand<sup>40</sup>, it is thought, in absence of data, that Porth Hellick experiences less tourism interest than beaches on the west coast of St Mary's. As a result, it will likely not experience a significant difference in its tourism levels during the construction phase. Porth Hellick is in a rural area, with no significant settlement or tourism infrastructure within 800m. It is therefore unlikely that any businesses that focus on tourism will experience a decrease in footfall as a result of the scheme. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

### ***South Dunes***

Only 11% of tourists that visit the Isles of Scilly stay on Tresco, and even then, they predominantly stay in the settlements of Old Grimsby and New Grimsby<sup>41</sup>, both approximately 1.5km north of the South Dunes scheme. However, 70% of visitors to the Isles of Scilly visit Tresco during their trip. South Dunes is in a rural area, with no significant settlement within 800m. Tresco also has many other sandy beaches on the east and west coasts. Even if

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<sup>40</sup> <https://www.cornwall-beaches.co.uk/scilly-isles/porth-hellick.htm>

<sup>41</sup> <https://www.tresco.co.uk/staying-on-tresco>

construction of the proposed scheme results in a decrease in visits to the immediate area, it is not anticipated to impact upon the tourism economy on Tresco. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

#### 8.4.3 Public amenity

##### *Porth Mellon*

During construction, reduced access to approximately 25% of the beach, could impact upon public amenity. A **temporary slight impact** on public amenity is therefore likely. The proposed contractor's compound for the scheme is located just off Telegraph Road, within the proximity of a permissive footpath. A **temporary slight impact** could occur with regards to public access to this permissive footpath, if it is affected by construction works, as by the impact assessment matrix shown in Table 3-4.

##### *Porthloo*

Construction of the proposed scheme is likely to restrict access to the northern half of the beach. The proposed construction compound is adjacent to a permissive footpath, which passes between the site compound and the construction site. A **temporary slight negative impact** could occur with regards to public access to the beach and footpath, as by the impact assessment matrix shown in Table 3-4.

##### *Porth Hellick*

The construction site itself will only limit access to the eastern edge of the beach at Porth Hellick. Although there is a permissive footpath close to the construction site and site compound, it is not anticipated that it would need to be closed or diverted as a result of the construction. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

##### *South Dunes*

The construction site itself would limit access to a portion of South Dunes beach. The site compound, where plant and materials would be stored whilst not in use, is adjacent to the concrete slipway where ships dock on Tresco, approximately 700m to the west. Plant would travel between the construction site and site compound, and materials would be transported to the construction site when required from the site compound via tractor and trailer. This would require use of the road network and permissive pathways located along the northern edge of the South Dunes beach and therefore could result in reduced public access to the beach. A **temporary slight impact** is assessed, as by the impact assessment matrix shown in Table 3-4.

#### 8.4.4 Geodiversity

##### *Porth Mellon*

Cornish granite sourced from the mainland would be used for the rock sections of the proposed scheme at Porth Mellon. Whilst this would not be mineralogically identical to granite found on the archipelago, it is in keeping with local geology from a landscape perspective and as a result should not impact adversely on geodiversity. The Porth Mellon scheme is not within the vicinity of any SSSIs designated for geological interest. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4. As a result, **no adverse impact** is assessed to result from the proposals.

##### *Porthloo*

Cornish granite sourced from the mainland would be used for construction of the rock revetment at Porthloo. Whilst this would not be mineralogically identical to granite found on the archipelago, it is in keeping with local geology from a landscape perspective and as a result should not impact adversely on geodiversity.

The proposed scheme is not within the Porthloo SSSI boundary, but the construction footprint extends to its boundary. As a result, the scheme would not impact upon the designating features of the SSSI, namely the exposure of layers of quaternary sediments. It would also not afford any protection to exposures within SSSI. Noting that continual erosion of cliffs within the SSSI maintains their exposure. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4. However, the shallow profile of the rock revetment should dissipate wave energy to a greater extent than the current rock rubble revetment, potentially reducing erosive forces on the adjacent SSSI cliff face. Therefore, **no adverse impact** is assessed to result from the proposals.

### ***Porth Hellick***

The Porth Hellick scheme is in close proximity to Basin Rock and the local rock formation known as 'Camel Rock' (Figure 8-4). Although not designated, this is a well-known geological formation on St Mary's. The scheme at Porth Hellick would introduce a crushed granite fill, sourced from Cornwall. The granite fill would be mineralogically different from sediments naturally derived from the surrounding geology but is in keeping in appearance with the surrounding geology and would become revegetated. Given that the Porth Hellick scheme is not within the vicinity of any SSSIs designated for geological interest. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.



**Figure 8-4: 'Camel Rock' rock formation at Porth Hellick**

### ***South Dunes***

The proposed scheme at South Dunes will use Cornish granite with the proposed rock rolls and is anticipated become entirely covered by windblown sand over time. Whilst this granite

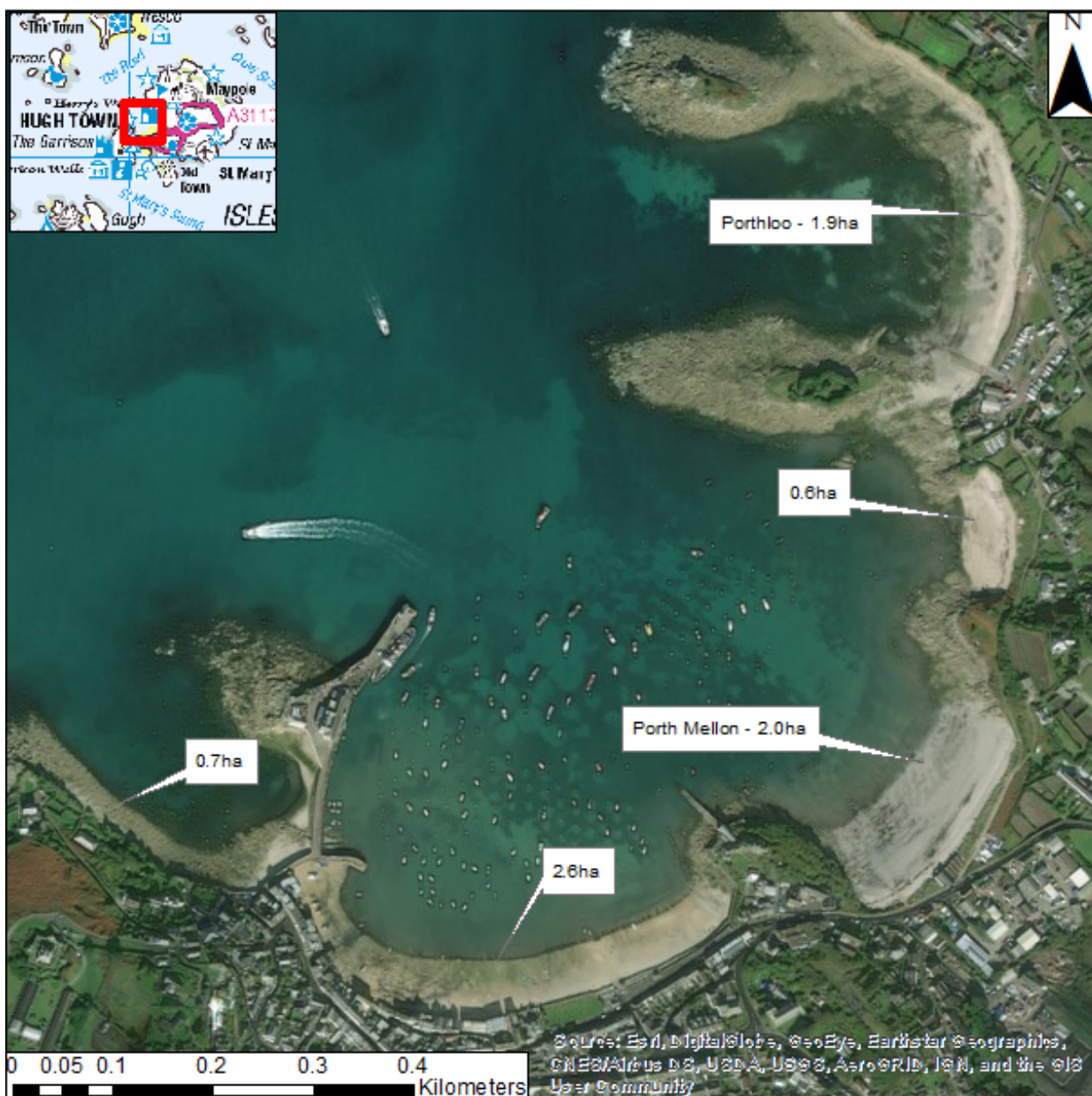
would not be mineralogically identical to granite found on the archipelago, it is in keeping with local geology from a landscape perspective and as a result should not impact adversely on geodiversity. Given that the South Dunes scheme is not within the vicinity of any SSSIs designated for geological interest. As a result, the impact is assessed as being **not significant**, as by the impact assessment matrix shown in Table 3-4.

## 8.5 Cumulative effects

Regarding land use and access, no adverse impacts are envisaged from any of the four schemes in isolation (See section 8.4.1). However, this does not eliminate the potential for cumulative impacts. Given its small scale and location on Tresco, it is not expected that the South Dunes scheme would result in cumulative impacts with any of the other three schemes. However, given the close proximity of the Porth Mellon and Porthloo schemes to one another, cumulative impacts would result in the combined loss of 0.18ha of intertidal sand habitat on the two beaches. Within the wider Hugh Town to Porthloo area, there is currently a total of 7.8ha of intertidal beach area mapped by the Ordnance Survey<sup>42</sup> (Figure 8-5). A loss of 0.18ha in this area would therefore equate to a total loss of 2.3% in this area. A loss of intertidal sand of this magnitude would still be considered **not significant**, as by the impact assessment matrix shown in Table 3-4.

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<sup>42</sup> Measured using 1:25,000 scale Ordnance Survey mapping available on Bing maps (<https://www.bing.com/maps>)



**Figure 8-5: Areas of intertidal sand in wider Hugh Town/Porthloo area**

It is not considered that the four schemes would create a cumulative adverse impact on tourism, for the following reasons:

- A substantial majority of areas and beaches within the Isles of Scilly would not be affected by the works;
- The works are due to take place in the winter and spring of 2020, outside of the main tourist season;
- Repeat visits to the Isles of Scilly from the same tourists is very high, with the average number of repeat visits standing at 11. This suggests visitors have a strong degree of loyalty to the Isles of Scilly that is unlikely to be impacted by four relatively small-scale, short-lived construction periods; and
- Once visitors are on the Isles of Scilly, they typically move around and visit other areas and islands. Other than the island where they had stayed, 79% of respondents visit Treviso, 67% St. Martin's and 66% St Agnes. 21% of visitors visit all five inhabited



islands during their trip<sup>35</sup>. This indicates that visitors would be likely to travel to the Isles of Scilly and avoid the construction work, rather than be deterred from visiting altogether.

It is not considered that predicted impacts on public amenity or geodiversity are of a scale to create cumulative impacts between two or more of the schemes.

## 8.6 Mitigation measures

As there are no formal PRow on the Isles of Scilly and therefore, there is no statutory requirement to divert footpaths during construction. Due to the relatively small-scale of the four schemes, there are currently no plans to close or re-divert the local permissive footpaths. However, in order to maintain the safety of the public, there should be a member of staff on each site at all times to monitor use of the permissive footpaths, either advising members of the public when it is safe to use them, or temporarily halting construction to allow members of the public to pass through the construction site.

Construction periods are currently programmed to be from February to June 2020, with the majority of work being complete by May 2020. This would avoid the peak tourism season in the summer months and therefore minimise impacts on tourism. This programme should be adhered to as much as is practicable, in order to avoid the peak summer months.

## 8.7 Residual effects

**No significant impacts** on land use are assessed from any of the four schemes, or cumulatively.

There is the potential for **temporary slight impacts** on local businesses around the Porth Mellon and Porthloo schemes, as visitors may be deterred from those areas during the construction periods. **No significant impacts** are assessed on local businesses from the Porth Hellick or South Dunes schemes. **No significant impacts** are anticipated on the wider tourism economy of the Isles of Scilly from any of the four schemes, individually or cumulatively.

There are no plans to divert permissive footpaths, as the scale and duration of the proposed works are relatively short. Providing a member of staff is present on all four sites during construction, to either advise members of the public when it is safe to cross, or temporarily halt construction so the permissive paths can be used, **no significant impacts** are assessed on the permissive footpaths close to or within the proposed construction sites.

Due to 25% of Porth Mellon beach being temporarily closed to the public for construction, reducing access between the northern and southern extents of the beach, there is the potential for **temporary slight impacts** on public amenity in this area during construction.

**No significant impacts** upon geodiversity are assessed, either as a result of any of the four schemes individually, or cumulatively.

## 9 Sustainability and climate change

### 9.1 Introduction

This chapter assesses the potential impacts of the proposed developments on sustainability and climate change, during construction and operation of the proposals. The following key issues are assessed in this chapter:

- Sustainable resource use;
- Carbon footprint of the proposed development; and
- Resilience and adaptation of the proposed developments to a changing climate.

### 9.2 Baseline conditions

#### 9.2.1 Carbon footprint

##### *Carbon footprint*

The four proposed defence schemes on the Isles of Scilly are a response to coastal erosion and flooding, forecast to increase with future sea level rise and increased storminess, as a result of climate change. It is now well recognised that emissions of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases (GHGs) such as methane (CH<sub>4</sub>) and nitrogen dioxide (NO<sub>2</sub>) from human activities, have caused global warming and climate change<sup>43</sup>.

As well as a response to climate change it is recognised that CO<sub>2</sub> emissions would also result from construction of the coastal defence schemes, as a result of transport of materials via heavy vehicle movements, embodied carbon within the materials used and use of plant for construction. The defences would be low maintenance, but some emissions would arise as a result of the operation of the proposals.

The total CO<sub>2</sub> emissions emitted from the Isles of Scilly Local Authority area in 2016 was 10.0kt CO<sub>2</sub><sup>44</sup>. The total for the South West of England in 2016 was 27,832kt CO<sub>2</sub><sup>44</sup>. Per capita emissions on the Isles of Scilly were 4.3ty<sup>-1</sup>. This is significantly below the South West of England average (5.0ty<sup>-1</sup>) and the UK average (5.4ty<sup>-1</sup>). It should be noted that these figures do not account for non-CO<sub>2</sub> sources of GHGs, such as methane and other aerosols, which is measured in CO<sub>2</sub>-equivalent (CO<sub>2</sub>e).

##### *Climate change resilience and adaptation*

##### UKCP18 Projections

Marine and coastal related impacts of climate change that are of relevance to the proposed developments have been considered to establish the baseline for this chapter. This consists of changes in sea level, storminess, storm surges and wave heights. Projected baseline changes in these factors have been sourced from UKCP18. These are based on three emission scenarios: low, medium and high. A high emissions scenario is associated with very rapid economic growth, a peak in global population, in 2050, of 8.7 billion, and a rapid introduction of new and efficient fossil fuel intensive technologies. Projections used here are mainly used on the high emissions scenario to capture the worst case scenario (adopting the precautionary principle). Where this is not the case, it has been stated.

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<sup>43</sup> IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)] IPCC, Geneva, Switzerland, 151pp

<sup>44</sup> ONS, 2018: UK Local Authority and Regional Carbon Dioxide Emissions National Statistics: 2005 to 2016 [Online] Available at: <https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2016>

### 9.3 Assessment methodology

GHG emissions have been calculated using the Environment Agency's e:Mission Carbon Planning Tool. This program predicts the GHG impacts of construction activities in terms of CO<sub>2</sub>e. It does this by calculating the embodied CO<sub>2</sub>e of materials plus the CO<sub>2</sub>e associated with their transportation. It also considers personnel travel, site energy use and waste management. The tool was developed by the Environment Agency for fluvial and coastal schemes<sup>45</sup>. The IEMA guidance on assessing GHG emissions and evaluating their significance has also been used<sup>47</sup>.

Where information was not available to complete the climate change calculations, assumptions were made that detail a likely worst-case scenario (following the principle of the Rochdale Envelope approach to addressing uncertainty). Assumptions are stated below:

- The Environment Agency's e:Mission Carbon Planning Tool assumes that transporting material by road emits GHGs at a rate of 0.10672kmCO<sub>2</sub>e km<sup>-1</sup>kg<sup>-1</sup>;
- It was assumed that in construction stages where heavy plant is to be used, individual plant will run constantly during working hours, consuming diesel at a rate of 22.7 litres (5 gallons) per hour. Light plant are assumed to consume half the volume of diesel (11.4 litres an hour);
- It was assumed that all site offices and welfare facilities would be heated and lit constantly during working hours, for the entire duration of the construction stage; and
- Where a range of potential sources, or no source, for the material required were stated, the furthest away source in the UK was used, representing the longest realistic haulage distance. The chosen sources for all materials were the same for each scheme and are described below:
  - Granite: It was specified in the works information for the scheme that the granite would be sourced from a quarry in either Devon or Cornwall. To represent a worst-case scenario, the furthest granite quarry in the aforementioned area was chosen to represent a source. This is Torrington Stone Ltd, near Bideford in north Devon;
  - Polypropylene: It was not specified in the works information for the scheme where the material for the geotextile will be sourced from. As a result, assuming it would be sourced from elsewhere in the UK rather than abroad, the furthest sources in the UK was used. This was PolymerHouse Ltd, based in Glasgow;
  - Concrete: It was not specified in the works information for the scheme where the concrete would be sourced from. As a result, assuming it would be sourced from elsewhere in the UK rather than abroad, the furthest sources in the UK was used as a worst-case scenario. This was Tarmac's cement plant in Dunbar.
  - Stainless steel: It was not specified in the works information for the scheme where the stainless steel would be sourced. As a result, assuming it would be sourced from elsewhere in the UK rather than abroad, the furthest source in the UK was used as a worst-case scenario. This was British Steel's plant at Saltburn-by-the-Sea.
  - Timber: It was not specified in the works information for the scheme where the timber would be sourced. As a result, assuming it would be sourced from elsewhere in the UK rather than abroad, the furthest source in the UK was used as a worst-case scenario. This was James Jones & Sons in Morayshire.

Operational GHG emissions of the proposed development are not considered significant. Although there would be emission associated with maintenance (i.e. patch repairs usage of

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<sup>45</sup> Environment Agency, 2016. e:Mission Carbon Planning Tool [online]. Available at: [https://assets.oubling.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/571707/LIT\\_7067.pdf](https://assets.oubling.service.gov.uk/government/uploads/system/uploads/attachment_data/file/571707/LIT_7067.pdf)

concrete), there would be difficult to quantify and would likely to be negligible in comparison to construction GHG emissions.

### ***Climate change resilience***

The four schemes have been designed to protect against a 1 in 200 year event, as described by the UKCP09 projections, with the medium emissions 95% confidence interval applied to a 2066 event. This reflects the fifty year anticipated design life of the schemes (apart from the South Dunes scheme, which has a much shorter design life).

### ***Climate change adaptation***

The assessment of climate change adaptation involves the following steps as presented in the IEMA Climate Change Resilience and Adaptation Guidelines<sup>46</sup>:

- Identifying the emerging baseline, taking account of the influence of climate change;
- Identifying the potential impacts from the scheme during construction, operation and decommissioning;
- Assessing the sensitivity of baseline receptors to climate change;
- Assessing the scale of impact of the project in combinations with climate change;
- Assessing the significance of the combined impact; and
- Identifying mitigation measures and, where these do not result in acceptable impacts, refine the design and reassess the residual effect (climate change adaptation in a plan).

Given that the coastal defence schemes have been designed to protect homes and critical infrastructure on St Mary's and Tresco from flooding and erosion, which is predicted to become exacerbated by climate change. The coastlines on the Isles of Scilly are being defended in order to protect critical infrastructure of the archipelago from increased rates of coastal erosion, maintaining the viability of Scilly as a settlement in future. In accordance with the IEMA Climate Change Resilience and Adaptation Guidelines<sup>46</sup>, receptors are categorised on the basis of the impact that climatic factors would have as follows:

- High sensitivity – absolutely reliant on specific climate conditions prevailing;
- Moderate sensitivity – affected by changes in climate but not dependent on specific conditions;
- Low sensitivity – hardly influenced by climate change at all.

On the basis of these definitions, the four sites are considered highly sensitive to the effects of climate change.

## **9.4 Potential impacts and significant effects**

GHG emissions would result from the construction of the proposed development due to the following factors:

- Vehicle movements arising from the delivery of materials to site;
- Use of construction equipment and plant; and
- Embodied carbon of the materials used to construct the proposed development.

These are addressed in turn for each of the sites and then considered cumulatively for the overall development.

### ***9.4.1 Porth Mellon GHG emissions***

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<sup>46</sup> IEMA & Mott MacDonald, 2015: Environmental Impact Assessment Guide to: Climate Change Adaptation and Resilience.

The EA's carbon calculator was used to calculate the likely potential embodied energy of construction materials. From this, GHG emissions as CO<sub>2</sub>e could be calculated based on the estimated mass of the material that would be used. The estimated embodied GHG emissions associated with the use of materials for the proposed development is provided in Table 9-1.

**Table 9-1: Estimated embodied carbon emissions associated with the construction material for the proposed development at Porth Mellon**

Material	Quantity (t)	Kg embodied carbon/kg	Embodied tCO <sub>2</sub> e
Granite	2,404	0.7	1,682.94
Polypropylene geotextile	1.08	2.54	2.73
<b>Total embodied carbon equivalent (tCO<sub>2</sub>e)</b>			<b>1,685.67</b>

Estimated construction material delivery emissions likely to arise from vehicle and sea transport movement calculated using the EA's carbon calculator are presented in Table 9-2.

**Table 9-2: Estimated CO<sub>2</sub> emissions associated with the delivery of construction materials to the site on Porth Mellon**

Material for delivery	Mass (t)	Mode of transport	Estimated distance between source of supply and site (km)	Tonnes CO <sub>2</sub> e resulting from transport
Granite	2,404	Road	169	43.36
Polypropylene geotextile	1.08		891	0.10
Granite	2,404	Sea	67	2.474
Polypropylene geotextile	1.08			0.001
<b>Total embodied carbon equivalent (tCO<sub>2</sub>e)</b>				<b>45.935</b>

When embodied carbon values and values resulting from the freight of these materials are combined, the total CO<sub>2</sub>e emission resulting from the materials used from the Porth Mellon development are **1,731.6tCO<sub>2</sub>e**.

Construction waste may be generated as part of the development if clay is excavated that cannot be reused. However, the construction methodology for the Porth Mellon scheme states that this is unlikely, as a Ground Investigation on site indicated that excavation should not produce clay arisings (Appendix E). As a result, embodied carbon from waste disposal has not been assessed at present.

GHGs would also be emitted from the operation of heavy plant during construction of the proposed development. The number and specifics of the plant that would be used for construction is presented in the Construction Method Statement (CMS) (Appendix D). Utilising the EA's carbon calculator and assuming an average fuel usage of heavy plant is 5 gallons diesel/hr (22.7l/hr) and fuel usage of light plant is 2.5 gallons diesel/hr (11.4l/hr), and that all plant will be running constantly during the entire construction period, it is estimated that **168.5tCO<sub>2</sub>e** would be emitted as a result of plant from the Porth Mellon development.

Emissions that would result from the powering of site offices has also been estimated. It was assumed that they would be heated and lit during the entire construction period and the temporary building would be uninsulated, kept at 21°C. **10.0tCO<sub>2</sub>e** would be emitted.

A contractor for the scheme has not yet been appointed. There are contractors based on St Mary's with experience in constructing coastal defences. If a local contractor is used, it is not expected they would travel a significant distance to reach the site, as St Mary's is a relatively small island. If a contractor were appointed from outside the Isles, it is assumed they would stay in the Isles for the duration of the construction. Either way, emissions that would result

from personnel travelling to the site to work has been assumed to be negligible when compared to other emissions arising from the scheme.

It is estimated that in total **1,910.1tCO<sub>2</sub>e** would be emitted as a result of the construction of the proposed development at Porth Mellon.

#### 9.4.2 Porthloo GHG emissions

Embodied energy calculated using the EA's carbon calculator for the Porthloo site are provided in Table 9-3.

**Table 9-3: Estimated embodied carbon emissions associated with the construction material for the proposed development at Porthloo**

Material	Mass (t)	Kg embodied carbon / kg	Embodied tCO <sub>2</sub> e
Granite	7,066	0.7	4,946.2
Polypropylene geotextile	2.46	0.3	6.248
Concrete blocks	220	0.11	23.537
<b>Total embodied carbon equivalent (tCO<sub>2</sub>e)</b>			<b>4,975.99</b>

Estimated construction material delivery emissions likely to arise from vehicle and sea transport movements are presented in Table 9-4.

**Table 9-4: Estimated CO<sub>2</sub> emissions associated with the delivery of construction materials to the site on Porthloo**

Material for delivery	Mass (t)	Mode of transport	Estimated distance between source of supply and site (km)	Tonnes CO <sub>2</sub> e resulting from transport
Granite	7,066	Road	169	127.440
Polypropylene geotextile	2.46		891	0.234
Concrete	220		917	21.527
Granite	7,066	Sea	67	7.272
Polypropylene geotextile	2.46			0.003
Concrete	220			0.226
<b>Total embodied carbon equivalent (tCO<sub>2</sub>e)</b>				<b>156.702</b>

When embodied carbon values and values resulting from the freight of these materials are combined, the total CO<sub>2</sub>e emission resulting from the materials used from the proposed development are **5,132.7tCO<sub>2</sub>e**.

Construction waste may be created as part of the development if clay is excavated that cannot be reused. However, Ground Investigations for the schemes (reports for which are available in Appendix E) determined that this was unlikely. Proposed quantities are unknown. As a result, this has currently been assumed to be negligible.

GHGs would also be emitted from the plant during construction of the proposed development. The number and specifics of the plant that would be used for construction have been supplied by the client in the CMS (Appendix D). Assuming an average fuel usage of heavy plant is 5 gallons diesel/hr (22.7l/hr) and fuel usage of light plant is 2.5 gallons diesel/hr (11.4l/hr), and that all plant will be running constantly during the entire construction period, **413.6tCO<sub>2</sub>e** would be emitted as a result of plant from the development.

Emissions that would result from the powering of site offices has also been estimated. It was assumed that they would be heated and lit during the entire construction period and the temporary building would be uninsulated, kept at 21°C. **12.2tCO<sub>2</sub>e** would be emitted.

A contractor for the scheme has not yet been appointed. There are contractors based on St Mary’s with experience in constructing coastal defences. If a local contractor is used, it is not expected they would travel a significant distance to reach the site, as St Mary’s is a relatively small island. If a contractor were appointed from outside the Isles, it is assumed they would stay in the Isles for the duration of the construction. Either way, emissions that would result from personnel travelling to the site to work has been assumed to be negligible when compared to other emissions arising from the scheme.

It is estimated that in total **5,558.5tCO<sub>2</sub>e** would be emitted as a result of the construction of the proposed development at Porthloo.

### 9.4.3 Porth Hellick GHG emissions

Embodied energy calculated using the EA’s carbon calculator for the Porth Hellick site is provided in Table 9-5.

**Table 9-5: Estimated embodied carbon emissions associated with the construction material for the proposed development at Porth Hellick**

Material	Mass (t)	Kg embodied carbon / kg	Embodied tCO <sub>2</sub> e
Granite	2,500	0.7	1,750.00
Timber	0.115	0.31	0.036
Stainless Steel	8.12	6.15	49.938
Polypropylene geotextile	0.397	2.54	1.008
Concrete blocks	104.4	0.11	11.171
<b>Total embodied carbon equivalent (tCO<sub>2</sub>e)</b>			<b>1,812.153</b>

Estimated construction material delivery emissions likely to arise from vehicle and sea transport movements are presented in Table 9-6.

**Table 9-6: Estimated CO<sub>2</sub> emissions associated with the delivery of construction materials to the site on Porth Hellick**

Material for delivery	Mass (t)	Mode of transport	Estimated distance between source of supply and site (km)	Tonnes CO <sub>2</sub> e resulting from transport
Granite	2,500	Road	171	45.623
Timber	0.115		1175	0.014
Stainless Steel	8.12		744	0.645
Polypropylene geotextile	0.397		893	0.038
Concrete blocks	104.4		919	10.239
Granite	2,500	Sea	67	2.573
Timber	0.115			<0.001
Stainless Steel	8.12			0.008
Polypropylene geotextile	0.397			<0.001
Concrete blocks	104.4			0.107
<b>Total embodied carbon equivalent (tCO<sub>2</sub>e)</b>				<b>59.247</b>

When embodied carbon values and values resulting from the freight of these materials are combined, the total CO<sub>2e</sub> emission resulting from the materials used from the proposed development are **1,871.4tCO<sub>2e</sub>**.

GHGs would also be emitted from the plant during construction of the proposed development. The number and specifics of the plant that would be used for construction have been supplied by the client in the CMS (Appendix D). Assuming an average fuel usage of heavy plant is 5 gallons diesel/hr (22.7l/hr) and fuel usage of light plant is 2.5 gallons diesel/hr (11.4l/hr), and that all plant will be running constantly during the entire construction period, **156.1tCO<sub>2e</sub>** would be emitted as a result of plant from the development.

Emissions that would result from the powering of site offices has also been estimated. It was assumed that they would be heated and lit during the entire construction period and the temporary building would be uninsulated, kept at 21°C. **6.9tCO<sub>2e</sub>** would be emitted.

A contractor for the scheme has not yet been appointed. There are contractors based on St Mary's with experience in constructing coastal defences. If a local contractor is used, it is not expected they would travel a significant distance to reach the site, as St Mary's is a relatively small island. If a contractor were appointed from outside the Isles, it is assumed they would stay in the Isles for the duration of the construction. Either way, emissions that would result from personnel travelling to the site to work has been assumed to be negligible when compared to other emissions arising from the scheme.

A total of **2,034.4tCO<sub>2e</sub>** is expected to be emitted as a result of the construction of the proposed development at Porth Hellick.

#### 9.4.4 South Dunes, Tresco GHG emissions

Embodied energy calculated using the EA's carbon calculator for the South Dunes site are provided in Table 9-7.

**Table 9-7: Estimated embodied carbon emissions associated with the construction material for the proposed development at South Dunes**

Material	Mass (t)	Kg embodied carbon / kg	Embodied tCO <sub>2e</sub>
Granite	1,230	0.7	861.042
Timber	35	0.31	10.85
Polypropylene geotextile	1.46	2.54	3.708
<b>Total embodied carbon equivalent (tCO<sub>2e</sub>)</b>			<b>875.6</b>

Estimated construction material delivery emissions likely to arise from vehicle and sea transport movements are presented in Table 9-8.

**Table 9-8: Estimated CO<sub>2</sub> emissions associated with the delivery of construction materials to the site on South Dunes**

Material for delivery	Mass (t)	Mode of transport	Estimated distance between source of supply and site (km)	Tonnes CO <sub>2e</sub> resulting from transport
Granite	1,230	Road	169	22.185
Timber	35		1173	4.381
Polypropylene geotextile	1.46		891	0.139
Granite	1,230	Sea	69	1.304
Timber	35			0.037
Polypropylene geotextile	1.46			0.002
<b>Total embodied carbon equivalent (tCO<sub>2e</sub>)</b>				<b>28.048</b>



When embodied carbon values and values resulting from the freight of these materials are combined, the total CO<sub>2</sub>e emission resulting from the materials used from the proposed development are **903.6tCO<sub>2</sub>e**.

GHGs would also be emitted from the plant during construction of the proposed development. Information on the plant required for the scheme is not known, so it has been assumed, given the relatively small scale of the works, that one large plant and one small plant will be required for the duration of the works. Assuming an average fuel usage of heavy plant is 5 gallons diesel/hr (22.7l/hr) and fuel usage of light plant is 2.5 gallons diesel/hr (11.4l/hr), and that all plant will be running constantly during the entire construction period, **32.5tCO<sub>2</sub>e** would be emitted as a result of plant from the development.

Emissions that would result from the powering of site offices has also been estimated. Information on the site offices required for the scheme is not known, so it has been assumed, given the relatively small scale of the works, that one combination unit office will be required for the duration of the works. It was assumed that they would be heated and lit during the entire construction period and the temporary building would be uninsulated, kept at 21°C. **3.8tCO<sub>2</sub>e** would be emitted.

A contractor for the scheme has not yet been appointed. There are contractors based on St Mary's with experience in constructing coastal defences. If a local contractor is used, it is not expected they would travel a significant distance to reach the site, as the Isles of Scilly is a relatively self-contained archipelago. If a contractor were appointed from outside the Isles, it is assumed they would stay in the Isles for the duration of the construction. Either way, emissions that would result from personnel travelling to the site to work has been assumed to be negligible when compared to other emissions arising from the scheme.

A total of **939.9tCO<sub>2</sub>e** is expected to be emitted as a result of the construction of the proposed development at South Dunes.

#### 9.4.5 Cumulative contribution to climate change

The cumulative carbon dioxide equivalent emissions resulting from all four schemes combined is estimated to be **10,532.9tCO<sub>2</sub>e**.

Given the global effect of GHGs on the climate, the value of these developments as receptors is considered to be high. However, the impact of GHG emissions on climate from the development proposals in isolation (or indeed any other infrastructure development project) is negligible at the global scale and therefore is not a useful comparison. The IEMA Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance states that: "*GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant*<sup>47</sup>". Although GHG emissions from an infrastructure development may be negligible in isolation, it is not appropriate to suggest this is insignificant, as GHG emissions from human activity constitute the single greatest cumulative environmental effect<sup>48</sup>. To put the impacts of the proposed developments on GHG emissions into context it is therefore much more useful to make national and regional comparisons.

According to Office for National Statistics' records on carbon dioxide emissions for UK regions and local authorities, the total CO<sub>2</sub> emissions in the Isles of Scilly local authority for 2016 (the most recent year for which records are available) equalled **10,017.1tCO<sub>2</sub>e**<sup>49</sup>. This is the

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<sup>47</sup> IEMA & Arup, 2017: Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their significance.

<sup>48</sup> The Intergovernmental Panel on Climate Change (IPCC), 2014: The Fifth Assessment Report of the IPCC.

<sup>49</sup> ONS, 2018: UK Local Authority and Regional Carbon Dioxide Emissions National Statistics: 2005 to 2016 [Online] Available at: <https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2016>

fourth lowest total of any UK authority area and the lowest of any UK authority area with a value above zero (three authorities in the UK, Highland, Argyll & Bute and Dumfries & Galloway have negative CO<sub>2</sub>e emissions, due to significant carbon absorption through Land Use, Land Use Change and Forestry (LULUCF)). As a result, these four schemes would result in a contribution to the Isles of Scilly Local Authority CO<sub>2</sub> emissions of **105.1%**. It would also result in a contribution to total CO<sub>2</sub> emissions for the south west of England of **0.038%**, and a contribution of England-wide CO<sub>2</sub> emissions of **0.0036%**.

#### 9.4.6 Climate change resilience and adaptation

Under UKCP09 climate projects, the proposed sea defences would initially provide protection for a 1 in 200 year event, as described by a medium emissions 95% confidence interval scenario applied to a 2066 event (reflecting the 50 year design life of the schemes). At no point during their design lives should the defences offer anything less than a 1 in 200 year event standard of protection, unless climate change impacts are reassessed and determined to be more severe than initially thought.

### 9.5 Mitigation measures

The coastal defence proposals are a response to the adverse consequences of a changing climate. Climate change is resulting in more extreme weather phenomena and will continue to cause flood events to be more frequent, more severe and less predictable<sup>50</sup>. The potential impact climate change will have upon storminess could further exacerbate these issues. Due to this, the mitigation measures for this scheme are limited. Mitigation has the potential to reduce the standards of protection that the schemes offer.

One significant mitigation measure could be to reconsider the material used for the rock needed for each scheme. Granite has been chosen as it is the underlying geology for the Isles of Scilly and therefore would be in-keeping with the local aesthetic and geodiversity. However, granite is an exceptionally energy intensive rock to use in construction, for two reasons (within these two reasons, granite is compared to limestone for reference. Limestone is often used for rock armour within coastal and fluvial defences);

- The relative density of granite is high. Weight-for-weight, granite is 32% denser than limestone for example (a rock also commonly used for fluvial and coastal defences). As a result, a volume of rock armour made of granite will weigh 32% more, on average, than it would if it were made of limestone. As a result of this extra mass, transporting granite over an equivalent distance to limestone would emit 32% more CO<sub>2</sub>.
- Granite is substantially harder than limestone. Granite has a value of between 6 and 7 on the Mohs Scale of Relative Hardness, whereas limestone typically has a value of around 3 (Mohs Scale of Relative Hardness is a purely ordinal scale, and this does not mean that granite is typically twice as hard as limestone. The actual difference is much greater)<sup>51</sup>. As a result, the quarrying and processing of granite is massively energy intensive. Quarrying and processing granite emits, on average, almost 8x more CO<sub>2</sub> as quarrying and processing the equivalent weight of limestone.

The use of granite on all four coastal defence schemes on the Isles of Scilly would result in approximately **9,240.1tCO<sub>2</sub>e** emitted from its quarrying and processing alone. If limestone were to be used, an equivalent volume would result in only **807.8tCO<sub>2</sub>e** being emitted. Transporting the limestone to site would also be emit 32% less CO<sub>2</sub>.

<sup>50</sup> Met Office Hadley Centre (2019) UKCP18 Science Overview Report, November 2018 (Updated March 2019) [Online] Available at: <https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf>

<sup>51</sup> [www.geologypage.com/2016/04/mohs-hardness-scale](http://www.geologypage.com/2016/04/mohs-hardness-scale)

As a result, if a softer rock were used for all four defences rather than granite, providing it could offer the same level of coastal protection, it could result in a reduction of emissions related to the construction of these four schemes of **over 80%**.

The material required for these schemes should be sourced from areas as local to the Isles of Scilly as possible in order to minimise transport emissions. Porthoustock Quarry, on the Lizard, is relatively close to the Isles of Scilly, and as it is positioned on the coast, offers the ability to load rock directly onto landing crafts, thus potentially eliminating the need to transport any rock via the road network.

## 9.6 Residual effects

The projected GHG emissions for the scheme would constitute an increase in emissions from the Isles of Scilly of 105.1%, and an increase in emissions from the south west of England of 0.038%, over the course of the year of 2020 (when construction is expected to occur). IEMA EIA guidance recommends that as contextualising GHG emissions on a global or even national scale is not an effective way of assessing them, but all emissions should be viewed as **significant** and should be mitigated. It is therefore recommended that the proposals are amended to:

- Potentially utilise a rock type, other than granite, that is less energy intensive to quarry. This could be used for all or part of the proposed defences. Potentially, the internal layers only of the coastal defences could be constructed using a different rock type, to preserve the geodiversity of the areas;
- Materials required for the proposed defences should be sourced from as close as possible to the developments, in order to minimise transport emissions.

The negative effects of this development are however arguably outweighed by the need to protect residents, infrastructure and economy of the Isles of Scilly, maintaining the viability of the archipelago as an area to live. The proposed development would have a **large, direct, permanent positive** impact upon many residents on the islands of St Mary's and Tresco.

## 10 Other construction related effects

### 10.1 Introduction

This Other Construction Related Effects chapter assesses impacts on receptors arising specifically during the construction phase, which are not considered in each of the other specialist ES topic chapters. Consideration is particularly given to impacts from construction activities associated with noise, vibration, air quality and light spill. With reference to Schedule 4 of the EIA Regulations this chapter provides where relevant ‘an estimate, by type and quantity, of expected residues and emissions (such as water, air, oil and subsoil pollution, noise, vibration, light, heat, radiation<sup>52</sup>) and quantities and types of waste produced during the construction phase’.

Where possible, an iterative approach to avoiding and mitigating construction related effects has been employed, to minimise the potential for significant environmental effects to arise during construction. Reference is made to the construction method statements provided in Appendix D, and which have been summarised in section 2.7. This assessment has been used to inform an outline CEMP, provided in Appendix I.

### 10.2 Baseline conditions

#### 10.2.1 Air quality, noise and baseline light conditions

Air quality is not routinely monitored on the Isles of Scilly, but is generally considered to be exceptionally good, given its aspect within the Celtic Sea 40 km off the UK mainland. Defra’s most recent release on air quality – Air Pollution in the UK 2017<sup>53</sup>, sets out the airborne concentrations of pollutants on the Isles of Scilly are well below national air quality objectives (Table 10-1). As a result, there are no Local Air Quality Management areas on the Isles of Scilly.

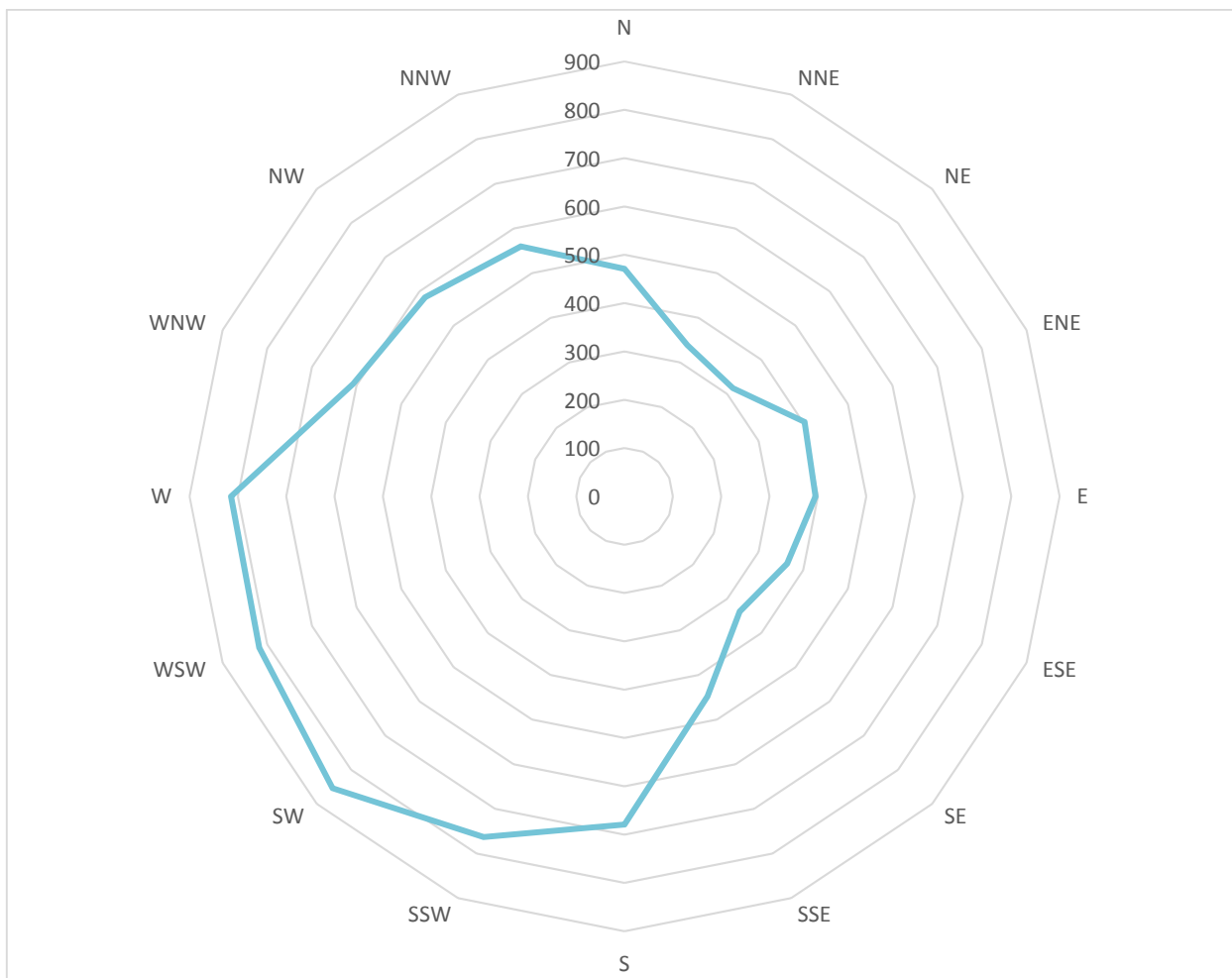
**Table 10-1: Airborne concentrations of pollutants on the Isles of Scilly<sup>53</sup>**

Pollutant	Airborne concentration ( $\mu\text{g m}^{-3}$ ) and National Air Quality Objective (in brackets)
Sulphur dioxide (SO <sub>2</sub> )	≤10 (20)
Nitrogen dioxide (NO <sub>2</sub> )	≤10 (40)
Particulate Matter 10	≤13 (40)
Particulate Matter 2.5	≤5 (40)
Carbon Monoxide (CO)	Not Stated – assumed to be well within national air quality objective (10)

Construction activities can generate significant quantities of airborne particulate matter (dust) as a result of plant movements on bare ground, movement and tipping of material, as well as the exhaust of diesel powered machinery. These activities have the potential to cause soiling to local properties and vehicles. It is also recognised that in coastal areas, such as Porth Mellon, salt spray gives rise to elevated levels of fine particulate matter. Given this, there is the potential for construction works to exacerbate dust impacts. The predominant wind direction on the Isles of Scilly is South westerly, as shown on Table 10-1.

<sup>52</sup> As this EIA is assessing impacts of a coastal defence scheme, heat and radiation will not be created during either construction or operation, and has therefore not been assessed in the forthcoming chapter.

<sup>53</sup> Defra (2018) – Air Pollution in the UK 2017 [Online] Available at: [https://uk-air.defra.gov.uk/assets/documents/annualreport/air\\_pollution\\_uk\\_2017\\_issue\\_1.pdf](https://uk-air.defra.gov.uk/assets/documents/annualreport/air_pollution_uk_2017_issue_1.pdf)



**Figure 10-1: Wind rose for the Isles of Scilly (y axis is average number of hours per year)**

The Council of the Isles of Scilly does not regularly measure noise levels on the Isles, but they are generally considered tranquil areas, which attracts many visitors to them. Anthropogenic background noise in Porth Mellon is generally from road traffic and occasional use of jet boats/skis within the bay<sup>54</sup>.

Traffic counts for St Mary’s, available on the Department for Traffic website<sup>55</sup>. There are five traffic count points on St Mary’s (Figure 10-2). Their locations and counts for the most recent year for which data is available is presented in Table 10-2.

<sup>54</sup> Blue Sail (2011) – Future of Tourism on Scilly: Green Framework [Online] available at: <https://www.scilly.gov.uk/sites/default/files/Blue%20Sail%203%20Green%20Framework.pdf>  
<sup>55</sup> <https://roadtraffic.dft.gov.uk/local-authorities/1>

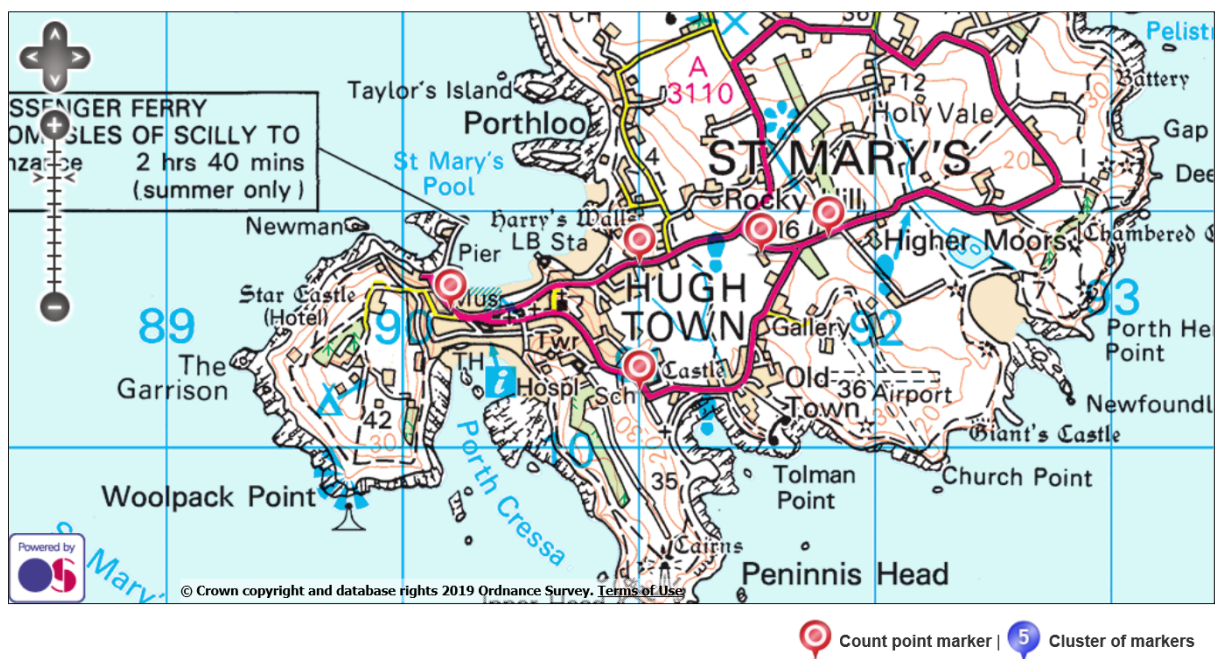


Figure 10-2: Location of the 5 traffic count points on St Mary's

Table 10-2: Baseline Average Annual Daily Traffic Flows for the 5 traffic count points on St Mary's

Count Point ID	AADF Year	Easting	Northing	All Vehicles	All HGVs
51	2017	90200	10585	1143	43
52		91000	10240	989	12
53		91000	10775	1323	21
54		91515	10820	730	37
55		91800	10890	376	16

Scilly's skies are some of the clearest in the UK, due to relatively low levels of light pollution<sup>56</sup>. There are five designated Dark Sky Discovery Sites within Scilly (Figure 10-3).

<sup>56</sup> Isles of Scilly Area of Outstanding Natural Beauty Management Plan 2015-202 [Online] Available at: [https://docs.wixstatic.com/ugd/f2ee4f\\_f34896db17404625927ce63f878c0ca2.pdf](https://docs.wixstatic.com/ugd/f2ee4f_f34896db17404625927ce63f878c0ca2.pdf)

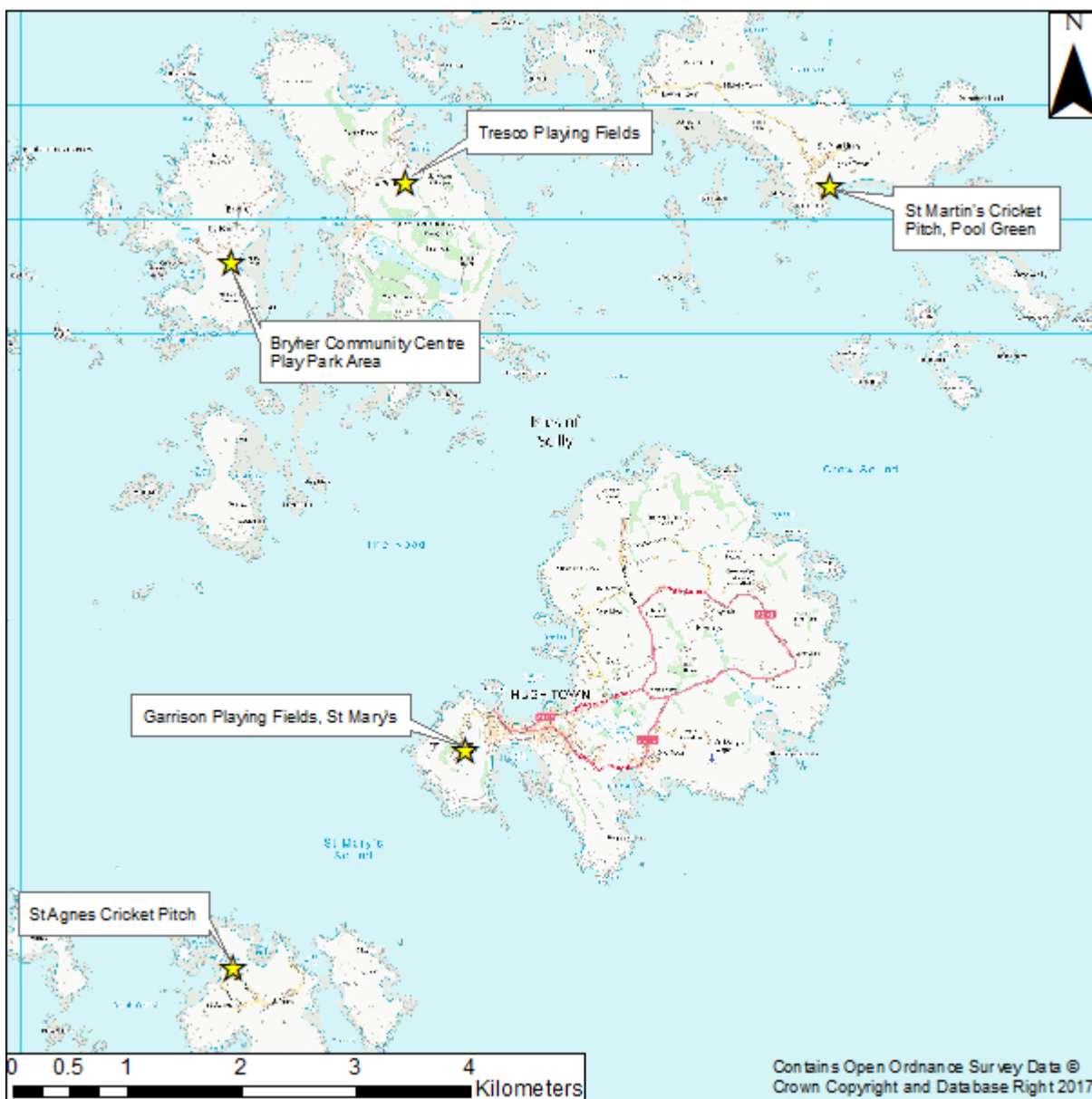


Figure 10-3: Dark Sky Sites on the Isles of Scilly<sup>57</sup>

### 10.2.2 Porthloo construction logistics

A full description of the construction methodology is provided in Appendix D and summarised in section 2.7.1. The following description provides assumptions of the likely construction requirements presented for the purpose of the construction effects assessment.

The Porthloo site is located within Hugh Town, within which approximately half of the Island's residents reside. 6 residential properties are located between 10 and 20m of the Porthloo site. Road access to the Porthloo site will be via Porthloo Lane.

At the time of writing the location of the site compound was unknown and therefore it has been assumed that this could be located anywhere within the construction site. The site compound will be equipped with one combination unit with first aid capabilities and welfare facilities, including a toilet, canteen, drying room, microwave, hot water and a generator.

<sup>57</sup> <https://www.darkskydiscovery.org.uk/dark-sky-discovery-sites/map.html>

Consideration has also been given to the types of plant that are likely to be used during the construction work. It has been assumed that one 20 tonne excavator would be likely to be required together with one 6 tonne dump truck. These would be kept on site for the duration of the construction, secured in Heras fencing when not in use. Premixed concrete would also need to be delivered directly to the site via a 26 tonne mixer lorry.

60t landing craft would deliver the site compound equipment, the rock, concrete, HPS12 geotextile and timber to site. The landing craft would be unloaded within in the working area, as the tide and sea state allow. This will mean deliveries will not need to be directed along Porthloo Road or through Hugh Town, to the south west.

As some aspects of the construction are reliant on tidal patterns, they would need to be undertaken at low tide. When low tide coincides with the night or low light conditions, particularly during the winter months, construction work may need to be artificially lit. It has therefore been assumed that where night-time or low light working would be required, two 7m VT2 lighting towers would be used. Porthloo Lane is currently not illuminated with street lighting, so this could require artificial lighting depending on the location of the construction compound.

A Ground Investigation was undertaken at the Porthloo site the full report is provided in Appendix E). Three pits were dug, all to a depth of 2m (Locations: 090880,011406, 090884,011359 and 090882,011309), the results of which are summarised as follows:

- Pit 1 uncovered loose sand with loose boulders and large cobbles to a depth of 0.8m. From 0.8m to 1.6m, unconsolidated medium dense gravel and sandy gravel with a firm / stiff clay element was uncovered. From 1.6m to 2.0m, Light grey stiff to firm claystone was uncovered.
- Pit 2 uncovered loose sand with individual boulders and large cobbles to a depth of 1.1m. From 1.1m to 1.7m sand, gravel and clay composite deposit (firm / stiff to dense / compact) was uncovered. From v1.7m to 2.0m stiff clay was uncovered.
- Pit 3 uncovered loose sand with loose boulders and large cobbles to a depth of 1m. From 1m to 2m, stiff clay was uncovered.

It is anticipated that all arisings, including any clay material encountered, will be reused on site as backfill along the revetment toe and elsewhere within the revetment footprint. However, any excess material disposal could require offsite disposal.

### **10.2.3 Porth Mellon construction logistics**

A full description of the construction methodology is provided in Appendix D and summarised in Section 2.7.2. The following description provides assumptions of the likely construction requirements presented for the purpose of the construction effects assessment.

The Porth Mellon site is approximately 500m away from the centre of Hugh Town, within which approximately half of the Island's residents reside. 6 residential properties are located between 10 and 20m of the Porth Mellon site.

The construction working area would be located on Porth Mellon Beach. Approximately one quarter of the beach would therefore need to be closed to the public, potentially for the three month duration of the works. This would also include the majority of the landward boundary, and an area where material would be unloaded from landing craft onto the shore.

Road access to the Porth Mellon site would be via Telegraph Road and the proposed location of the contractor's compound would be located behind Porth Mellon Beach, via a track off Telegraph road. It is likely that construction plant would use Telegraph Road to travel between the compound and working area.

The site compound would be equipped with one portable site building with first aid capabilities and welfare facilities, including a toilet, canteen, drying room, microwave, hot water and a generator. Consideration has also been given to the types of plant that are likely to be used



during the construction work. It has been assumed that one 20 tonne excavator would be likely to be required together with one 6 tonne dump truck. These would be kept on site for the duration of the construction, secured in Heras fencing when not in use.

The site compound equipment, the HPS12 geotextile and the rock used to construct the defence will be supplied to the site via 60 tonne landing craft, meaning plant movements will not have to pass through Hugh Town, to the west. All other materials would be delivered by road. It has been assumed that deliveries of materials will be staggered. Where non-rock armour construction material needs to be stored on site prior to use, it will be kept as close to the site compound as possible.

As some aspects of the construction are reliant on tidal patterns, they would need to be undertaken at low tide. When low tide coincides with the night or low light conditions, particularly during the winter months, construction work may need to be artificially lit. It has therefore been assumed that where night-time working would be required, two 7m VT2 lighting towers would be used. Telegraph Road is already illuminated with street lighting, so this should not require artificial lighting. The track off Telegraph Road, to the compound, may need to be lit.

A ground investigation was undertaken at the Porth Mellon site (the full report is provided in Appendix E). Two trial pits were dug, to a depth of 2.1m (Location: 090740, 010705) and 2.6m (Location: 090757, 010704), the results of which are summarised as follows:

- Pit 1 uncovered loose sand with boulders to a depth of 1.4m. From 1.4 to 1.6m deep, loose to compact medium to coarse grained sand and gravel were uncovered. From 1.6m to 2.1m deep, a composite of sand, gravel and clay (firm/stiff to dense/compact consistency).
- Pit 2 reached a depth of 2.6m before the prospect of digging any further was abandoned due to safety concerns. To a depth of 2.2m, loose, fine grained sand was uncovered. From 2.2 to 2.6m, loose, medium grained orange sand was uncovered.

It is anticipated that all arisings, including any clay material encountered, will be reused on site as backfill along the revetment toe and elsewhere within the revetment footprint. However, any excess material disposal could require offsite disposal.

#### **10.2.4 Porth Hellick construction logistics**

A full description of the construction methodology is provided in Appendix D and summarised in section 2.7.3. The following description provides assumptions of the likely construction requirements presented for the purpose of the construction effects assessment.

Porth Hellick Dune is in an isolated location with no nearby residential receptors. Road access to the construction site would be via Carn Friars Lane and then via an unsurfaced farm track leading to the beach.

The proposed location for a contractor's compound will be located in the field adjacent to the beach, immediately north east of the proposed artificial dune. The site compound will be equipped with one combination unit with first aid capabilities and welfare facilities, including a toilet, canteen, drying room, microwave, hot water and a generator. Consideration has also been given to the types of plant that are likely to be used during the construction work. It is assumed that one 20 tonne excavator would be likely to be required together with one 6 tonne dump truck. These would be kept on site for the duration of the construction, secured in Heras fencing when not in use.

To deliver the compound equipment and construction materials to site, the materials will be delivered via landing craft to Porthloo Site beach, where they will be offloaded and transported by flatbed lorry to the Porth Hellick site. Some materials may be delivered loose, including the 4-10mm granite stone. If this is the case, an excavator will load the dump trucks to transport the stone to Porth Hellick. If delivering the material onto Porthloo beach is deemed

to be not practicable, it will be delivered to the Isles of Scilly terminal at Hugh Town and transported to the site via the road network (Figure 10-4).

As some aspects of the construction are reliant on tidal patterns, they would need to be undertaken at low tide. When low tide coincides with the night or low light conditions, particularly during the winter months, construction work may need to be artificially lit. It has therefore been assumed that where night-time working would be required, two 7m VT2 lighting towers would be used.

Given the proposed construction technique of raising the existing dune bank, no significant waste arising is foreseen at the Porth Hellick site.

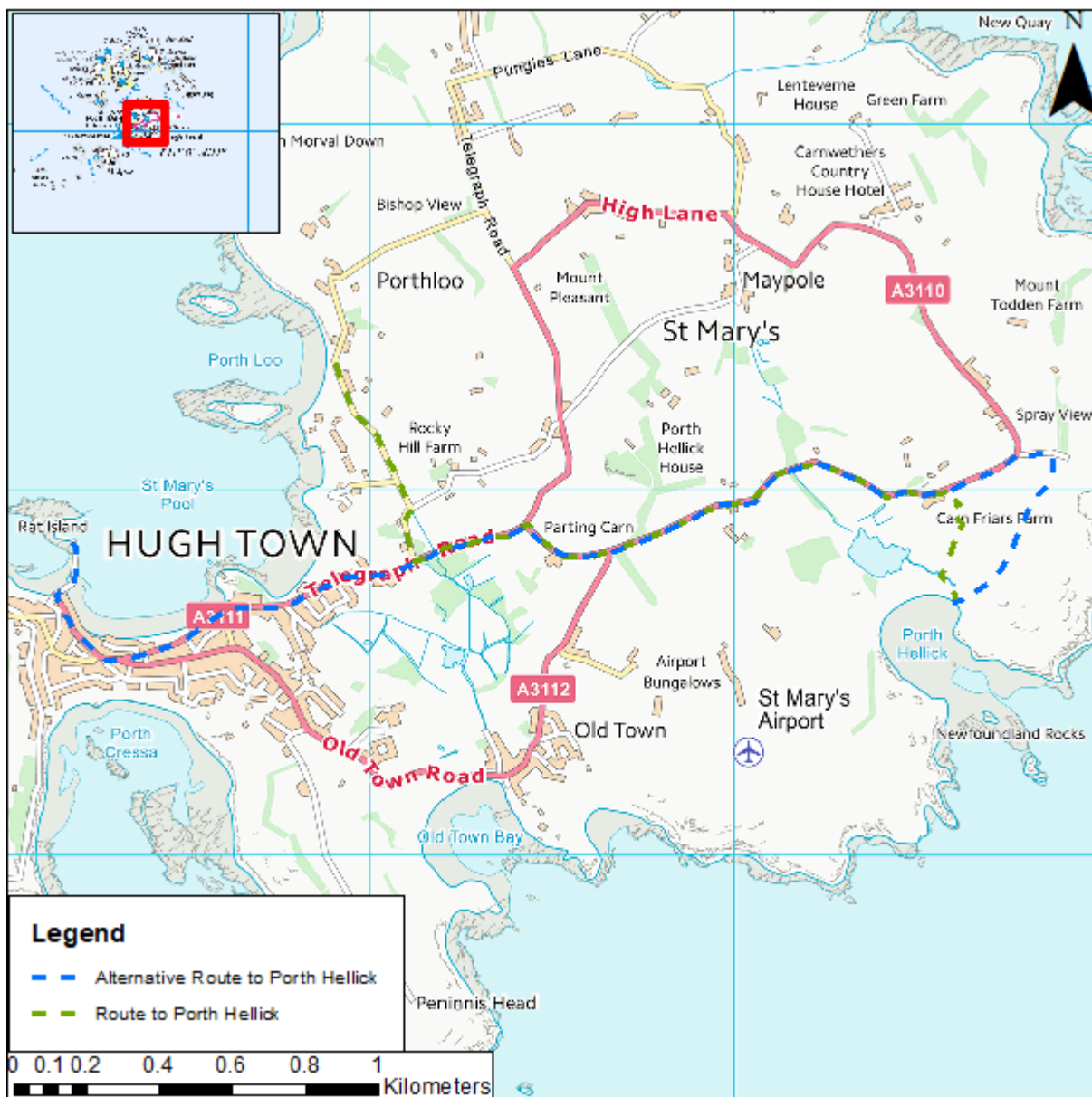


Figure 10-4: Likely materials transport routes to the Porth Hellick site

### 10.2.5 South Dunes construction logistics

A summary of the construction methodology for South Dunes is provided in section 2.7.4. The following description provides assumption of the likely construction requirements presented for the purpose of the construction effects assessment.

South Dunes is located in an isolated location on the southernmost point of Tresco with no nearby residential receptors.

The rock rolls required for the scheme would be transported from St Mary's to the low-tide jetty at Carn Near on Tresco via small boat. The material would then be stored in a small compound adjacent to the jetty the goods vessel docks, then transported via tractor down to the site when it is required, using the concrete slipway at the west end of the beach.

As some aspects of the construction are reliant on tidal patterns, they would need to be undertaken at low tide. When low tide coincides with the night or low light conditions, particularly during the winter months, construction work may need to be artificially lit. It has therefore been assumed that where night-time working would be required, two 7m VT2 lighting towers would be required.

A Ground Investigation was undertaken at the South Dunes site (the full report is provided in Appendix E). Three pits were dug, to a depth of 3.7m (Location: 089913, 013890), 3.5m (Location: 089885, 013884) and 2.6m (Location: 089841, 013881), the results of which are summarised as follows:

- Pit 1 uncovered only unconsolidated sand to a depth of 3.7m. A steel cable was uncovered during this excavation which was previously unknown, having not been found on any maps.
- Pit 2 uncovered fine to medium grained loose sand from 0 to 2.0m deep. From 2.0-3.5m deep, medium to coarse grained loose sand was uncovered.
- Pit 3 uncovered loose sand from 0 to 1.6m deep. From 1.6m to 2.6m deep grey firm to stiff claystone was uncovered.

Given the proposed construction technique of rock rolls, no significant waste arising is foreseen at the South Dunes site.

## 10.3 Assessment methodology and assessment criteria

### 10.3.1 Construction Traffic

Baseline traffic data for traffic count points 51, 53, 54 and 55 located on the route that construction traffic would take between Porthloo and Porth Hellick, was used to establish baseline traffic flows as presented in Table 10-2. The Porth Hellick scheme is the only one of the proposals which would generate road traffic associated with materials delivery to the site. Assessment has been undertaken using the Institute of Environmental Assessment's Guidelines for the Environmental Assessment of Road Traffic<sup>58</sup>. The guidance states that regarding environmental impacts, it is recommended as a starting point that a 30% change in traffic flow represents a reasonable threshold for including a highway link within the assessment. Where there are major changes in the composition of traffic flow, say a much greater flow of HGV's, a lower threshold may be appropriate. In sensitive areas, also the lower threshold of 10% is recommended.

It is estimated that only 2,613 tonnes of construction material would be needed to construct the Porth Hellick scheme. In order to transport this volume, it has been assumed that 131 standard 20 tonne truck journeys would be required, equating to approximately two to three HGV trips per day over the 2 month construction period for Porth Hellick.

The baseline traffic counts for St Mary's, available on the Department for Traffic website<sup>55</sup>, show that the average annual daily flow on the A3111 / A3110 are a minimum of 376 vehicles (at location 55), 16 of which were HGVs. An increase of one HGV as a result of the proposals is therefore well within the IEA thresholds meaning that traffic environmental impacts (traffic

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<sup>58</sup> IEA (1993). *Guidelines for the Environmental Assessment of Road Traffic*.

air quality and noise, pedestrian impact etc) are scoped out of any further impact assessment presented herein.

### 10.3.2 Air quality

A construction dust assessment has been undertaken using the Institute of Air Quality Management Guidance on the Assessment of Dust from Demolition and Construction<sup>59</sup>, to determine whether air quality impacts are likely to arise from the construction of the proposed development. Under the IAQM guidance, where there are existing human receptors within 350m or ecological receptors within 50m of the boundary of the site, it is determined that a detailed assessment is required to determine potential dust impacts.

The detailed assessment then determines the magnitude of dust impact from the works associated with earthworks, and other construction activities. Vehicle tracking out of site is also usually assessed, but which has been scoped out on the basis of the IEA thresholds set out in section 10.3.1. The approach taken to assessment of dust impacts is a risk assessment, where risk of impacts from dust is identified using Table 10-3 and Table 10-4, which compared with the sensitivity of receptors is used to determine the best practicable means that should be recommended to reduce the risk of dust impacts.

The matrix of significance of effects scoring terms provided in Table 3-4, has been used to define the resulting significance of effect of potential dust on sensitive receptors. Where the significance of effect scoring term is split (i.e. slight or moderate), then the location of sensitive receptors in relation to the prevailing wind direction (with reference to Figure 10-1) has been used to determine which significance score is most appropriate.

Table 10-3: Sensitivity of the area around the site to dust soiling impacts on people and property<sup>59</sup>

Receptor Sensitivity	Number of Receptors	Distance from the Source (m) <sup>c</sup>			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 10-4: Sensitivity of the area around the site to dust soiling impacts on ecological receptors<sup>59</sup>

Receptor Sensitivity	Distance from the Source (m) <sup>c</sup>	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

### 10.3.3 Noise and vibration

<sup>59</sup> IAQM (2014). Guidance on the Assessment of Dust from Demolition and Construction

An indicative assessment of the likely construction noise impacts to surrounding sensitive receptors was undertaken using the methodology contained within BS 5228 Code of practice for noise and vibration control on construction and open sites Part 1: Noise<sup>60</sup>. Annex E of BS 5228 recommends that:

*'Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. Noise levels, between 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the boundary site should not exceed 70 decibels in rural, suburban and urban areas away from main road traffic and industrial noise. This limit is for daytime working outside living rooms and offices. In noise-sensitive locations, when working outside normal hours – the allowable noise levels from building sites will be less: such as the reduced values given in the contract specification or as advised by an Environmental Health Officer (a reduction of 10 decibels may often be appropriate).'*

On the basis of likely plant requirements, the typical noise levels for the proposed construction activities as provided in BS 5228 (summarised in Table 10-5) have been used as a baseline for noise impacts on receptors within close proximity to the works. Where individual sensitive receptors are located approximately 10m from the construction site boundary, there is potential for the 70dB recommended limit to be exceeded on the basis of the typical noise levels. As such these values are taken as an indication that a detailed assessment would be required to assess the impact on the receptors at approximately this distance. BS 5228 also provides typical noise reductions that can be achieved through best practicable means, and so where an impact is identified on a specific receptor, consideration can be given to effectively reducing the impact through best practicable means.

**Table 10-5: Typical A-weighted sound pressure levels from construction activities at 10m<sup>60</sup>**

Construction Activity	A-weighted sound pressure level at 10m
20t excavator general site activities	71dB
6t dumper general site activities	73dB
Discharging cement mixer truck	75dB
14t wheeled excavator general site activities	71dB
Tractor towing trailer	79dB
Petrol generator	56dB
VT2 lighting tower 7m	64dB

BS 5228 Code of practice for noise and vibration control on construction and open sites Part 2: Vibration<sup>61</sup> also provides guidance on determining whether construction vibration impacts are likely to affect nearby receptors, by providing distances from typical construction activities at which vibration would be noticeable. This identifies that for most people, the threshold of vibration perceptibility is between 0.14 and 0.3  $\text{mms}^{-1}$  PPV, which for excavation works is typically noticeable to sensitive receptors at a distance of 15 to 20m. Where this impact is identified on a specific sensitive receptor at approximately this distance, this has been taken as an indication that a more detailed assessment would be required to assess the impact.

<sup>60</sup> BSI (2009). BS 5228. Code of practice for noise and vibration control on construction and open sites. Part 1 Noise.

<sup>61</sup> BSI (2009). BS 5228. Code of practice for noise and vibration control on construction and open sites. Part 2 Vibration.

### 10.3.4 Light spill

A qualitative assessment of light spill and glare has been undertaken with reference to the ILP *Guidance in Undertaking Environmental Lighting Impact Assessments*<sup>62</sup> and *Guidance Notes for the Reduction of Obtrusive Light*<sup>63</sup>. The guidance notes provide criteria for assessing the sensitivity of the lighting environment provided in Table 10-6, and magnitude of impact criteria provided in Table 10-7. Whether the construction sites for these schemes will be lit is currently unknown. As a result, information on number or arrangement of lighting columns has not been available. A judgement has therefore been made on the extent to which impacts would occur. This is based on the sensitivity of receptors given the existing lighting environment and the expected magnitude of change. The magnitude of change is based on the relative proximity of receptors to proposed lighting that will be associated with the proposed compound locations.

All of the sites are within the Isles of Scilly Area of Outstanding Natural Beauty (AONB) and so according to the criteria in Table 10-6 are considered intrinsically dark landscapes of very high sensitivity.

**Table 10-6: Criteria for assessing the sensitivity of the lighting environment**

Lighting environment	Sensitivity score	Criteria
Intrinsically dark landscapes	Very High	National Parks, AONBs etc
Low district brightness areas	High	Rural, small village or relatively dark urban locations
Medium district brightness areas	Medium	Small town centres or urban locations
High district brightness areas	Low	Town/city centres with high levels of night-time activity

**Table 10-7: Criteria for assessing the magnitude of lighting impacts**

Impact Score	Criteria
Major	Major increase in the level of light spill and/or glare onto surrounding areas and illuminance levels in at the windows of residential properties, resulting in a major change in lighting conditions.
Moderate	Moderate increase in the level of light spill and/or glare onto surrounding areas and illuminance levels at the windows of residential properties, resulting in a moderate change in lighting conditions.
Minor	Minor increase in the level of light spill and/or glare onto surrounding areas and illuminance levels at the windows of residential properties, resulting in a perceptible change in lighting conditions.
Negligible	No perceptible change in the level of light spill and/or glare onto surrounding areas and illuminance levels at the windows of residential properties and would cause no discernible change in lighting conditions.

<sup>62</sup> Institute of Lighting Professionals (ILP) (2013) PLG 04 *Guidance on undertaking environmental lighting impact assessments*

<sup>63</sup> Institute of Lighting Engineers (ILE) (2005) GN01 *Guidance Notes on the Reduction of Obtrusive Light*

### 10.3.5 Ground conditions, waste management & pollution prevention

The Ground Investigations undertaken at the Porthloo, Porth Mellon and South Dunes sites has been used to identify the requirements for remedial works associated with ground conditions (the full reports are provided in Appendix E). Where such works are required the environmental impact has been qualitatively assessed.

A review of waste management and pollution prevention proposals as outlined in each of the construction method statements (Appendix D) has also been undertaken and used to inform an Outline CEMP (Appendix I).

## 10.4 Potential impacts and significant effects

### 10.4.1 Air Quality

#### *Porthloo*

According to the IAQM Guidelines, given that the earthworks area would be <2,500m<sup>2</sup> and construction volume <20,000m<sup>3</sup> the magnitude of dust impact potentially arising from the Porthloo scheme is small (minor). Six residential receptors have been identified within 20m of the Porthloo site, as a result the risk of dust impacts is assessed as medium. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential dust is assessed as slight or moderate. Given the prevailing south-westerly wind direction and the location of the Porthloo residential receptors to the southeast of the proposed works, the significance of effect has been assessed as **temporary Slight adverse**.

Construction activities would also take place within 20m of the Porthloo SSSI, which is considered to be medium sensitivity on the basis of the IAQM Guidelines. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential dust is assessed as slight or moderate. Given the prevailing south-westerly wind direction and the location of the Porthloo SSSI to the north and northwest of the proposed works, the significance of effect has been assessed as **temporary Moderate adverse**.

#### *Porth Mellon*

According to the IAQM Guidelines, given that the earthworks area would be <2,500m<sup>2</sup> and construction volume <20,000m<sup>3</sup> the magnitude of dust impact potentially arising from the Porth Mellon scheme is small (minor). Six residential receptors have been identified within 20m of the Porth Mellon site, as a result the risk of dust impacts is assessed as medium. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential dust is assessed as **temporary Slight adverse**.

#### *Porth Hellick*

According to the IAQM Guidelines, given that the earthworks area would be <2,500m<sup>2</sup> and construction volume <20,000m<sup>3</sup> the magnitude of dust impact potentially arising from the Porth Mellon scheme is small (minor). Zero residential receptors have been identified within 20m of the Porth Mellon site, as a result the risk of dust impacts is assessed as medium. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential dust is assessed as **Neutral**.

Construction activities would also take place within 20m of the Higher Moors and Porth Hellick SSSI, which is considered to be medium sensitivity on the basis of the IAQM Guidelines. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential dust is assessed as slight or moderate. Given the prevailing south-westerly wind direction and the location of the Higher Moors and Porth Hellick SSSI to the north and northwest of the proposed works, the significance of effect has been assessed as **temporary Moderate adverse**.

### **South Dunes**

According to the IAQM Guidelines, given that the earthworks area would be <2,500m<sup>2</sup> and construction volume <20,000m<sup>3</sup> the magnitude of dust impact potentially arising from the South Dunes scheme is small (minor). No residential receptors have been identified within 20m of the South Dunes site, as a result the risk of dust impacts is assessed as medium. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential dust is assessed as **Neutral**.

Construction activities would take place within 20m of the Pentle Bay, Merrick and Round Islands SSSI, which is considered to be medium sensitivity on the basis of the IAQM Guidelines. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential dust is assessed as slight or moderate. Given the prevailing south-westerly wind direction and the location of the Pentle Bay, Merrick and Round Islands SSSI to the north and northwest of the proposed works, the significance of effect has been assessed as **temporary Moderate adverse**.

Construction activities would also take place within Isles of Scilly Complex SAC and the Isles of Scilly Ramsar, which are considered to be high sensitivity on the basis of the IAQM Guidelines. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential dust is assessed as **temporary Moderate adverse**.

## **10.4.2 Noise and Vibration**

### **Porthloo**

According to BS 5228 the operation of a 20t excavator, 6t dumper and delivery of premixed concrete, likely to be required to undertake the proposed works the Porthloo site, could result in impacts on sensitive receptors where located approximately 10m from the works. No residential receptors are located within 10m of the Porthloo site. However, six residential receptors have been identified within 20m, and given the low noise environment of the site, this indicates that there is **potential for significant temporary noise effects on residential receptors** as a result of the works. BS 5228 refers to noise reductions that can be achieved through best practicable means, and so it is recommended that this is considered further in the mitigation assessment below to reduce the risk of significant noise impacts occurring.

### **Porth Mellon**

According to BS 5228 the operation of a 20t excavator and 6t dumper, likely to be required to undertake the proposed works at the Porth Mellon site could result in impacts on sensitive receptors at approximately 10m. No residential receptors are located within 10m of the Porthloo site. However, six residential receptors have been identified within 20m, and given the low noise environment of the site, this indicates that there is **potential for significant temporary noise effects on residential receptors** as a result of the works. BS 5228 refers to noise reductions that can be achieved through best practicable means, and so it is recommended that this is considered further in the mitigation assessment below to reduce the risk of significant noise impacts occurring.

### **Porth Hellick**

According to BS 5228 the operation of a 20t excavator and 6t dumper, likely to be required to undertake the proposed works at the Porth Hellick site could result in impacts on sensitive receptors at approximately 10m. No residential receptors are located within close proximity to the Porth Hellick site, with the closest residential receptor located over 200m away from the site. However, the Higher Moors and Porth Hellick Pool SSSI, which is designated in part for its populations of breeding and over wintering birds is located within 10m of the site. As the works would be taking place in winter 2020, there is the **potential for significant temporary noise effects on sensitive ecological receptors**, in particular over wintering birds. BS 5228 refers to noise reductions that can be achieved through best practicable



means, and so it is recommended that this is considered further in the mitigation assessment below to reduce the risk of significant noise impacts occurring.

### ***South Dunes***

According to BS 5228 the operation of a 14t wheeled excavator and tractor towing trailer, likely to be required to undertake the proposed works at the South Dunes site, could result in impacts on sensitive receptors at approximately 10m. No residential receptors are located within close proximity to the South Dunes site, with the closest residential receptor being located over 500m from the site. However, the Pentle Bay, Merrick and Round Islands SSSI, Isles of Scilly Complex SAC and the Isles of Scilly Ramsar are located within 10m to 20m of the site. As such there is **potential for significant temporary noise effects on sensitive ecological receptors**. BS 5228 refers to noise reductions that can be achieved through best practicable means, and so it is recommended that this is considered further in the mitigation assessment below to reduce the risk of significant noise impacts occurring.

### ***10.4.3 Light Spill***

#### ***Porthloo***

The location of the Porthloo site within the Isles of Scilly AONB means that it is considered an intrinsically dark landscapes of very high sensitivity. As some aspects of the construction are likely to need to be undertaken at low tide conditions at night, construction work areas and construction compounds may need to be artificially lit. Porthloo Lane is currently not illuminated with street lighting, so this could require artificial lighting depending on the location of the construction compound. It has been assumed that where night-time working would be required, two 7m VT2 lighting towers would be required. The VT2 typically provides illumination of 20 lux over an area of approximately 2000m<sup>2</sup>, which if positioned directly over the working area would limit light spill at this level of illuminance to less than 50m.

Residential receptors are present within 50m of the Porthloo site, with 6 properties within 20m, and so utilising the impact magnitude criteria in Table 10-7, this is assessed a moderate impact. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential light spill from the Porthloo site as a result of night-time working is assessed as **Temporary Large Adverse**.

#### ***Porth Mellon***

The location of the Porth Mellon site within the Isles of Scilly AONB means that it is considered an intrinsically dark landscapes of very high sensitivity. As some aspects of the construction are likely to need to be undertaken at low tide conditions at night, construction work areas and construction compounds may need to be artificially lit. It has been assumed that where night-time working would be required, two 7m VT2 lighting towers would be required. The VT2 typically provides illumination of 20 lux over an area of approximately 2000m<sup>2</sup>, which if positioned directly over the working area would limit light spill at this level of illuminance to less than 50m.

Residential receptors are present within 50m of the Porth Mellon site, with 6 properties within 20m, and so utilising the impact magnitude criteria in Table 10-7, this is assessed a moderate impact. Using the matrix of significance of effects scoring terms provided in Table 3-4, the significance of effect of potential light spill from the Porth Mellon site as a result of night-time working is assessed as **Temporary Large Adverse**.

#### ***Porth Hellick***

The location of the Porth Hellick site within the Isles of Scilly AONB means that it is considered an intrinsically dark landscapes of very high sensitivity. As some aspects of the construction are likely to need to be undertaken at low tide conditions at night, construction work areas and construction compounds may need to be artificially lit. It has been assumed that where night-time working would be required, two 7m VT2 lighting towers would be required. The

VT2 typically provides illumination of 20 lux over an area of approximately 2000m<sup>2</sup>, which if positioned directly over the working area would limit light spill at this level of illuminance to less than 50m.

No residential receptors are present within 50m of the Porth Hellick site, with the closest residential receptor located over 200m away from the site. Given that there are no sensitive human receptors within close proximity to the site, the significance of effect of potential light spill from the Porth Hellick site as a result of night-time working is assessed as **neutral**.

### ***South Dunes***

The location of the South Dunes site within the Isles of Scilly AONB means that it is considered an intrinsically dark landscapes of very high sensitivity. As some aspects of the construction are likely to need to be undertaken at low tide conditions at night, construction work areas and construction compounds may need to be artificially lit. It has been assumed that where night-time working would be required, two 7m VT2 lighting towers would be required. The VT2 typically provides illumination of 20 lux over an area of approximately 2000m<sup>2</sup>, which if positioned directly over the working area would limit light spill at this level of illuminance to less than 50m.

No residential receptors are present within 50m of the South Dunes site, with the closest residential receptor located over 500m away from the site. Given that there are no sensitive human receptors within close proximity to the site, the significance of effect of potential light spill from the Porth Hellick site as a result of night-time working is assessed as **neutral**.

#### **10.4.4 Ground Conditions, Waste Management & Pollution Prevention**

The Ground Investigations undertaken at the Porthloo, Porth Mellon and South Dunes sites have not identified any requirements for radiation associated with ground conditions or contamination (the full reports are provided in Appendix E). It is anticipated that all arisings, including any clay material encountered, will be reused on site as backfill along the revetment toe and elsewhere within the revetment footprint. However, any excess material disposal could require offsite disposal. No proposals for waste management are set out in the construction method statements (provided in Appendix D), and so recommendation are provided in the mitigation section below, which have been used to inform an Outline CEMP (Appendix I).

### **10.5 Cumulative effects**

Given the relatively small scale and large distance from the other schemes, construction of the South Dunes scheme is not anticipated to create cumulative construction impacts with any of the other schemes.

Were the Porth Mellon and Porthloo schemes to be constructed simultaneously (as currently planned), there is potential for residential receptors around Thomas' Porth to experience minor cumulative construction impact. However, as the sites are over 500m apart, this is not considered to be significant.

Residents of Porthloo hamlet may experience minor cumulative impacts from the construction of the Porthloo scheme together with the Porth Hellick scheme where transport of materials for both schemes would be transported via Porthloo Beach. If, however, the alternative route of Isles of Scilly terminal at Hugh Town to the Porth Hellick site is used (Figure 10-1), then the potential for cumulative effects would be reduced to neutral.

### **10.6 Mitigation measures**

Temporary moderate adverse effects on sensitive receptors as a result of dust emissions has been assessed at all four sites. Therefore, in accordance with the IAQM guidelines, it is recommended that the 41 highly recommended mitigation measures for medium risk sites are implemented through a Construction Environmental Management Plan (CEMP).

Potential for significant temporary noise effects on sensitive receptors has also been identified at all four sites. It is therefore recommended that in accordance with BS 5228 the following measures are undertaken to reduced noise impacts from construction plant by between 5dB and 15dB:

- Fit more efficient exhaust sound reduction equipment on excavators and dumpers;
- Manufacturers' enclosure panels on plant need to be kept closed;
- Do not drop materials from excessive heights, rather place materials where required.
- Line chutes and dump trucks with a noise resilient material;
- Screen dropping zones with acoustic panelling attached to Heras fencing; and
- Where possible, line of sight between VT2 generator and reception point needs to be obscured. Alternatively, erect acoustic panels on Heras fencing between VT2 generator and noise receptors.

Where possible construction works should be undertaken within regular construction working hours. Typically, these are: Monday to Friday 0800 to 1800 hours and Saturdays 0800 to 1300 hours. Any construction works taking place outside of these hours would need to be agreed with the Isle of Scilly Council in advance of the works. Where daylight working is not possible noisy construction activities should be kept to a minimum and commitment made to undertaking to the recommendations of the ILP *Guidance Notes for the Reduction of Obtrusive Light* which sets out the following measures for reducing light spill and glare:

- Do not over-light working areas;
- Dim or switch off lights when a task is complete, or the area is not in use;
- Use specifically designed lighting equipment that minimises the upward spread of light near to and above the horizontal when the task is finished;
- Keep glare to a minimum by ensuring that the main beam angle of all lights directed towards any potential observer is not more than 70°; and
- Higher mounting heights allow lower main beam angles, which can assist in reducing glare.

No proposals for waste management are set out in the construction method statements (provided in Appendix D). Waste that is recyclable should be sorted on site. All waste materials will either be placed into the relevant storage disposal container or removed from site by the individual site contractor and disposed of in an appropriate manner. For any waste taken off site, a chain of custody must be recorded at all times.

Measures undertaken to minimise risks of pollution to the marine environment should follow the CIRIA guidance *Control of water pollution from construction sites. Guidance for consultants and contractors* (C253D) (Masters-Williams, 2001). Examples of good practices include;

- Site storage of fuel and any chemicals on site should be above MHWS and away from high-risk locations.
- All chemicals of a hazardous nature should be stored in bunded, locked containers in surfaced areas (bund to contain an additional 10% over the capacity of the liquid stored);
- Plant, equipment and vehicle refuelling should only be permitted at designated refuelling areas. No refuelling should take place below MHWS;
- Refuelling and bulk deliveries should be supervised at all times;
- Emergency spill kits should be available where plant is operating, and operatives should be trained in their use. Any spillages should be contained and reported;
- Drip trays should be used to prevent oil leaking from machinery when parked or stored and during refuelling.

This assessment has been used to inform development of a CEMP, provided in Appendix I. The CEMP has been written to carry forward the recommendations for environmental managements made in this ES, to the construction phase of the development project. It outlines the likely roles and responsibilities of those involved in the delivery of the project and sets out the environmental actions required to achieve a series of environmental management objectives identified for the scheme.

Environmental management actions are set out in the CEMP, within which an appropriate project team member is identified for ensuring that the action is fully implemented. Monitoring of the CEMP would be undertaken by the construction contractor as part of their Environmental Management System (EMS).

## 10.7 Residual effects

Temporary moderate adverse effects on sensitive receptors as a result of dust emissions has been assessed at all four sites. However, were the 40 highly recommended mitigation measures for medium risk sites set out in the IAQM guidelines then the residual effect of dust effects at all four sites would be **negligible**.

Potential for significant temporary noise effects on sensitive receptors has also been identified at all four sites. Were the measures recommended in BS 5228 are implemented it would be possible to reduce noise impacts on sensitive receptors arising from the use of construction plant by between 5dB and 15dB. This would bring construction noise levels at these receptors within the 70dB threshold required for a residual **negligible** likely significant effect on these receptors.

Should noisy construction operations be required outside of normal construction working hours at the Porthloo and Porth Mellon sites, this would need to be agreed with the Isle of Scilly Council in advance of the works and may require noise monitoring. Similarly, where daylight working is not possible as these site, any noisy construction activities undertaken at night should be kept to a minimum and commitment made to undertaking to the recommendations of the ILP guidelines. With these measures undertaken the residual likely significant effect on sensitive receptors at the Porthloo and Porth Mellon sites is assessed as **slight**.

With measures undertaken to minimise risks of pollution to the marine environment following the standard CIRIA guidelines the residual effect of waste and pollution management issues is assessed as **negligible**.

## 11 Cumulative and in-combination effects

### 11.1 Introduction

Regulation 18(3) of the EIA Regulations requires with reference to paragraph 5 of Schedule 4, a consideration of cumulative effects is included in the Environmental Statement:

*'A description of the likely significant effects of the development on the environment resulting from... (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources...*

*The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC(1) and Directive 2009/147/EC(2).'*

Cumulative effects would consider the impacts of any other committed developments where these would coincide with the temporal and spatial scope of the development proposals. The environmental impacts of the respective developments are assessed collectively on individual receptors to determine where this could give rise to likely significant effects, which would otherwise be not significant.

### 11.2 Baseline conditions

#### 11.2.1 Cumulative effects with other committed developments

A search of the CIOs planning applications identified developments which may cause cumulative effects<sup>64</sup>. Development projects that meet the above criteria were identified as:

**Table 11-1: Planning applications granted that could create cumulative impacts with the proposed schemes**

Reference	Description	Location
P/18/048	Installation of 9.6kW Solar Array (Two strings of 16 solar panels) to roof of fire station	Fire Station, 18 Porth Mellon Industrial Estate, St Mary's
P/17/093	Erection of a 2 bedroom dwelling. (Amended Plans) – Removal of front porch, alterations to fenestration on front, rear and North West elevations and increase in width of middle part of dwelling by 0.55m	Land adjacent to Beachfield House, Porthloo, St, Mary's
P/16/084	Replace 2 bedroom chalet with 2 bedroom cottage	White Cottage Chalet, Porthloo, St Mary's
P/16/066	Re-build existing dwelling to create a 2 storey 3 bedroom dwelling	Sunholme, Porthloo, St Mary's
P/15/077	Erection of a storage building, to house plant and equipment for the processing of waste and recyclates	Porth Mellon Waste Management Site, Moorwell Lane, Hugh Town, St Mary's

The Marine Management Organisation (MMO) is responsible for granting marine licenses in England. A marine license is required for many different activities that occur within inshore and offshore areas in England including construction works.

<sup>64</sup> <http://www.scilly.gov.uk/planning-development/planning-applications>

As is the case for planning applications, marine license applications are available to view on a public register<sup>65</sup>. This public register was searched. It was deemed that there were no permitted schemes that could create cumulative impacts with any of the proposed schemes on the public register.

### 11.3 Assessment methodology and assessment criteria

Cumulative effects are assessed with regard to (i) the environmental impacts of the development proposals when considered cumulatively with the environmental impact of other existing adjacent and approved development projects at the time of submission of the ES; and (ii) the cumulative effect of inter-relationships between multiple environmental impacts on individual receptors.

Regarding (i), the spatial and temporal scope of the EIA would take into account the following:

- The physical extent of the proposed works, as defined by the limits of land to be used (temporarily or permanently) as denoted in the respective planning or marine license consents by their site boundary;
- The nature of the existing baseline environment, including the location of sensitive receptors;
- The geographical extent of impacts beyond the sites, e.g. effects from traffic, visual effects and disturbance of ecological receptors;
- The geographical boundaries of the political and administrative institutions and authorities, which provide the planning and policy context for the project; and
- The timing of the works for the respective development project.

Cumulative effects would therefore consider the impacts of any other committed developments where these would coincide with both the temporal and spatial scope of the development proposals assessed within this ES. The environmental impacts of the respective development projects are assessed collectively on individual receptors to determine where this could give rise to synergistic likely significant effects.

Regarding (ii) the cumulative effects of inter-relationships between multiple environmental impacts would consider any impacts assessed individually within this ES, the synergistic effects of which would either be made greater as a result of the cumulative effects on the individual receptors, or which otherwise would not be considered significant on its own.

### 11.4 Potential impacts and significant effects

#### 11.4.1 Interrelationship effects between topics

Residential properties and local businesses close to the proposed developments may be subject to synergistic interrelationship effects during construction. Recreational and tourist receptors may also experience cumulative impacts arising from interrelationship effects between topics.

Table 11-2 summarises the interrelationship effect on specific receptors, as an accumulation of the environmental effects assessed individually for these receptors elsewhere in the ES.

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<sup>65</sup> [www.marinelicensing.marinemangement.org.uk/mmofox5/fox/live](http://www.marinelicensing.marinemangement.org.uk/mmofox5/fox/live)

**Table 11-2: Interrelationship impact during construction on specific receptors where environmental effects have been assessed individually elsewhere in the ES**

Receptor	Impacts			Overall Significance Assessed
	Lost Business	Public Amenity	Landscape & Visual	
Residential receptors & local businesses – Porthloo	Slight	Not significant	Moderate	Moderate
Residential receptors & local businesses – Porth Mellon	Slight	Slight	Moderate	Moderate
Recreational receptors & tourists – Porth Mellon	Not significant	Slight	Moderate	Moderate

Interrelationship effects are also possible on some environmental receptors where mitigation is proposed on other environmental topics. For example, mitigation proposed in Chapter 10: other Construction Effects could also have a positive impact upon receptors assessed in other ES chapters, including Chapter 5: Biodiversity & Nature Conservation.

#### 11.4.2 Cumulative effects with other committed developments

The environmental impacts of the four development proposals when considered cumulatively with the environmental impact of other existing adjacent and approved development projects at the time of submission of the ES is assessed for significance in Table 11-3.

**Table 11-3: Assessment of potential cumulative impacts arising from the applications described in Table 11-1**

Reference	Description	Location	Potential for cumulative effects	Significance
P/18/048	Installation of 9.6kW Solar Array (Two strings of 16 solar panels) to roof of fire station.	Fire Station, 18 Porth Mellon Industrial Estate, St Mary's	Could temporarily increase noise pollution in a similar location to the Porth Mellon Scheme.	Schemes are >20m apart and therefore no receptors within 10m of both construction sites. Insignificant.
P/17/093	Erection of a 2 bedroom dwelling. (Amended Plans) – Removal of front porch, alterations to fenestration on front, rear and North West elevations and increase in width of middle part of dwelling by 0.55m.	Land adjacent to Beachfield House, Porthloo, St, Mary's	If materials need to be delivered to this site, could increase construction-related traffic along similar routes to the Porth Hellick scheme.	Porth Hellick scheme would result in an increase in HGV traffic of 6%. Not anticipated that P/17/1093 will further increase traffic to an extent whereby an impact will become significant.
P/16/084	Replace 2 bedroom chalet with 2 bedroom cottage.	White Cottage Chalet, Porthloo, St Mary's	Could temporarily increase noise pollution in a similar location to the Porthloo Scheme.	Schemes are >20m apart, so no residential receptors within 10m of both schemes. Cumulative impacts not anticipated to be significant.
P/16/066	Re-build existing dwelling to create a 2 storey 3 bedroom dwelling.	Sunholme, Porthloo, St Mary's	Could temporarily increase noise pollution in a similar location to the Porthloo Scheme.	Schemes are >20m apart, so no residential receptors within 10m of both schemes. Cumulative impacts not anticipated to be significant.

Reference	Description	Location	Potential for cumulative effects	Significance
P/15/077	Erection of a storage building, to house plant and equipment for the processing of waste and recyclates.	Porth Mellon Waste Management Site, Moorwell Lane, Hugh Town, St Mary's	Could increase noise and light pollution in a similar location to the Porth Mellon scheme during its construction	Schemes are >20m apart, so there are no residential receptors within 10m of both schemes. Cumulative impacts not anticipated to be significant.

## 11.5 Mitigation measures

### 11.5.1 *Interrelationship effects between topics*

If the demand should arise, it is possible that a Community Liaison Officer could be appointed by the council for the Porthloo and Porth Mellon schemes, specifically. The role would require keeping residents of these areas well informed on the progress of the construction stage and answering any queries that may arise as the construction stage progresses.

### 11.5.2 *Cumulative effects with other committed developments*

No significant cumulative impacts are anticipated to be caused by other committed developments. No mitigation is therefore proposed.

## 11.6 Residual effects

### 11.6.1 *Interrelationship effects between topics*

Cumulative impacts with other developments may be experienced by residents and businesses in Porthloo and Porth Mellon. However, it should be considered that these receptors have much to gain from the installation of coastal defences in these areas, as does the entire populations of St Mary's and Tresco. Whilst this would not diminish impacts, they may experience during construction, it places it in context with maintaining and securing the future viability of the Isles of Scilly as a settlement in a changing climate.

### 11.6.2 *Cumulative effects with other committed developments*

No residual impacts regarding cumulative impacts with other developments are identified.



## 12 Conclusions

### 12.1 EIA outcomes

Table 12-1 provides a summary of the significant effects, mitigation measures and residual effects identified in each of the chapters in this ES. For the purpose of this summary table, some significance scores have been adapted to reflect the standardised approach to significance scoring as detailed in Table 3-4. Refer to the individual topic specific ES chapters for the topic specific guidelines significance terminology.

**Table 12-1: Summary of significant effects, mitigation measures and residual effects**

Environmental Topic	Locations	Potential Likely Significant Effect	Significance Score	Proposed Mitigation	Residual Effect Significance Score
<b>Coastal Processes, geomorphology and flood risk</b>	Porthloo Porth Mellon Porth Hellick	Impacts on local hydrodynamic and sediment regimes of rock stockpiling.	Negligible	Adoption of good construction practices as set out in CEMP	Not significant
	All sites	Impact on local sediment movement from beach excavation.	Negligible	Fencing installed along vehicle routes at Porth Hellick to prevent trampling of dunes.	Not significant
	Porthloo Porth Mellon Porth Hellick	Impact on local sediment regime from vehicle movements	Negligible		Not significant
	All sites	Impacts on hydrodynamic regime resulting from operation of revetment	Negligible	Full beach survey undertaken at regular intervals until clear that new defences are not impacting sediment processes	Not significant
		Impacts on local sediment regime resulting from operation of revetment	Negligible		Not significant
		Impact on flood risk resulting from operation of the revetment	Moderate (positive)	N/A	Moderate (positive)
<b>Biodiversity and Nature Conservation</b>	All sites	Disturbance to breeding birds at the Isles of Scilly SPA & Ramsar site	Slight	Adoption of good construction practices as set out in the CEMP	Not significant
		Direct damage to Isles of Scilly Complex SAC via pollution and runoff	Slight	Adoption of industry standard good construction practices as set out in the CEMP	Not significant
		Disturbance of breeding birds during construction	Slight		Not significant
		Damage to subtidal and intertidal habitats via pollution and runoff	Slight		Not significant
	All sites	Spread of invasive species	Slight	Adoption of good construction practices as set out in the CEMP	Not significant
	Porth Mellon	Damage to marine invertebrate populations through delivery of materials via landing craft	Slight	Material should be placed onto existing rocky shore wherever possible	Not significant
	Porth Hellick	Direct damage to maritime habitat within Isles of Scilly MCZ	Slight	Adoption of good construction practices as set out in the CEMP	Not significant
	Porth Hellick South Dunes	Disturbance to breeding and migratory bird species within Higher Moors and Porth Hellick SSSI, Great Pool SSSI and Pentle Bay, Merrick and Round Islands SSSI	Slight	Nesting bird check carried out by ecologist prior to works beginning. Works areas to be clearly demarcated.	Not significant

Environmental Topic	Locations	Potential Likely Significant Effect	Significance Score	Proposed Mitigation	Residual Effect Significance Score
				Access tracks will utilise unvegetated tracks where possible.	
	Porth Hellick	Loss of coastal grassland habitat through planting of <i>Fascicularia bicolor</i>	Slight	Monitoring programme implemented in the weeks post-construction to ensure species is not spreading	Not significant
<b>Landscape</b>	Porthloo	Impacts on local landscape character	Moderate (construction)	None proposed	Moderate (construction)
	Porth Mellon		Moderate (construction) Slight (operation)		Moderate (construction) Slight (operation)
	Porth Hellick		Moderate/ substantial (construction) Slight/ moderate (operation)		Moderate/ substantial (construction) Slight/ moderate (operation)
	South Dunes		Moderate (construction) Slight/ Moderate (operation)		Moderate (construction) Slight/ Moderate (operation)
	Porthloo		Impacts on residential receptors		Moderate/ Substantial (construction)
	Porth Mellon	Slight/ moderate (construction)			Slight/ moderate (construction)
	All sites	Impacts on recreational receptors	Moderate (construction) Slight (operation)		Moderate (construction) Slight (operation)
	All sites	Impact on views from St Mary's and Tresco coast paths	Moderate (construction) Slight (operation)		Moderate (construction) Slight (operation)
	Porthloo Porth Mellon Porth Hellick	Impact on views from Telegraph Road, Porthloo Lane and Carn Friars Lane	Slight/ moderate adverse (construction) Slight adverse (operation)		Slight/ moderate adverse (construction) Slight (operation)
	Porthloo Porth Mellon	Impact on views from Hugh Town Ferry Terminal	Slight		Slight
<b>Historic Environment</b>	Porth Mellon	Impact on prehistoric field systems from unloading of material onto Porth Hellick Beach	Moderate	Deliveries should be directed toward the south of the beach.	Slight
		Impact on visual setting of Scheduled Monuments	Slight (construction)	None proposed	Slight (construction)
	Porth Hellick	Impact on Sir Cloudesley Shovel grave marker from relocating it	Substantial	Watching brief implemented during relocation	Substantial
		Impact on Setting of heritage assets	Slight	None proposed	Slight

Environmental Topic	Locations	Potential Likely Significant Effect	Significance Score	Proposed Mitigation	Residual Effect Significance Score
	South Dunes	Impact on Setting of Scheduled Monuments	Slight to Moderate	None proposed	Slight to moderate
		Impact on Setting of Scheduled Monuments	Slight	None proposed	Slight
<b>Land Use, Tourism and Public Amenity</b>	Porthloo Porth Mellon	Impact on local tourism businesses	Slight (construction)	Construction to take place outside main tourist season	Slight
	Porthloo Porth Mellon South Dunes	Impacts on public access to beaches and permissive footpaths	Slight (construction)	Footpaths to be monitored by construction staff on site – public advised when it is safe to use them	Slight
<b>Sustainability and Climate Change</b>	All sites	Impact upon climate change due to the release of GHGs during construction	Significant	Materials to be used could be reconsidered. Materials should be sourced as close as possible to site.	Significant
	All sites	Impact upon local receptors as a result of the new defence offering increased flood and erosion protection	Large (positive)	N/A	Large (positive)
<b>Other construction effects</b>	Porthloo	Impact upon residential receptors arising from degradation in air quality from dust emissions.	Slight (construction)	Adoption of industry standard mitigation techniques as set out in the CEMP.	Negligible
	Porth Mellon		Moderate (construction)		
	Porthloo Porth Hellick South Dunes	Impact upon designated sites arising from degradation in air quality from dust emissions.	Moderate (construction)		Negligible
	Porthloo Porth Mellon	Impact on residential receptors arising from noise and vibration	Significant (construction)	Adoption of industry standard mitigation techniques as set out in the CEMP.	Negligible
	Porth Hellick South Dunes	Impact upon designated sites arising from noise and vibration	Significant (construction)		Negligible
	Porthloo Porth Mellon	Impact upon residential receptors arising from light spill	Large (construction)	Adoption of industry standard mitigation techniques as set out in the CEMP. Night working to be avoided if possible.	Slight
<b>Cumulative effects</b>	All Sites	Cumulative impacts arising from the impact of the proposed development on individual receptors, together with impacts from other developments on the same receptors	Not significant	None proposed	Not significant
	All Sites	Cumulative interrelationship effects arising from impacts on individual receptors when combined with other impacts on the same receptors	Moderate (construction)	Appointment of Community Liaison Officer	Moderate (construction)

## 12.2 Concluding remarks

The proposed sea defences at Porthloo, Porth Mellon, Porth Hellick and South Dunes on the Isles of Scilly will increase protection of homes, businesses and infrastructure on the Isles of Scilly, from tidal flooding and coastal erosion, for the lifetimes of the respective schemes.

It was determined by a Screening Opinion from CIoS in October 2016 that the works would constitute EIA development, and an ES must be written to accompany the planning applications for the four schemes.

This ES has assessed anticipated impacts for the four schemes under the following specialist chapters – Coastal Processes, geomorphology and flood risk, Biodiversity & nature conservation, Landscape, Heritage, Land use, tourism & public amenity, Sustainability & climate change, Construction effects and Cumulative effects. Where potential impacts have been identified (summarised in Table 12-1), mitigation has been suggested (where possible) in order to lessen these impacts.

### **12.3 Mitigation and monitoring**

An Outline CEMP has been produced to assist with the implementation of construction mitigation recommended within this ES. An ECoW would also be present on site, to aid the construction contractor for the duration of the construction period. The role of the ECoW on a construction project is to monitor compliance with the ecological policies described in the CEMP together with any planning conditions and legal environmental requirements.

If the need for one should arise, a Community Liaison Officer would be provided during the construction phases of the four schemes. The role of the Community Liaison Officer would be to communicate and coordinate between the construction contractor and local residents and businesses. This would ensure that any disruptive construction activities are well communicated to residents in advance of the works, and that the views or concerns of residents are accounted for by the construction contractor when planning the works.

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