



**11c14 Walney Island**

**(Technical report by Jacobs)**

# Policy area: 11c14 Walney Island

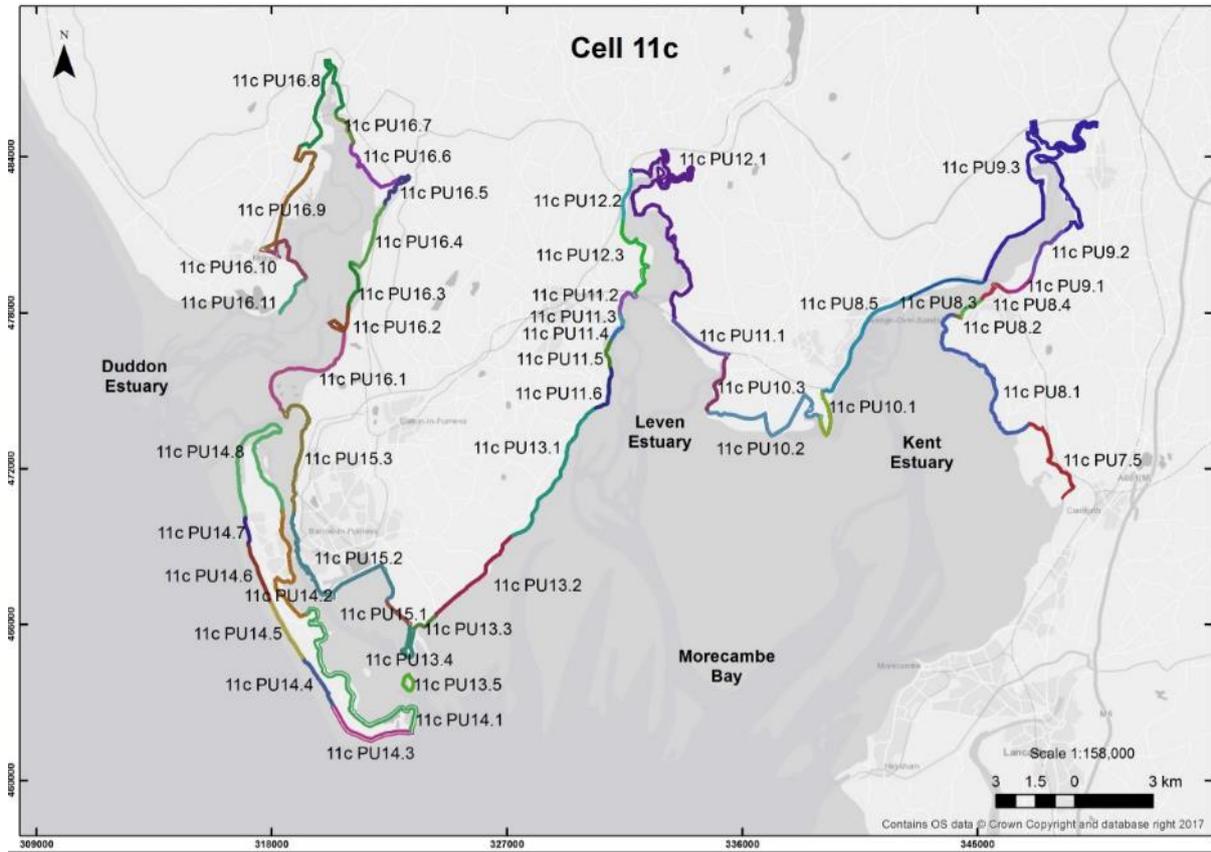


Figure 1 Sub Cell 11c Arnside to Hodbarrow Point Location Plan of policy units. Baseline mapping © Ordnance Survey; licence number 10026791.

# 1 Introduction

## 1.1 Location and site description

<b>Policy units:</b>	<p>11c14.1 South End Hawes to Biggar (east side)</p> <p>11c14.2 Biggar to Lenny Hill (east side)</p> <p>11c14.3 South End Hawes to Hare Hill (open coast)</p> <p>11c14.4 Hare Hill to Hillock Whins</p> <p>11c14.5 Hillock Whins to Nanny Point Scar</p> <p>11c14.6 Nanny Point Scar to Mill Scar</p> <p>11c14.7 Mill Scar to north of West Shore Park</p> <p>11c14.8 North Walney – from north of West Shore Park to Lenny Hill (both coasts)</p>
<b>Responsibilities:</b>	<p>Barrow Council</p> <p>Cumbria Country Council</p> <p>Private landowners</p>
<b>Location:</b>	<p>The policy area covers the entire frontage of Walney Island, both open coast (west coast) and channel (east coast) shorelines.</p>
<b>Site Overview:</b>	<p>Walney Island is composed of glacial deposits overlaying a rock platform; cliffs along the open coast are cut into these glacial sand and gravels, which provide little resistance to erosion.</p> <p>The two shorelines of Walney Island experience very different exposure conditions; the west coast is exposed to the Irish Sea whilst, in contrast, the east coast is sheltered from wave action. At either end of the Island, large sand and shingle spits extend towards the Duddon Estuary to the north and Morecambe Bay to the south.</p> <p>Along the west coast the beaches are characterised by a shingle upper beach and sand lower beach, with numerous shingle and cobble scars (Halcrow, 2011). The sheltered east coast of Walney Island is characterised by large expanses of saltmarsh and sand or mudflats (Halcrow, 2011) and is separated from the mainland by Walney Channel and Piel Channel. Saltmarshes are present at North End Marsh, Tummer Hill Marsh and along Biggar Sands, Snab Sands and Haws Bed.</p> <p>Significant areas of Walney are low lying and at coastal flood risk, including the village of Biggar, while other parts of the island, including the major settlements at Vickerstown and North Walney are on higher land. A rock revetment has recently been constructed at West Shore Park, on the west coast, to manage erosion risk in the short term. There is an adaptation strategy for the medium to long term.</p> <p>The south and north of the Island are sparsely populated, with low grade agricultural land and nature reserves. Walney Airfield is located towards the north. There are also a number of historical landfill sites on the eroding west coast of the island which constitute a pollution risk.</p> <p>The lifting Jubilee Bridge which carries the A590 road provides the only transport link between the Island and the mainland. There are a number of other roads crossing the Island linking the various communities.</p> <p>Historically there has been a general trend for erosion on the west coast and accretion on the shingle and sand spits at the north and south of the Island,</p>

	<p>resulting in a net narrowing of the Island over time. In response, flood and erosion defences have been put in place at various locations around Walney Island to manage the probability of flooding and erosion, dating back to the 1930s, but sections of shoreline remain undefended. If left unmanaged the west coast would continue to erode, leading to more frequent risk of surge tides causing flood water to spread across low lying land affecting both the east and west sides of the island.</p> <p>The intertidal area around the coastline of Walney, is designated internationally, nationally or locally. The designations include: Duddon Estuary Special Protection Area (SPA), Ramsar Site and Site of Special Scientific Interest (SSSI); Morecambe Bay and Duddon Estuary Special Area of Conservation (SAC), SPA, Ramsar Site and SSSI; Southern Walney and Piel Channel Flats SSSI; North Walney National Nature Reserve (NNR); and South Walney NNR.</p> <p>Whilst there are no Scheduled Monuments on the Island, there are extensive historical and archaeological features from prehistory to modern day, including military artefacts from the First and Second World Wars. There is evidence of a medieval bloomery at North Haws. Relict field boundaries and ridge and furrow earthworks are also notable. There is also a number of listed properties located within North Scale, Vickerstown, Biggar and South End.</p>
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## 1.2 Current SMP policy

The policy details for this policy area are shown in the table below, taken directly from the SMP2 (Halcrow, 2011). All units have been defined as non priority for the strategy.

Table 1 Current SMP Policy for policy area 11c14

<b>Overview:</b> <i>The integrity of Walney Island as a whole will be maintained largely through natural processes over the next century. However, local flooding across the island during tidal surge events will become more frequent. The long term plan accounts for the risk of breaches at narrow areas that might compromise defence at Barrow, and risks to landfill sites which if eroded could cause pollution. By only defending limited sections of the open coast, natural processes will continue to provide sediment to the foreshore to enhance the natural defence and make the remaining defences more sustainable. On the landward side, holding the line where economically and environmentally justified is the preferred plan. The approach meets the majority of social and natural environment objectives.</i>				
Location		Policy and Approach (from 2010)		
		0-20 years	20-50 years	50-100 years
11c14.1	South End Hawes to Biggar (east coast)	<b>No active intervention</b> – Investigate whether it is feasible to withdraw from maintenance and allow natural processes to continue.	<b>No active intervention</b> – Subject to investigations, allow limited local defences to fail and natural processes to continue.	<b>No active intervention</b> – Subject to investigations, allow limited local defences to fail and natural processes to continue.
11c14.2	Biggar to Lenny Hill (east side)	<b>Hold the line</b> – Manage flood and erosion risk by maintaining existing defences.	<b>Hold the line</b> – Manage flood and erosion risk by maintaining existing defences.	<b>Hold the line</b> – Manage flood and erosion risk by maintaining existing defences.
11c14.3	South End Hawes to Hare Hill (open coast)	<b>No active intervention</b> – No defences present, allow natural processes to continue.	<b>No active intervention</b> – No defences present, allow natural processes to continue.	<b>No active intervention</b> – No defences present, allow natural processes to continue.
11c14.4	Hare Hill to Hillock Whins	<b>Hold the line</b> – Manage flood and erosion risk to sea defence at landfill sites and maintain integrity of island.	<b>Hold the line</b> – Manage flood and erosion risk to sea defence at landfill sites and maintain integrity of island.	<b>Hold the line</b> – Manage flood and erosion risk to sea defence at landfill sites and maintain integrity of island.

11c14.5	Hillock Whins to Nanny Point Scar	<b>No active intervention</b> – Limited defences present, investigate possibility of withdrawing from maintenance and re instate natural processes. Establish set back flood defences when flood risk justifies.	<b>Managed realignment</b> – Create set back flood defences to allow open coast line to erode and function naturally.	<b>Managed realignment</b> – Create set back flood defences to allow open coast line to erode and function naturally.
11c14.6	Nanny Point Scar to Mill Scar	<b>No active intervention</b> – Allow shoreline to continue to evolve under natural processes.	<b>No active intervention</b> – Allow shoreline to continue to evolve under natural processes.	<b>No active intervention</b> – Allow shoreline to continue to evolve under natural processes.
11c14.7	Mill Scar to north of West Shore Park	<b>Managed realignment</b> – Continue short term limited intervention at West Shore Park to manage erosion risk whilst coastal adaptation approach is developed. Investigate feasibility of adapting existing defences to improve beach management for the whole frontage while allowing continued movement of sediment along the frontage to maintain the down drift frontages. Develop adaptation approach to move back or relocate the access track, beach access, properties at West Shore Park and golf course assets and undertake as soon as practicable	<b>Managed realignment</b> – As defences reach the end of their residual lives do not replace them and look to make adaptation or relocation provisions at West Shore Park and the golf course to manage erosion risk.	<b>Managed realignment</b> – By realigning, adapting or rollback of assets at West Shore Park to manage erosion risk.
11c14.8	North Walney from north of West Shore Park to Lenny Hill (both coasts)	<b>No active intervention</b> – Allow shoreline to continue to evolve under natural processes, with monitoring to assess long term risk to landfill site.	<b>No active intervention</b> – Allow shoreline to continue to evolve under natural processes.	<b>No active intervention</b> – Allow shoreline to continue to evolve under natural processes.

### 1.3 Walney Island Strategy

Since the SMP2, Walney Island Strategy has been developed; this study took account of the SMP2 policies, including information and monitoring data collected since the previous strategy. The Walney Island Strategy was approved by Barrow Borough Council and the Environment Agency in 2014.

For the current Cumbria Coastal Strategy, the policies and implementation measures set out in the recent strategy have not been reappraised. Instead a high level review has been undertaken, to take account of more recent changes, for example in coastal dynamics or defence condition, since the strategy was completed.

It should be noted that the Walney Island Strategy divided the coast into nine revised units for the development and assessment of options, named Units 1 to 9, rather than the eight policy units defined by the SMP2 in order to better account for land areas that are at flood and erosion risk from the shorelines on both sides of the island. Options were then considered in terms of the benefit areas, meaning that Units 5 and 8 were combined into a single benefit area (Benefit Area 5) due to the shared flood plains (see Figure 2).

The preferred options, identified by the Walney Island Strategy are shown in Table 2 below.

Table 2 Preferred options by unit, identified by the Walney Island Strategy. Table shows equivalent SMP2 policy units.

Walney Island Strategy Unit	Equivalent SMP2 policy unit	Short term (0 – 20 years)	Medium term (20 – 50 years)	Long term (50 – 100 years)	Change from SMP2?
<b>Unit 1 (Benefit Area 1)</b>	11c14.8	No active intervention	No active intervention	No active intervention	No
<b>Unit 2 (Benefit Area 2)</b>	11c14.7 (part)	Managed realignment – extend temporary rock armour and maintain defences to allow relocation of properties	Managed realignment – remove rock defences	Managed realignment – Do nothing	Minor
<b>Unit 3 (Benefit Area 3)</b>	11c14.7 (part)	No active intervention	No active intervention	No active intervention	Yes
<b>Unit 4 (Benefit Area 4)</b>	11c14.6	No active intervention	No active intervention	No active intervention	No
<b>Units 5 and 8 (Benefit Area 5)</b>	Unit 5 - 11c14.5 Unit 8 - 11c14.2 (part), 11c14.1 (part)	Do minimum – Repair defences as and when failures occur.	Do minimum – Repair defences as and when failures occur.	Do minimum – Repair defences as and when failures occur.	Yes
<b>Unit 6 (Benefit Area 6)</b>	11c14.4	Do minimum – Repair defences as and when failures occur.	Do minimum – Repair defences as and when failures occur.	Do minimum – Repair defences as and when failures occur.	Yes
<b>Unit 7 (Benefit Area 7)</b>	11c14.3 and 11c14.1 (part)	No active intervention	No active intervention	No active intervention	No
<b>Unit 9 (Benefit Area 8)</b>	11c14.2 (part)	No active intervention	No active intervention	No active intervention	Yes

For the purposes of this strategy, the Walney Island Strategy Benefit Areas (1 to 8) have been used, rather than the SMP2 policy units.



Figure 2 Subdivision of coast, for Walney Island Strategy.

## 2 Appraisal of Walney Island Strategy

For the Cumbria Coastal Strategy, all of Walney Island has been defined as a non priority area, as there is an approved strategy in place.

A light touch review has therefore been undertaken of current Walney Island Strategy recommendations, taking into account information from the most recent asset inspections report (Barrow Borough Council, 2016), analysis of beach monitoring data (CH2M, 2018), and recent observations of coastal change and concerns raised by local residents.

As noted above, the areas defined by Walney Island Strategy have been used rather than the SMP2 policy units; therefore, this proforma differs from others produced for this current strategy.

### 2.1 Benefit Area 1 - North Walney (unit 1)

#### 2.1.1 Existing approach to flood and coastal erosion risk management

This frontage is largely undefended. There is a low risk of either erosion or flooding across most of the area.

#### 2.1.2 Strategy considerations

In terms of flood and erosion risk, the Walney Island Strategy identified:

- Low risk of erosion to a former landfill site, as the shoreline shows a historical trend of accretion at that location.
- Few properties at present or future tidal flood risk.
- Section of the eastern runway at the airfield (operated by BAE Systems Ltd) at risk of flooding under a 1 in 50 (2%) annual probability event, which increases in future with sea level rise to a 1 in 1 (100%) annual probability event. The remaining two runways and the airport buildings would be unaffected and so the impact upon the airfield would be limited.

This area has significant environmental value and encompasses North Walney National Nature Reserve (NNR), featuring nationally rare and important habitats such as sand dunes, dune heath, hay meadows, intertidal mudflats and saltmarsh. The area is an important haven for breeding and overwintering birdlife, and supports the rare natterjack toad. As such it is also designated as Duddon Estuary SSSI, Duddon Estuary Ramsar, Morecambe Bay & Duddon Estuary SPA and Morecambe Bay SAC. The intertidal zone is currently in favourable condition (last assessed in 2010) and is important for its bird interest. The last inspection stated that there were no known new activities or management occurring on the site that are likely to affect the condition of the key habitat features, other than natural processes and fluctuations.

Whilst there are no scheduled monuments or Listed Buildings within this area, there is high archaeological interest, with previous finds indicating evidence of occupation from late Neolithic and early Bronze Age.

From the east side of the Island, the route of the England Coast Path skirts the edge of Walney Airfield and does not go to the north end of the North Walney NNR; instead it follows a loop using existing paths. This is to prevent disturbance to vegetated shingle and sand dune habitats (interest features of the Morecambe Bay SAC), and to prevent disturbance to roosting and breeding birds. To the west of the airfield the route lies slightly inland to avoid areas of vegetated shingle (features of the Morecambe Bay SAC). North Walney is registered Access Land under the CRoW Act 2000 but there are defined routes through the NNR.

At North End Haws, accretion has previously been reported, which resulted in an increased width of the intertidal zone by up to 25 m per year in the last half of the 19th century (Atkins, 2000).

However, more recently it was identified that a secondary tidal channel had split from the main Jubilee Channel, which started to reverse this trend (Halcrow, 2012). There are only two North West Regional Monitoring Programme profile monitoring locations that cover the western shoreline of North End. Data from these show that the sand dunes at Shope Tree Scar, North End Rabbit Warren, retreated around 8 m between 2008 and 2016, but most of this erosion occurred between 2013 and 2014, probably in response to the winter storms. Beach levels since have shown some recovery. The profile further south shows that over the same period there has been net accretion of the dune. Oblique aerial images (latest from 2015) suggest that in general the frontal dunes are well vegetated and show little sign of mobility, apart from a short stretch, when bare sand is visible (Figure 3).



*Figure 3 North Walney illustrating that the frontal dunes are generally well vegetated and show little sign of erosion, part from a short stretch at the right hand side of the photograph. Also shown are the mobile bars and channels along the foreshore, which may locally have an influence on exposure conditions. 2015 aerial photograph © North West Regional Monitoring Programme.*

There is no coastal monitoring on the sheltered east coast of Walney Island; previously it has been reported to be relatively stable but this cannot be confirmed from available data.

### 2.1.3 Discussion

No do something options were considered by Walney Island Strategy, due to the limited number of assets at risk (which include the historic landfill site, Ferry pub and a few properties at North Scale), that would be at risk of flooding and erosion within the 100 year strategy lifetime.

There has been no significant change in risk levels since the strategy, therefore the current strategy approach of Do nothing is considered appropriate and in accordance with the management principles of the national and international environmental designations for the site, as it promotes natural functioning of the coastal system.

Future actions include:

- Continued monitoring of beach and shoreline change, as part of the North West Regional Monitoring Programme, to identify any changes in observed trends and any possible increase in risk level. At this stage it is not thought necessary to add any additional profiles, but should the profile data indicate significant change, further profiles or use of remote sensing, such as LiDAR, could be beneficial.
- Risk of flooding to the BAE systems airfield needs to be monitored. It may be necessary for localised works to manage this risk in the future. These would require consent from Natural England and a scheme Habitats Regulations Assessment (HRA) and Appropriate Assessment

(AA) would need to be undertaken, given the significant environmental value of the area. As part of this, the potential for impacts on buried archaeology would also need consideration.

## 2.2 Benefit Area 2 - West Shore Park (unit 2)

### 2.2.1 Existing approach to flood and coastal erosion risk management

Erosion has been an ongoing issue along the West Shore Park frontage. A fishtail groyne was constructed at Earnse Point to the south, in 1993 to 1994, to stabilise the frontage, but erosion continued along West Shore Park. In response, an informal rock armour revetment was constructed in 2007 along the southern half of the West Shore Park frontage. However, following this, there was accelerated erosion along the northern half of the frontage.

In 2013, there was further erosion at West Shore Park and part of the road fronting the park was undermined and failed. The road was not passable and temporary works were required to replace or relocate the rock which had been removed.

A new rock armour defence was installed a couple of years ago and remains in Very Good condition (Barrow Borough Council, 2016). This defence is privately maintained. The defences are temporary as they are due to be removed after 20 years to allow for the Park owners and residents to develop and implement an adaptation strategy in conjunction with the Council (Barrow Borough Council, 2016).



Figure 4 Rock armour defence at West Shore Park (Barrow Borough Council, 2016).

### 2.2.2 Strategy considerations

This frontage consists of a gently sloping shingle beach with a large expanse of sand exposed at low water. West Shore Park was recognised by the Walney Island Strategy to be at significant erosion risk and at the time of the strategy, the rate of erosion was estimated to be up to 1.2 m per year, based on data from 2008 to 2013. Further erosion took place in winter 2013 to 2014. Although several beach profile data were collected along the West Shore Park frontage between 2008 and 2009, these locations have been re surveyed only once since then; after a storm in February 2018. There is only one profile location where data is regularly collected as part of the North West Regional Monitoring Programme; this lies at the southern end of the Park, near the car park. This shows that there is evidence of localised beach accretion at the toe of the beaches, but the permanence of this material is uncertain. Further seaward, changes in beach level reflect movement of sand bars across the scar feature.

The Walney Island Strategy calculated that under a Do nothing scenario (prior to the construction of the recent rock armour scheme), 26 residential properties would be at risk of erosion by year 25 and 94 by year 99 and that the sewerage pumping station, which serves the whole of West Shore Park, could be lost by year 20. In addition to the risk to properties at West Shore Park, the road that runs in front of the Park is an emergency access to the airfield and therefore an important link road.

The area is a key tourism area for the Island and the beach at West Shore is the most northerly of the three designated bathing waters on Walney Island. In 2016, it was designated as 'sufficient'.

The beach and intertidal area is designated as Duddon Estuary SSSI, Duddon Estuary Ramsar, Morecambe Bay and Duddon Estuary SPA and Morecambe Bay SAC. The intertidal zone is currently in favourable condition (last assessed in 2010) and is important for its bird interest. The last inspection stated that there were no known new activities or management occurring on the site that are likely to affect the condition of the key habitat features, other than natural processes and fluctuations.

The route of the England Coastal Path runs on the seaward side of the Park, but it is recognised that there may be need to relocation of the path in the future due to coastal change.

### 2.2.3 Discussion

The Walney Island Strategy consider 3 do something options, in addition to No active intervention:

- Do minimum – assuming reactive patch and repair every 3 years. It was assumed that this could delay onset of erosion by 10 years, compared to Do nothing, with erosion of properties by Year 20.
- Maintain – assuming replacement of rock armour units every 20 years over the 100 year period when required and extending the ad hoc rock armour along the whole frontage length in year 3.
- Managed realignment – involving the extension of existing defences along the whole of this frontage in the short term (20 years) to allow time to relocate or replace assets, with removal of defences at the end of their residual life, after which the coast would be allowed to erode naturally.

The Walney Island Strategy concluded that Managed realignment was the preferred option, for the following reasons:

- Most economically viable.
- Implements SMP2 preferred policy of Managed realignment along this frontage.
- Is the environmentally preferred option, as it enables processes to continue while allowing adaptation to changes in future climate.
- Technically feasible.

Since the Walney Island Strategy, new rock armour defence has been installed along the frontage (see Figure 4). This defence is intended to be temporary and is due to be removed after 20 years, therefore the approach is in line with the current Walney Island Strategy preferred option and SMP Policy of Managed realignment. Continuing to maintain the defence here in the short term may, however, be affected by decisions along adjacent frontages to the south.

Future Actions include:

- Continued monitoring of the beach fronting defences and either side of the defences as part of the North West Regional Monitoring Programme. Currently, there is only one profile location, but it is recommended that an additional profile be added to be more representative of changes along the Park frontage.
- Liaison between the Park owners and Barrow Borough Council to discuss future relocation of the Park, as set out by the SMP and Walney Island Strategy. This is also likely to require discussion with Natural England as the surrounding area is designated for its environmental interests.

## 2.3 Benefit Area 3 - Earnse Point to Walk Haw Scar (unit 3)

### 2.3.1 Existing approach to flood and coastal erosion risk management

This frontage has been largely defended since the 1950s in the form of revetments (Figure 5). Whilst these have prevented erosion and shoreline retreat, the Walney Island Strategy identified that they caused beach lowering over time with subsequent defence failure.

A fish tail groyne was constructed at Earnse Point in the 1990s; this has trapped sediment enabling the build-up of beaches, which now protect the old defences. The latest asset inspection (Barrow Borough Council, 2016) identified this to be in Good condition, with some minor displacement of rocks. It was noted that shingle has built up substantially on the southern side further reinforcing the groyne but concluded that the level of build-up did not appear to have increased significantly since the last inspection. A rock revetment continues to the north of the groyne. This is currently in Good condition, with only minor rock displacement in places.

To the south of Earnse Point groyne, at Walk Hall Scar, revetments have been constructed in the past to manage the risk of erosion. At the northern end, there has been accretion along the foreshore with vegetation growth. Here, although small rocks are missing from the revetment in places, the latest asset inspection (Barrow Borough Council, 2016) suggested that no repairs were necessary. Along the central section, there has been lowering of foreshore levels, which has exposed sheet piling at the toe of the structure. Further south, there has been vegetation growth at the toe, suggesting accumulation of sediment here; although evidence of undercutting (Barrow Borough Council, 2016) suggests lower levels in the past.

The latest inspection suggests a current condition grade of Fair and residual life of 5 – 10 years for the length of the revetment.



### 2.3.2 Strategy considerations

The beach and intertidal area is designated as Duddon Estuary SSSI, Duddon Estuary Ramsar, Morecambe Bay and Duddon Estuary SPA and Morecambe Bay SAC. The intertidal zone is currently in favourable condition (last assessed in 2010) and is important for its bird interest. The last inspection stated that there were no known new activities or management occurring on the site that are likely to affect the condition of the key habitat features, other than natural processes and fluctuations.

The route of the England Coast Path runs along the coastal edge, following the route of an existing track, in front of the golf course. The potential need to roll back or relocate the path in the future, due to coastal change, has been recognised in the proposals and, where possible, the route will be aligned several metres away from the coast or cliff edge.

Furness Golf Course is the only asset at risk along this frontage within the lifetime of the strategy. The Walney Island Strategy identified that after failure of the defences, erosion would lead to the loss of a coastal strip of golf course, with up to 5 m recession by Year 50 and 20 m by Year 99.

Beach monitoring data has been collated as part of the North West Regional Monitoring Programme: there is one profile location along this frontage, at Walk Haw Scar, where data has been collected since 2008. A more intensive survey was undertaken in 2008 and 2009, and repeated as part of post storm survey for West Shore Park in Feb 2018, but no other data have been collected at these additional profile locations. The data available show that beach levels at the toe of the sloping revetment have fluctuated over time. There was a fall in beach levels between 2013 and 2014, likely related to the storms during this period. Some recovery has occurred since, although the latest profile analysis (CH2M, 2018) found that beach levels (October 2016) were still lower, by around 0.3 m, than in 2013. The asset photographs for this frontage (see Figure 5) show that although in places beach levels have fallen, elsewhere along the reveted frontage, they have increased. Further monitoring data are required to confirm these trends. As the defence has continued to fix the backshore position along this frontage, there is no additional data for this shoreline regarding potential recession rates, once the defence fails. Data for areas to the south (Mill Scar and Bent Haw Scar) do indicate, however, that although year on year changes tend to be small, a storm event, or series of storms as experienced in winter 2013 or 2014, can cause up to 5 to 6 m of recession. Future erosion is likely to depend upon the frequency and severity of such events.

### 2.3.3 Discussion

The Walney Island Strategy considered 3 do something options, in addition to No active intervention:

- Do minimum - Reactive repair and patch up the fish tail groyne and other existing defences are assumed to take place every 10 years for the first 30 years, increasing to every 5 years to year 60 and then every 2 years up to year 100. Erosion would be delayed 10 years compared to Do nothing.
- Maintain - effectively a continuation of current practices, but extended to the whole frontage length over the 100 year period. This would involve replacement of the fishtail groyne, significant repair to revetments and rock armour and additional rock armour toe protection.
- Managed realignment – which allows maintenance of existing defences up to Year 50, with removal thereafter, allowing the coast to erode naturally.

The Walney Island Strategy concluded that No active intervention was the preferred option, although it recognised that this would not preclude privately funded maintenance of existing ad hoc defences, subject to the usual consents. This is not in line with the SMP2 preferred policy of Managed realignment, which was also the preferred environmental option, but the strategy concluded that maintenance or capital works could not be justified due to the limited assets present.

Recent beach monitoring and asset inspection data indicate that although there are local fluctuations in beach level at the toe, the sloping revetment is generally in fair state, such that ongoing maintenance could be sufficient to sustain it for a number of years, beyond the No active intervention approach. Subject to funding being available, this could be a more viable short term option than simply allowing the current defence to fail, which could have an impact on both the viability of the fishtail groyne at Earnse Point and temporary defences at West Shore Park. Once defences at West Shore Park are removed, then a more feasible realignment of the coast may be achieved, by allowing erosion and retreat of the larger frontage.

Future actions include:

- Continued monitoring of the beach fronting defences as part of the North West Regional Monitoring Programme. Currently there is only one profile location where data is regularly collected, but it is recommended that an additional profile be added to be more representative of changes along the frontage.
- Consideration of potential funding streams to support continued maintenance of the existing defences, in line with plans for West Shore Park. With a long term plan of allowing the defence to fail, once defences are removed at West Shore Park.

## 2.4 Benefit Area 4 - Walk Haw Scar to Nanny Point Scar (unit 4)

### 2.4.1 Existing approach to flood and coastal erosion risk management

There are no formal defences along this frontage. The coastline is subject to erosion along approximately a 900 m length from Hollow Scar to Bent Haw Scar.

### 2.4.2 Strategy considerations

To the north of Hollow Scar, the area is designated as Duddon Estuary SSSI, Duddon Estuary Ramsar, Morecambe Bay and Duddon Estuary SPA and Morecambe Bay SAC. The intertidal zone is currently in favourable condition (last assessed in 2010) and is important for its bird interest. To the south, the coastal zone is not covered by specific designations, but does fall within the buffer zones of Duddon Estuary SSSI and South Walney and Piel Channel Flats SSSI.

The route of the England Coast Path runs along the coastal edge, largely following the route of existing tracks or paths. The potential need to roll back or relocate the path in the future, due to coastal change, has been recognised in the proposals and where possible, the route will be aligned several metres away from the coast or cliff edge.

Beaches at Sandy Gap and Biggar Bank are designated bathing beaches; they were both classified as 'sufficient' in 2017.

The Walney Island Strategy identified that there would be no built assets at risk from erosion or flooding within the 100 year lifetime of the strategy, with an estimated shoreline retreat of up to 55 m by Year 99. Recent profile data collected as part of the North West Regional Monitoring Programme indicate that for the three profiles that cover this frontage (at Mill Scar, Tummer Hill Scar and Bent Haw Scar), there is little change recorded year on year, but the storms of winter 2013 and 2014 caused between 5 and 6 m retreat at Mill Scar and Bent Haw Scar.

### 2.4.3 Discussion

The Walney Island Strategy calculated that there are no built assets at risk of erosion within the 100 year strategy lifetime due to slow rates of erosion; therefore no do something options were considered by Walney Island Strategy. Although the more recent monitoring data shows that during storms several metres of recession can occur, other years (up to October 2016) show little change (CH2M, 2018).

Based on this data set, it is concluded that there has been no significant change in risk levels since the strategy, therefore the current strategy approach of Do nothing is considered appropriate, which is also the same as the SMP2 policy.

Future actions:

- Continued monitoring of beach and shoreline change, as part of the North West Regional Monitoring Programme, to identify any changes in observed trends and any possible increase in risk level. At this stage it is not thought necessary to add any additional profiles, but if the profile data indicate significant change, further profiles or use of remote sensing, such as LiDAR, could be beneficial.

## 2.5 Benefit Area 5 - Nanny Point Scar to Hillock Whins (unit 5) and Biggar to Tummer Hill (unit 8)

### 2.5.1 Existing approach to flood and coastal erosion risk management

Within the Walney Island Strategy, Units 5 and 8 combine to form Benefit Area 5 which extends across the island.

#### Unit 5

At the northern end of this unit, at Bent Haw (see Figure 6), the defence, which dates from the 1980s, has a crest level of 9.1 m and is made up of rock armour and large stone blocks, with some areas of tipped rubble and bricks. The 2016 asset inspection (Barrow Borough Council) notes that many of the blocks have been displaced and there are increasing areas of the rocks slipping. Some repairs have been made with rock armour.

At the locations where rocks have slipped there has been further erosion. The residual life of the structure is recorded as less than 5 years, with current condition being Poor.



*Figure 6 Bent Haw rock revetment, with erosion evident behind the revetment (Barrow Borough*

At Bent Haw tip, a linear rock armour bund was constructed along the front of the southern tarmac car park in 2000 to prevent erosion of the former Bent Haw landfill, which was previously run by Barrow Borough Council (Figure 7). The rock embankment has a crest level of 6.0 m. Although the latest asset inspection report (Barrow Borough Council, 2016) concurs with the strategy in the residual life of 5 to 10 years, it does note that shingle has now built up in front of the embankment and is providing protection to the previously exposed material along almost the entire length of the defence (see Figure 7). This is evidence that the defence is being overtopped but the build-up of shingle may now help extend the life of the defence beyond the estimate provided by the Walney Island Strategy.



*Figure 7 Bent Haw showing accumulation of shingle behind the rock revetment, which is now providing some protection to the low till cliffs behind (Barrow Borough Council, 2016).*

Armour bunds were constructed in 1988 to prevent erosion and overwashing of low lying land at Middle Hill and to the south between Cow Leys and Hillock Whins. The Walney Island Strategy noted that the revetments at Middle Hill Lane and Cow Leys Lane were being outflanked by erosion.

At Middle Hill Lane, the rock armour has a crest level of 7.6 m and the residual life is estimated to be 5 to 10 years (Barrow Borough Council, 2016), which concurs with Walney Island Strategy. This defence is located at the lowest point of the natural shoreline to prevent further erosion of the lowest lying land. The latest asset inspection (Barrow Borough Council, 2016) recorded that the defence has not been damaged by the high tides but the build-up of shingle behind the defence illustrates how easily this defence is being over topped. It was also noted that there has been some settlement of the revetment leaving sections with gaps and some stones on the foreshore but this does not appear to have deteriorated significantly since the last assessment. Furthermore, the land protected by this defence has not been eroded further since the previous inspection.



*Figure 8 Cow Leys Lane rock revetment (Barrow Borough Council, 2016).*

The latest asset inspection report notes that to the south of this unit, at Cow Leys Lane, the rock revetment (Figure 8) (which is maintained by Barrow Borough Council) now provides little protection due to previous outflanking of the defences due to erosion of undefended sections either side.

However, the report also noted the establishment of vegetation on the foreshore at the toe of the revetment and accumulation of shingle at this location, which suggests some current stability. This may extend the life of the defence beyond the estimate provided by the Walney Island Strategy.

## Unit 8

Along Unit 8, which lies along the eastern side of the Island, flood defence is provided by an earth bank that runs northwards from the village of Biggar towards Tummer Hill; this has a crest level of 6.0 m and is maintained by Barrow Borough Council. At Tummer Hill, the most recent inspection (Barrow Borough Council, 2016) concluded that the defence condition was Fair with an estimated residual life of 10 to 20 years. The defence was noted to be covered in heavy vegetation and protected by a well developed saltmarsh.



Figure 9 Tummer Hill – man-made embankment (Barrow Borough Council, 2016)

There are three outfalls through the embankment. These were judged to be in Fair to Good condition, although some issues of siltation were noted.

Biggar Dyke extends southwards to Biggar and provides flood protection to the road at high tide. This has a crest level of 7.0 m and was classified as Fair condition (Barrow Borough Council, 2016). The embankment is fronted by a mature saltmarsh and is therefore not exposed to wave erosion.

Creephaw Marsh Embankment lies to the south of Biggar and provides some protection to low grade farmland. The overall condition was defined as Fair, in the 2016 inspection (Barrow Borough



Figure 10 Creephaw Marsh Embankment in the background showing the wide expanse of fronting marsh. 2015 Aerial photograph © North West Regional Monitoring Programme.

Council), but it was noted that the embankment was heavily vegetated. There is a wide expanse of marsh in front of the defence, meaning that exposure conditions are low. Creephaw Marsh Floodgate was noted to be of lightweight material but the asset inspection reported that due to the protection from a well developed salt marsh there is little pressure on this asset. There is little evidence of flooding behind the embankment from high tide.

### 2.5.2 Strategy considerations

The Walney Island Strategy identified that erosion of Unit 5 could lead to the development of a flood route across the island impacting upon properties in Tummer Hill and Biggar Village. These properties would also be impacted by flooding directly from the west coast, via Unit 8. Walney Island Strategy calculated that risk of flooding along the Tummer Hill embankment is a 1 in 20 (5%) annual probability (overtopping), increasing to 1 in 10 (10%) and then 1 in 1 (100%) annual probability by year 20 and year 50 respectively due to projected sea level rise. The Biggar Dyke embankment, located seaward of Carr Lane, provides a higher standard of flood protection with a 1 in 1000 year (0.1%) annual probability (overtopping), increasing to 1 in 100 (1%) annual probability by year 99.

As a result, it was calculated that:

- By year 20, 12 residential properties would be at a 1 in 100 year (0.1%) annual risk of flooding, increasing to 94 residential and 3 non residential properties at risk by year 99.
- 100 ha of agricultural land would be at 1 in 5 year (20%) annual risk of flooding by year 20, increasing to 130 ha by year 99.
- The access road linking the north of the island to the south would be a 1 in 1 (100%) annual risk of flooding once the defences fail at the end of their residual life in Year 10, restricting access to Biggar village and assets to the south.
- Within this area the landfill site at Bent Haw is likely to be at risk of erosion by years 5 to 10, with up to 9 m erosion predicted by Year 20 and over 100 m by Year 99.

Erosion and overtopping is also an issue along this frontage. There has been previous flooding of the main access road to Biggar: in 2013, there was water flooding across from the west of the island (Unit 5) towards Biggar which resulted in the main access road becoming temporarily inaccessible, cutting off access between the north and south of the island. There was also overtopping of Biggar Dyke, which washed out a section of the Dyke crest and blocked the drains, delaying the flood water receding.

Recent profile data collected as part of the North West Regional Monitoring Programme indicate that between Bent Haw Scar and Middle Hill the key changes during the period of data available (2008 – October 2016) have been due to the storms in 2013 and 2014 which caused between 2 and 6 m retreat (CH2M, 2018). During other periods, change has tended to be less than 0.5 m between surveys. Further south at Cow Leys Scar, change shown by the data are difficult to distinguish from survey error, due to the presence of a rock revetment; therefore, it is not possible to define any change here.

At the time of the SMP and strategy the intertidal area on the open coast frontage was not covered by specific designations, but did fall within the buffer zones of Duddon Estuary SSSI and South Walney and Piel Channel Flats SSSI. The Morecambe Bay and Duddon Estuary SPA was extended to include this area in 2017 and now covers the intertidal area and beaches around the whole island.

The England Coast Path follows an existing track along the coastal edge and between Bent Haw and Hillock Whins the coastal strip is Registered Common Land. The potential need to roll back or relocate the path in the future, due to coastal change, has been recognised in the proposals and where possible, the path will be aligned several metres away from the coast or cliff edge.



Figure 11 Shoreline between Bent Haw carpark (left hand side) and Cow Leys Scar, showing rock armour stretches, with erosion continuing behind and active low cliffs between. 2015 Aerial photograph © North West Regional Monitoring Programme.

### 2.5.3 Discussion

For Unit 5, the Walney Island Strategy considered 3 do something options, in addition to No active intervention:

- Do minimum - Reactive repair and patch up the existing defence is assumed to take place every 10 years for the first 30 years, increasing to every 5 years to year 60 and then every 2 years up to year 100. Erosion would be delayed 10 years compared to Do nothing.
- Maintain – replacement or upgrading of a quarter of the length of existing defence every 20 years.
- Managed realignment – which allows maintenance of existing defences up to Year 20, with removal thereafter, allowing the coast to erode naturally. Set back defences are considered for Unit 8, to manage the cross island flood risk.

For Unit 8, the Walney Island Strategy considered 3 do something options, in addition to No active intervention:

- Do minimum - reactive repair and patch up the existing defences assumed every 10 years for the first 30 years, increasing in frequency to every 5 years to year 60 and then every 2 years to year 100.
- Maintain - allows for annual maintenance of the defences together with re building quarter of the length of each hard defence every 20 years from year 10. The standard of flood protection will fall over time.
- Improve - involves construction of a seawall along the channel side of the road at Tummer Hill, maintenance of the Biggar Dyke embankment and construction of two earth embankments southwest of Thorney Nook Lane to prevent flood linkages from the west coast (Unit 5).

The Walney Island Strategy concluded that Do minimum was the preferred economic option for Area 5.

For Unit 5, this was the only economically viable option and was considered environmentally acceptable. It would include relocation of the landfill site. This is potentially contrary to the existing SMP policy of No active intervention in the short term followed by Managed realignment in the long term.

For Unit 8, this option would implement the long term SMP2 policy of Hold the line in the northern part of the frontage (11c14.2 part) but does not implement the SMP preferred policy of Managed realignment in the south (11c14.1 part). It was the environmentally preferred option though.

The Walney Island Strategy does recommend that if after completion of the more detailed contaminated land studies on the landfill sites it is determined that erosion protection work is necessary for environmental or health and safety reasons, alternative sources of funding will need to be sought to maintain defences at Bent Haw landfill.

Along Unit 8, given the current condition of defences along this stretch and low exposure conditions, Do minimum is likely to sustain defences for some time. Any increase in risk and the acceptance of risk will need to be reviewed on a regular basis.

Along Unit 5, the recent asset inspection indicates that the current defences are already being overtopped, with retreat of the cliffs having occurred behind them. Although there is currently some build-up of shingle along this frontage, which may provide some protection to the cliffs, in the event of another storm, this may be stripped out and it is unlikely that the defences will provide much protection in their current state. The Walney Strategy proposed that the Do minimum option in Unit 5 should include creation of a rock stockpile to be used for maintaining and repairing the defences as and when failures occur. For this option to remain viable the storm damage that has occurred since the strategy needs to be repaired.

## 2.6 Benefit Area 6 - Hillock Whins to Hare Hill (unit 6)

### 2.6.1 Existing approach to flood and coastal erosion risk management

A rock revetment has been constructed along the south part of this frontage, providing protection to the recently decommissioned South Walney landfill site. There is also a rock bund fronting the northern part, giving some protection to historical landfill sites previously managed by Cumbria County Council. The Walney Island Strategy identified that the defences vary in condition and performance along the frontage with some sections expected to fail within 0 to 5 years. There is a short stretch, at the northern end of the former landfill site is undefended and the cliffs are actively eroding (see Figure 15).

The central part of the former landfill site is protected by White Horse Scar Revetment, which has a crest level of 6.5 m. The 2016 asset inspection (Barrow Borough Council, 2016) noted that there had been extensive loss of rocks and major movement, with the crest settling below an effective height and large gaps between rocks in the revetment (see Figure 14). The inspection also noted that monthly high tides have previously been over topping the embankment along its length.

To the south of the unit, in front of the more recent Cumbria Waste Management Ltd site protection is provided by a rock revetment (crest level 8.4 m) maintained by Cumbria County Council. The latest asset inspection (Barrow Borough Council, 2016) recorded the structure to be in Good condition, with vegetation becoming established along the foreshore at the toe of the revetment (Figure 12).



*Figure 12 Low Bank revetment, showing the development of vegetation along the toe of the structure (Barrow Borough Council, 2016).*

### 2.6.2 Strategy considerations

The Walney Island Strategy determined that over 50 ha of agricultural land could be lost to erosion over the 100 year lifetime of the strategy and that the landfill site at Low Bank would require relocation prior to year 50 to avoid the erosion of landfill material once defences fail.

The intertidal and beach area is designated as South Walney & Piel Channel Flats SSSI and Morecambe Bay and Duddon Estuary SPA. The intertidal zone is currently in favourable condition (last assessed in 2010).

The England Coast Path follows an existing track along the coastal edge. The potential need to roll back or relocate the path in the future, due to coastal change, has been recognised in the proposals and where possible, the path will be aligned several metres away from the coast or cliff edge.

There have been recent concerns raised by members of the public regarding the outwash of landfill material, due to erosion. Actions following this are discussed in the section below. There was a detailed inspection of the South Walney Closed Landfill undertaken by Barrow Borough Council in

May 2013, as part of its Statutory Duty, under Part 2A of the Environmental Protection Act 1990<sup>1</sup>. This concluded that the land does not meet the definition of contaminated land under Section 78A of the Act.

As the recession has tended to take place along the cliff top, behind the defences, the retreat has not been picked up very well by beach monitoring data for the area. The data do show, however that beach levels can fluctuate by up to a metre at the base of the defences.

### 2.6.3 Discussion

The Walney Island Strategy considered 3 do something options, in addition to No active intervention:

- Do minimum - Reactive repair and patch up the existing defences every 3 years using rock armour. Beyond 10 years, assumed that existing defences could not be maintained in a good enough condition to prevent erosion.
- Maintain – Annual maintenance including replacement of one quarter of each distinct length of rock armour defence every 20 years from the end of each defence lengths residual life.
- Managed realignment – which allows annual maintenance of existing defences up to Year 50, with removal thereafter, allowing the coast to erode naturally.

The Walney Island Strategy concluded that Do minimum was the preferred economic option and that whilst this was not the environmentally preferred option it was environmentally acceptable as it would only have minor adverse impacts on geomorphology and provides benefits for ecology and societal assets. Do minimum would only implement the SMP preferred policy of Hold the line along this frontage in the short term. To implement the preferred Do minimum option the Walney Island Strategy recommended that the rock defences should be reactively repaired with rock stockpiles will be created immediately so that materials are readily available for repairs when defences fail.

The Walney Island Strategy did recommend that if after completion of the more detailed contaminated land studies on the landfill sites it is determined that erosion protection work is necessary for environmental or health and safety reasons, alternative sources of funding will need to be sought to maintain defences at these landfill sites.

However, since the Walney Island Strategy was approved, an area of the historic landfill has been subject to wash out by the sea following the winter storms of 2013. A separate report was produced by Cumbria Waste Group (CWG) in 2014 which reported that the site, which lies between Hillock Whins and White Horse Scar, covers around 14 ha (see Figure 13), but that the depth of deposited waste is not known. The central part of the site (indicated as Area A on the map below) is bounded by a bund protected by rock armour. There has been damage to the rock armour and some has been removed by wave action. There has been erosion of the perimeter bund and exposure of some waste (Figure 14). Along the northern end of the site (indicated as Area C on the map below) there is no perimeter bund and this frontage is undefended; this is where waste has become exposed (Figure 15). The CWG report also states that Barrow Borough Council's Coastal Survey refers to monthly high tides overtopping the rock armour along Area A.

There have been recent works along this frontage undertaken by Cumbria County Council (March and April 2018 and ongoing) that include reprofiling and capping of the bund with clay, as well as organising regular inspections and litter picks to reduce the risk of pollution and contamination along the frontage.

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<sup>1</sup> (2013) Detailed Inspection and Assessment of South Walney Landfill Part 2A Environmental Protection Act 1990.

Refers to report by AMEC: AMEC (2012) South Walney Landfill - Final Detailed Part2A Inspection Interpretive Report. Cheshire: AMEC Environment & Infrastructure UK Limited.

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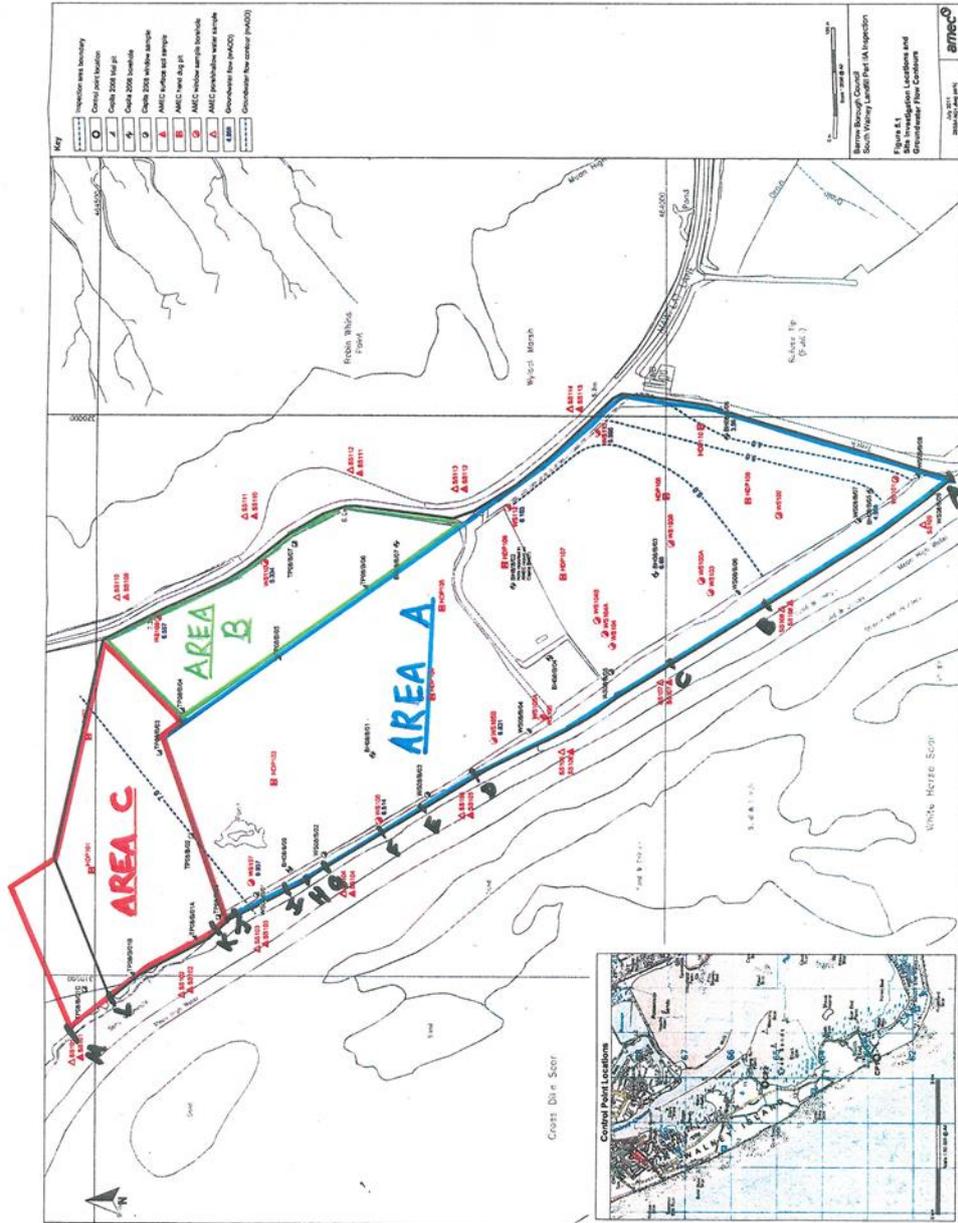


Figure 13 Site drawing showing the location of the landfill site between Hillock Whins and White Horse Scar. Taken from CWG (2014).



Figure 14 Area A, section B-C, shown on map above, illustrating erosion of the perimeter bund behind the rock armour. Taken from CWG (2014).



Figure 15 Area C, showing no protection to cliffs and exposure of waste. Taken from CWG (2014).

It is understood that Cumbria County Council are currently seeking a longer term permanent solution to the problem, to mitigate the impacts of coastal erosion along the frontage, beyond the current strategy of reactive maintenance. This will involve a four phase approach from preliminary investigatory work, through options development and concept design work, to subsequent detailed design and construction. The first two phases are due to be completed by winter 2018 to 2019.

The outcome is likely to require a revision of the preferred strategy option, reverting to the existing SMP2 policy for this frontage of Hold the line.

Future actions include:

- Ongoing monitoring of beach and defence condition, as part of the North West Regional Monitoring Programme.
- Separate study to be commissioned by CCC to develop options to mitigate the impacts of coastal erosion at former South Walney Landfill Site
- Possible revision of strategy option, but unlikely to require a change to SMP policy.

## 2.7 Benefit Area 7 - South Walney (unit 7)

### 2.7.1 Existing approach to flood and coastal erosion risk management

This unit extends from Haw Hill on the west coast, anticlockwise around the island to the south of Creephaw Marsh on the east coast. On the western and southern coasts of this unit, there are groynes present which were intended to slow littoral drift. The Walney Island Strategy suggested that the lack of maintenance and the high energy environment have meant that groynes south of Hare Hill and at Hilpsford Point have had only limited success.

On the eastern and northern coasts of this unit, between South End Hawes and Biggar, flood defence is generally provided by saltmarsh and the natural topography of the land supplemented at low spots by intermittent privately maintained earth bunds. Around the southern end of the island, a 1.5 km long embankment, built to protect the oyster farm, provides the main flood defence.

Along part of Wylock Marsh there is a privately maintained embankment; ownership of this is unknown, but it provides only a low level of protection to both agricultural fields and the road (Mawflat Lane). Barrow Borough Council maintain a flood gate within a culvert under the road or embankment. A new floodgate was fitted in January 2013, following damage to agricultural land when the original floodgate failed. The road has previously been overtopped by tidal surges. The

current condition of the floodgate is Fair (Barrow Borough Council, 2016) with repairs required to loose blockwork. Mawflat Lane is known to overtop on large tides and tidal surges, making the route to South Walney Nature Reserve impassable on very large tides.

Further embankments are present at Rape Haw and South Haws (Shelley Bays). Ownership is unknown and both were reported to be in Poor condition (Barrow Borough Council, 2016), with evidence of undercutting and damage due to high tides.

## 2.7.2 Strategy considerations

Coastal erosion and tidal flooding are both risks to this area. The Walney Island Strategy determined that there are few assets in this area:

- 3 residential properties, 2 non residential properties and 140 static caravans at 1 in 100 (1%) annual probability risk of flooding by year 99 under a scenario of Do nothing.
- 35 ha of low grade agricultural land will be at risk of 1 in 5 (20%) annual probability of flooding by year 99 and there is also a risk of erosion along the undefended west coast.
- The road providing access between the north and south of the island is at risk of tidal flooding due to erosion of the cliffs on the western side of the island opposite South End Caravan Park.

The cliffs opposite South End Caravan Park eroded significantly during the 2013 and 2014 winter storms. As a result, water can flood over the cliffs during high spring tides making the road to the south of the island impassable for days at a time. This impacts upon access to the Nature Reserve, the oyster hatchery and the small number of properties within Unit 7 including the lighthouse and coastguard cottages. The most recent monitoring data from the North West Regional Monitoring Programme indicates that there has been continued erosion along this frontage, but this tends to be less than 0.5 m between surveys. The aerial images also indicate that the cliffs are active.

At Pho Hill and Hilpsford Scar there have been significant changes as the coastline here naturally realigns (see Figure 16). This is reflected by both significant changes in beach level and retreat of the cliffs and dunes. At Pho Hill this erosion is not just driven by storms, with recession recorded prior to storms in 2013 of around 7 m. A further 12 m occurred in 2013 and 2014 and 6 m in 2015 and 2016 (CH2M, 2018). At Hilpsford Scar, there has been erosion and retreat of the fronting shingle bank, with around 25 m change between 2012 and 2016, but the impact of this has not yet been observed along the dune face.

This area incorporates the area covered by South Walney Nature Reserve, which is managed by Cumbria Wildlife Trust and is designated as part of the South Walney and Piel Channel Flats SSSI, Morecambe Bay and Duddon Estuary SPA and Morecambe Bay Ramsar, which includes both intertidal areas and South End Haws sand dune system. South End Haws sand dune is currently in unfavourable recovering status (last assessed in 2010), with poor zonation and invasive species key negative indicators. The intertidal area (South End Saltmarsh) is in Favourable condition (last assessed in 2011).

The area has high heritage value and during the medieval period was farmed by the monks of Furness Abbey. In the 19th and 20th centuries salt, sand and gravel were extracted, leaving large lagoons and industrial remains.

The proposed route for the England Coast Path crosses the island north of the South Walney Nature Reserve, between Hare Hill and Rape Haw and does not enter South Walney Nature Reserve. North of Rape Haw, on the east shoreline of the Island, the main route initially follows a track at the top of the foreshore, as far as Scar End Point. Here it rejoins the minor road, which it then follows as far as the northern edge of Creepshaw Marsh. This coastal strip is also Registered Common Land (Creepshaw Marsh and Saltmarsh).



Figure 16 South End Haws, here there has been shoreline change as the coastline realigns. 2015 Aerial photograph © North West Regional Monitoring Programme.

### 2.7.3 Discussion

The Walney Island Strategy considered 2 do something options, in addition to No active intervention:

- Do minimum - reactive repair and patch up of the existing defences assumed to take place every 10 years for the first 20 years, then every 5 years to year 50 then every 2 years to year 100. Erosion risk would be delayed by 10 years and flood risk managed until defences failed in around year 15.
- Maintain - allows for the annual maintenance of the existing defences, together with the replacement of the existing embankments at the end of their individual residual life and every 50 years after. Erosion risk and flood risk would be managed.

The Walney Island Strategy concluded that No active intervention was the preferred option for Benefit Area 7, due to few assets in this benefit area. However, this would not preclude privately funded maintenance of existing ad hoc defences, subject to the usual consents. The latest asset inspection report (Barrow Borough Council, 2016) suggested that such privately owned defences would no longer be inspected as part of the annual asset inspections undertaken by the council.

However, the strategy also stated *“The Borough Council recognises the need to provide a resilient access to isolated properties at the southern end of the Island at times of high tides and surges. Local residents and businesses are working together on proposals to elevate the un-adopted road south of the caravan site and the Borough Council has indicated its support for this initiative.”*

Future actions include:

- Liaison between local residents and local business to ensure safe access to properties, with support from Barrow Borough Council.
- Any repairs to embankments would be permitted, but would require consent from Natural England and a scheme HRA and AA would need to be undertaken, given the significant environmental value of the intertidal and hinterland zones.

## 2.8 Benefit Area 8 - Vickerstown and North Scale (unit 9)

### 2.8.1 Existing approach to flood and coastal erosion risk management

South of the Jubilee Bridge the frontage is undefended.

Along the Vickerstown frontage, there is a sloping revetment and footpath which directly abuts the road for about 1 km north of the Jubilee Bridge, along the promenade, with a crest level of around 5.8 m. Behind this lies extensive residential development. The revetment, dating from the 1930s, is owned by Barrow Borough Council, but maintained by Cumbria County Council.

The latest asset inspection (Barrow Borough Council, 2016) records the current condition as Fair, but identified that there have been numerous repairs to the structure over time, including more recent concrete repairs. Estimated residual life is 5 to 10 years (Barrow Borough Council, 2016).

However, the inspection noted the following areas of concern:

- areas where washout has occurred and further repairs are required,
- severe cracking, loss of joint material and loss of stone from the revetment,
- increased undercutting at the toe in areas.



Figure 17 Vickerstown Promenade sloping revetment (Barrow Borough Council, 2016).

Further north are ad hoc coast protection defences and a small section of gabions at North Scale (Chapel Field road) provide erosion protection to a small number of properties. These were built in 2004 and are privately maintained (Barrow Borough Council, 2016). The last asset inspection (Barrow Borough Council, 2016) estimated a residual life of 20 to 50 years. This is longer than would usually be assumed for gabions in a coastal setting, but this stretch lies within Walney Channel and therefore there is little exposure to waves. The inspection did, however, note that there appears to be some bulging of the structure, but concluded that this does not appear to have deteriorated since the last inspection. Current condition is defined as Fair (Barrow Borough Council, 2016).

### 2.8.2 Strategy considerations

The Walney Island Strategy concluded that the key risk to this area is from flooding rather than erosion over the 100 year strategy period, as Vickerstown is located on high land and erosion along this sheltered east coast is very slow. The Walney Island Strategy calculated that current defences provide 1 in 5 (20%) annual probability of flooding, increasing to 1 in 1 (100%) annual probability by Year 20. The standard of protection for flood risk along Promenade North is 1 in 20 (5%) annual probability of flooding, increasing to 1 in 1 (100%) annual probability by Year 20.

The following potential impacts under a Do nothing scenario were identified:

- 1 non residential properties at a 1 in 100 year (0.1%) annual risk of flooding by year 20 under No active intervention, increasing to 8 residential and 5 non residential properties at a 1 in 100 year (0.1%) annual probability of flood risk by Year 99.
- 1 in 1 year (100%) annual probability of flooding of the main road running along the coast from Vickerstown north.
- Flooding through Vickerstown via low lying land could lead to flooding of Park Vale leisure centre.

There have been previous issues due to flooding: in 2013, at Vickerstown and North Scale, flooding of the road occurred resulting in the road becoming impassable. A number of properties were accessible only by foot during the high water levels.

There is no coastal monitoring on the sheltered east coast of Walney Island; previously it has been reported to be relatively stable but this cannot be confirmed from available data.

This area has significant environmental value; as such it is designated as South Walney and Piel Channel SSSI, Morecambe Bay Ramsar, Morecambe Bay and Duddon Estuary SPA and Morecambe Bay SAC. South of Biggar, Sandy Nook Marsh is currently in favourable condition (last assessed in 2011) and the last inspection noted that there was good site diversity with unhindered coastal processes; the landward edge of the marsh being restricted by a natural cliff. Tummer Hill Saltmarsh, between Biggar and Vickerstown is also in favourable condition (last assessed: 2011), with excellent diversity and structure noted by the last inspection. This also identified that this ungrazed saltmarsh is accreting and that coastal processes are active and unhindered. Similarly, in front of Vickerstown and North Scale, the intertidal zone is currently in favourable condition (last assessed in 2010) and is important for its bird interest. The last inspection stated that there were no known new activities or management occurring on the site that are likely to affect the condition of the key habitat features, other than natural processes and fluctuations.

The route of the England Coast Path between Creepshaw Marsh and Biggar follows existing paths, across a narrow strip of Registered Common Land between the saltmarsh and adjacent fields (although there are some seasonal access restrictions). North of Biggar the route follows the main highway (Carr Lane) before re-joining the coast at Vickerstown. It follows the Promenade north of Jubilee Bridge before following a path along the back of the beach at North Scale. It is recognised that the section at North Scale may need to follow a proposed alternative route along the main road in North Scale.

Most of the listed buildings on the Island lie within this area, concentrated in Biggar, Vickerstown and North Scale. There is also wider heritage interest with previous evidence of occupation of this northern part of the Island from late Neolithic and early Bronze Age.

### 2.8.3 Discussion

The Walney Island Strategy considered 3 do something options, in addition to No active intervention:

- Do minimum - reactive repair and patch up the existing defences every 10 years from the end of the residual life of each defence length using rock armour. The defence residual life is extended, delaying defence failure by 10 years to years to year 20.
- Maintain - assumes annual maintenance and a new revetment frontage constructed in Year 50 to replace the existing revetment frontage along North Promenade together with the construction of a small crest wall to provide increased defence elevation along this frontage. The gabions at Chapel Field, North Scale, were assumed to be replaced in year 20. Defences are maintained for 100 years. Flood risk would increase over time.
- Improve - maintain current defences and construct a small crest wall to provide increased defence elevation along the revetment frontage, reducing flood risk to the road and property in Vickerstown.

The Walney Island Strategy concluded that No active intervention was the preferred option due to low flood damages. This would not, however, implement the SMP2 preferred policy of Hold the line. The asset at risk from flooding would be The Promenade within Vickerstown, north of Jubilee bridge, which is also a key link road to other communities on the Island. There is also a risk that the road would become damaged and unpassable should the revetment start to fail. The defences along this section of highway are currently maintained by Cumbria County Council. The Walney Island Strategy also noted that there is a highway scheme in progress to improve drainage on Cows Tarn Lane so that emergency access to North Scale can be maintained when the Promenade is flooded. The

potential for other funding should be explored to continue to provide protection to the defences along the promenade; given the low exposure conditions along the frontage continued maintenance is likely to be sufficient for some time, with possible consideration of temporary flood defences as an alternative to raising the crest level.

Future actions include:

- Consideration of potential funding streams to support continued maintenance or future raising of the existing defences.

For comment

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For Comment