Cumbria Coastal Strategy

Technical Appraisal Report for Policy Area

11d3 Ravenglass Estuary Complex

(Technical report by Jacobs)

Policy area: 11d3 Ravenglass Estuary Complex

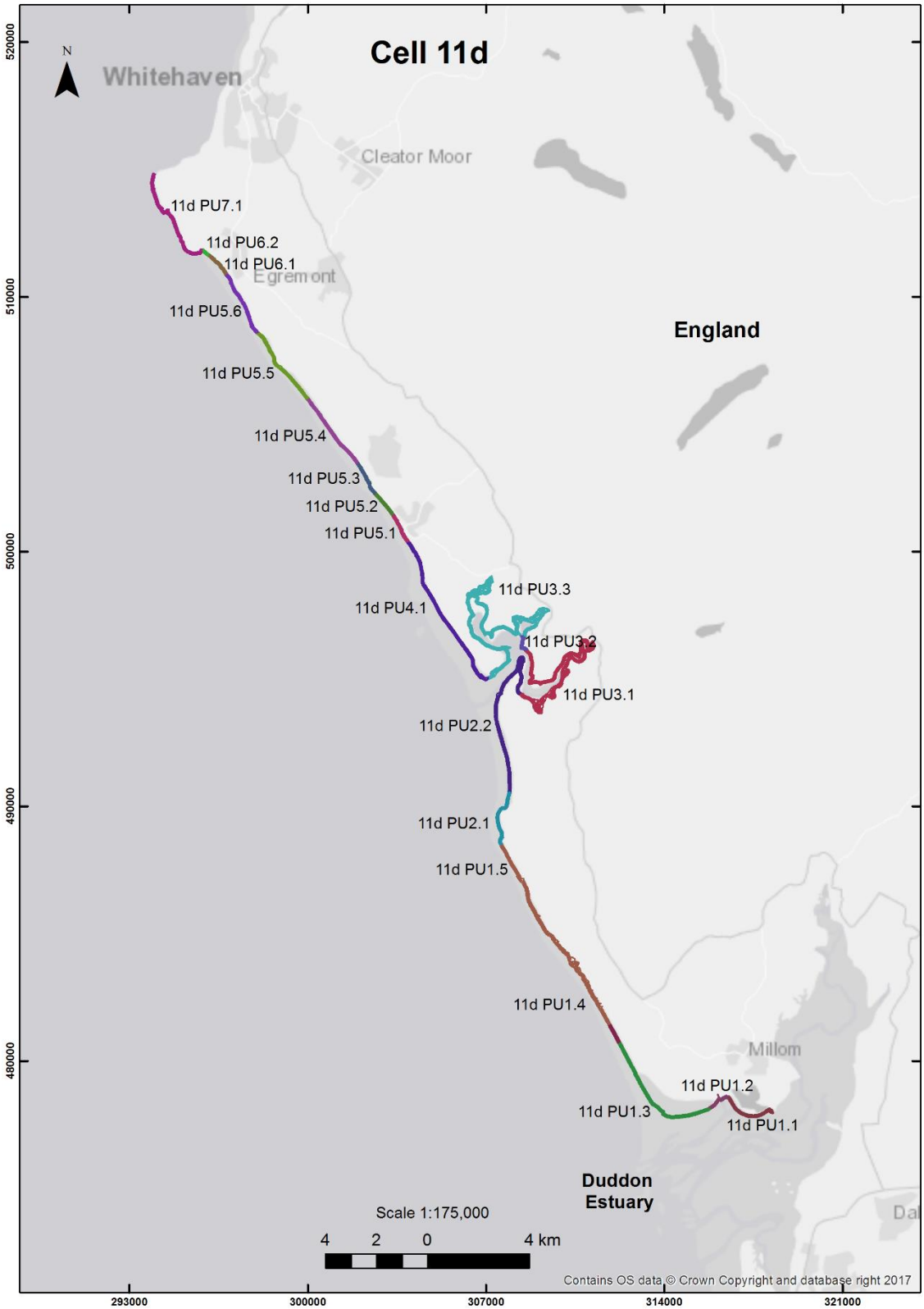

Figure 1 Sub Cell 11d Hodbarrow Point to St Bees Head Location Plan of Policy Units. Baseline mapping © Ordnance Survey: licence number 100026791

1 Introduction

1.1 Location and site description

Policy units:	11d3.1 Eskmeals Dunes to Ravenglass 11d3.2 Ravenglass 11d3.3 Ravenglass to Drigg Point
Responsibilities:	Copeland Borough Council Environment Agency Network Rail Highway Authority Private landowners
Location:	The Policy Area covers the Ravenglass Estuary Complex within sub cell 11d Hodbarrow Point to St Bees Head.
Site overview:	The Ravenglass is a small composite estuary, made up the Esk, Mite and Irt River estuaries, which share a common channel to the Irish Sea. The limits of the estuary can be defined by a line between northern end of Eskmeals dunes and Drigg Point and the normal tidal limits at Hinning House Bridge on the River Esk, Muncaster Mill on the Mite and Drigg Holme on the Irt. The mouth of the composite estuary is narrower than it was previously due to the southward extension of the Drigg Spit and northwards extension of the Eskmeals Dunes spit. The estuary is constrained by embankments fronting low lying land; reclaimed marsh and alluvial plains. The rivers flow into the estuary bordered by a steep hinterland, which limits the tidal intrusion into these rivers and therefore reduces the tidal power of the estuary complex (Halcrow, 2013). The railway viaducts have also changed the nature of the tidal flows within the estuary, leading to considerable expansion of marshland following their construction in the mid 19th century (Carr, 1986). At the present time, the estuary is believed to be close to a state of dynamic equilibrium, with localised areas of marsh edge erosion and accretion related to changes in position of the low water channels (Halcrow, 2013). Most shorelines within the estuary are sheltered from wave action due to the protection afforded by the two spits (Halcrow, 2013) and the estuary itself is only exposed to storms from the southwest due to this protection and the orientation of the mouth. There are significant lengths of unprotected glacial till cliffs and sand dunes on the coast both to the north and south of the estuary mouth, although rates of cliff recession and longshore sediment drift have been low in recent decades which if sustained may have effects on the stability of the estuary (Halcrow, 2013). Within the estuary, evidence suggests a slow increase in elevation of the saltmarshes and mudflats (Halcrow, 2011). Monitoring of the banks indicates only negligible changes to the banks of the estuary except at Saltcoats where isolates strips of saltmarsh have retreated around 5 m since 2009. The frontage lies within the Lake District National Park and World Heritage Site and there are multiple footpaths and cycleways throughout the area. The entire Ravenglass Estuary Complex is designated under land and marine based designations including SSSI, SPA, SAC and SPA. In addition, Drigg Dunes located at the mouth of the Ravenglass Estuary complex, is designated as a Local

	Nature Reserve (Drigg Dunes and Gullery, Ravenglass) and overlaps with the Cumbria Coast Marine Conservation Zone. Another defining feature of the estuary is the presence of the Drigg Low Level Waste Repository (LLWR), which stores Nuclear Waste from nearby Sellafield. Although the Drigg LLWR is located close to the Irt estuary it has been shown to be at very low long term risk of erosion from the estuary (Halcrow, 2013; Fish et al. 2010).

1.2 Current SMP policy

The policy details for the whole policy area are shown in the table below, taken directly from the SMP2 (Halcrow, 2011).

Table 1 Current SMP policy for policy area 11d3.

Overview: *The long term plan is to allow the natural behaviour of Rivers Esk, Mite and Irt to continue without further intervention. Localised defence of the Cumbrian railway is not expected to have any significant detrimental effects upon these. Managed risk to Ravenglass will continue; it is located on an area of higher land in the estuary so there are no advantages to surrounding coastal processes or environmental interests in not continuing to hold this. The recommended long term plan will promote a naturally functioning system helping to maintain a number of habitats and SSSI's. A limited number of properties and access roads will be at increasing risk of flooding in future and could need to be abandoned in the long term epoch. Some local tourism assets such as the Ravenglass and Eskdale Railway, the Cumbrian Coastal Way and small parts of Muncaster Castle Registered Park and Gardens may also be at an increasing risk of flooding in the long term. The implementation of this plan will need to manage residual risks to isolated properties, assets and infrastructure.*

Location		Policy and Approach (from 2010)		
		0-20 years	20-50 years	50-100 years
11d3.1	Eskmeals Dunes to Ravenglass including River Esk to Muncaster Bridge SMP Boundary	**No active intervention** – Permit maintenance or additional works to reduce risk to the viaduct and mainline railway as long as it is in operation.	**No active intervention** – Permit maintenance or additional works to reduce risk to the viaduct and mainline railway as long as it is in operation.	**No active intervention** – Permit maintenance or additional works to reduce risk to the viaduct and mainline railway as long as it is in operation.
11d3.2	Ravenglass	**Hold the line** - By maintaining or improving seawalls and embankments.	**Hold the line** - By maintaining or improving seawalls and embankments.	**Hold the line** - By maintaining or improving seawalls and embankments.
11d3.3	Ravenglass to Drigg Point including River Mite to Muncaster Mill and River Irt to Drigg Holme	**No active intervention** – Permit maintenance or additional works to reduce risk to the viaduct and mainline railway as long as it is in operation, subject to consent.	**No active intervention** – Permit maintenance or additional works to reduce risk to the viaduct and mainline railway as long as it is in operation, subject to consent.	**No active intervention** – Permit maintenance or additional works to reduce risk to the viaduct and mainline railway as long as it is in operation, subject to consent.

2 Appraisal of non priority units

There are three units within this policy area: all have been defined as non priority units.

A light touch review has been undertaken of current SMP recommendations, considering conclusions from option appraisals for the adjacent frontages, where appropriate.

2.1 11d3.1 Eskmeals Dunes to Ravenglass

2.1.1 Existing approach to flood and coastal erosion risk management

The existing SMP2 policy along this frontage is No active intervention on all timescales (0-100 years). The primary justifications for the policy included insufficient economic justification for new defences, and the need to maintain natural coastal processes in support of national and international designated sites within the policy unit.

Defences within this policy unit consist of predominately natural defences except the frontage north of Brighouse which consist of masonry walls supporting earth embankments and three sections of rock which are in a good condition (CH2M, 2017). Isolated areas of bank erosion are evident in the frontage north of Brighouse some of which are in close proximity to the railway. Further north, toward Ravenglass, a vertical masonry wall was described in the 2010 report as damaged with numerous breaches and the residual life had effectively expired (Halcrow, 2013). Furthermore, where the wall has been breached has allowed the cliff behind to be eroded (CH2M 2017). Overall condition of assets in this unit is deemed to be poor (CH2M, 2017). It is understood that Network Rail has recently placed additional rock armour to reinforce defences protecting the railway.

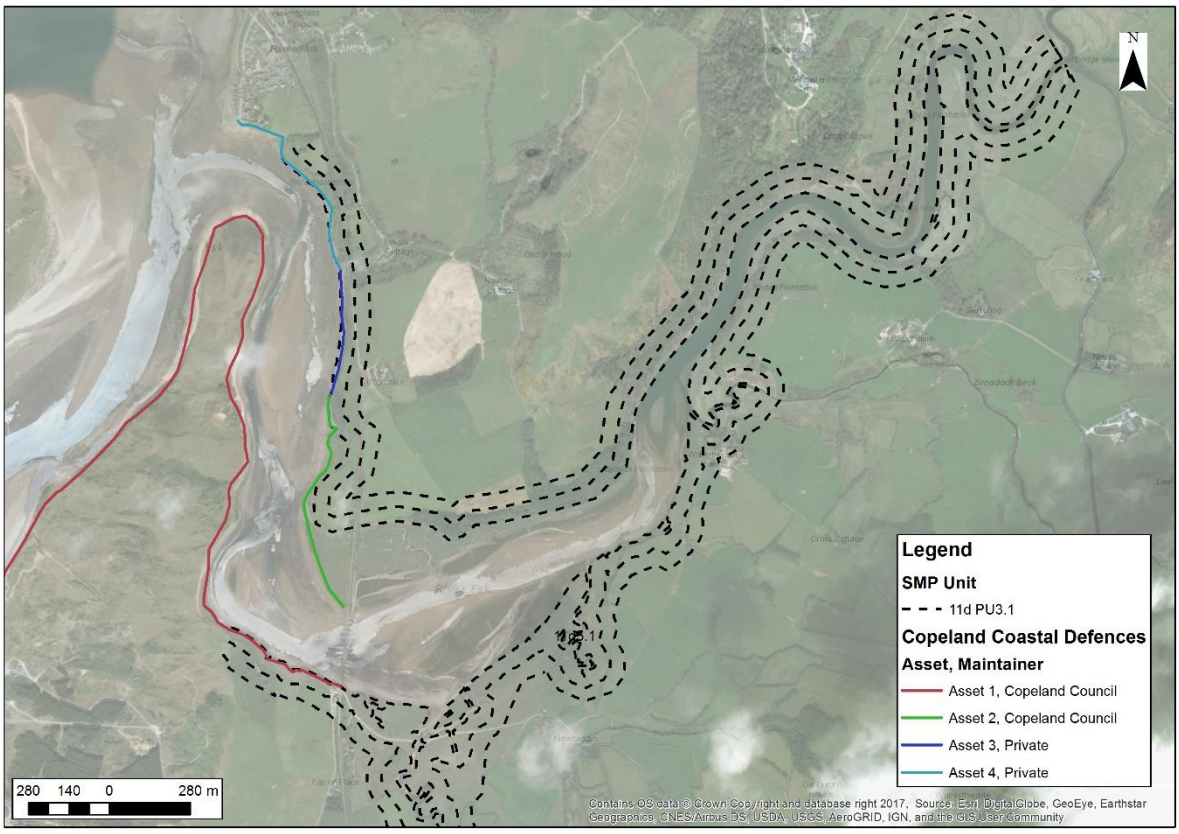

Figure 2 Overview map of policy unit 11d3.1.

2.1.2 Strategy considerations

The area has a high environmental value, designated as Drigg Coast, Morecambe Bay and Duddon Estuary SSSI, SPA, SAC. The nearshore and intertidal zone is now covered by Morecambe Bay and Duddon Estuary SPA, which was designated in 2017 and replaced two individual sites, Morecambe Bay SPA and Duddon Estuary SPA. The status of the SSSI sites are favourable and the SMP policy is in accordance with the management principles for this designation, which is to allow "coastal processes to proceed freely", which is considered essential for the "maintaining the range of habitats and associated species" (Natural England Views About Management (VAM) statement, 2005[1]). Improvements or modifications to current defences may also require a habitat regulations assessment for possible effects to the designations within the estuary (Drigg Coast, Morecambe Bay and Duddon Estuary SSSI, SPA, SAC).

It is understood that there is a public right of way (Cumbria Coast Path) that follows the entire length of the frontage on the north bank but is routed inland from the frontage on the south bank through Newbiggin. The route of the new England Coast Path is expected to follow some of the current Cumbria Coast Path. The new England Coast Path may also include the construction of a new footbridge near the current railway bridge which crosses the Esk but is currently awaiting approval from Secretary of State (Natural England, 2018). National Grid may also benefit from the bridge which could act as an alternative to burying pipes and cables under the estuary.

North West Coastal Connections are considering routes across Ravenglass, the project is to address a need for reinforcement of the National Electricity Transmission System (NETS) in the North West of England. The proposed development is centred on a proposed new power station at Moorside. The defined scoping corridor, with the anticipated extent of work proposed, is shown in Figure 3 (National Grid, 2015).

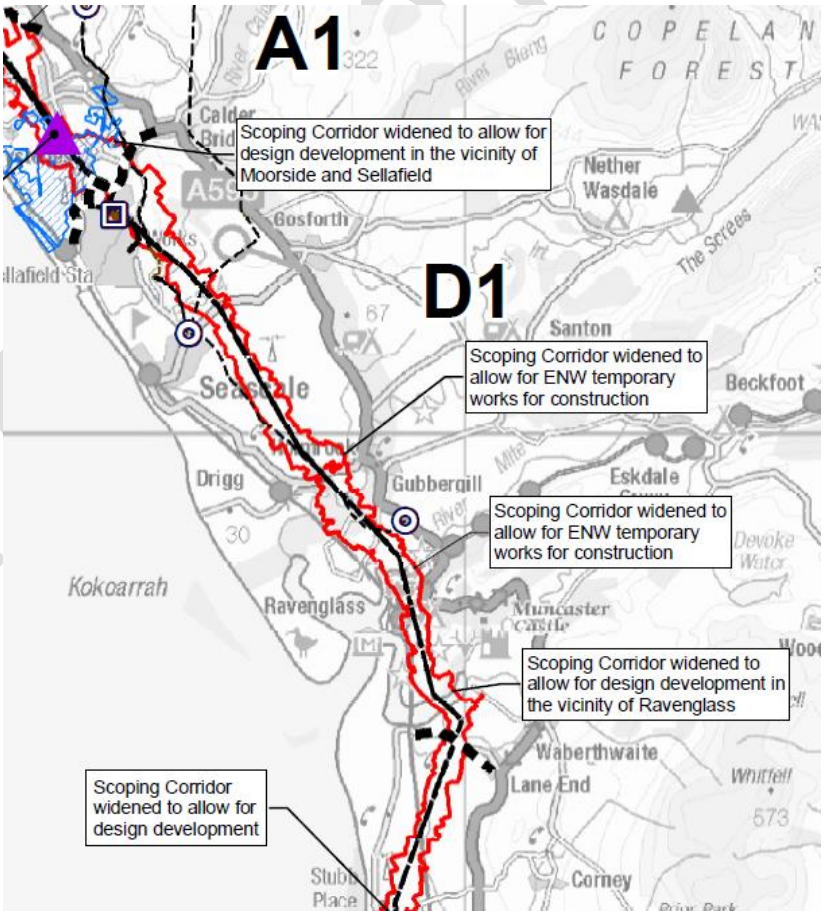

Figure 3 North West Coastal Connections scoping corridor (taken from National Grid, 2015).

[1] The VAM is available online: https://designatedsites.naturalengland.org.uk

A two kilometre stretch of land designated as a Registered Park and Gardens (Munster Castle) lies adjacent to the Esk which could be at risk of future erosion and flooding. In addition, this policy unit also includes a Scheduled Monument (approximately 0.04 km^2) consisting of a Roman Fort and Bathhouse with the boundary of the designation extending beyond the railway line to the frontage of the Esk. These features may also be at increasing risk of flooding and erosion in the long term. The A595 is already at flood risk where it crosses the Esk floodplain and will be at increasing risk of tidal flooding in future due to sea level rise, the Environment Agency is to raise awareness of this risk with the Highways Authority.

Despite isolated incidents of erosion to assets there is relatively low erosion and flooding risk to assets including future risks. However previous reports (Halcrow, 2013) have highlighted the lack of data regarding flood and coastal defences and coastal and estuary morphodynamics among others which limits our ability to confidently predict future morphological responses of the estuary. Therefore, new data should be collected to update understanding of coastal processes and risk.

A long term plan should also be developed to invest in the railway and ensure the maintenance and repair of assets which protect this social and economically important transport link to this area.

2.1.3 Discussion

There have been no significant changes to coastal risks and therefore at this time there is no justification for any change in policy, which also supports the SSSI designation for this frontage.

Localised defences have recently been improved along the railway embankment and further works may be required. Such work would be permitted under the SMP policy, given the wider strategic approach to maintaining the railway, but given the environmental status of this area, any further works are likely to require consent from Natural England.

Future actions include:

- Continued monitoring of intertidal and shoreline change, as part of the Northwest Regional Monitoring Programme, with a review of profile locations. CH2M (2018) recommended that the current beach profile monitoring be supplemented by remote sensing, namely LiDAR and aerial photograph surveys, to identify wider change that is taking place both across the estuary and within the dune areas, which are inaccessible due land ownership arrangements. In addition, it was also recommended that a multi beam hydrographic survey of the whole of the estuary be undertaken, recorded coincidently with collection of LiDAR data, would also provide useful data in identifying change and support qualitative understanding.
- Continued monitoring of Network Rail defence assets Current and longer term flood risk to the railway is not well understood. It is assumed that Network Rail will provide ongoing maintenance of their embankment. Therefore, liaison between Network Rail and Natural England to discuss any future works to maintain the defences to the railway are required.
- Inclusion of the southern end of this unit in an Asset Management Plan for Network Rail, to ensure a strategic approach to managing risks along the wider frontage.
- Monitoring and warning of flood risk to A595 at Muncaster Bridge – action for Environment Agency and Cumbria County Council.

2.2 11d3.2 Ravenglass

2.2.1 Existing approach to flood and coastal erosion risk management

The existing SMP2 policy along this frontage protecting the village of Ravenglass (Figure 4) is Hold the line from the short term. The primary justifications for the policy included the need to maintain the integrity of Ravenglass, associated infrastructure and amenity or tourism value (pending an economic assessment and cost benefit analysis) and the minimal impact of this policy on the wider estuary.

Figure 4 Ravenglass. Photograph ©North West Regional Monitoring Programme.

Defences within this policy unit (Figure 5) consist of predominately vertical masonry or mixed (concrete, masonry, and brick) walls and earth embankments with armour block facing. The condition of these assets as of 2008 had a residual life of 5 to 10 years (Halcrow, 2013) although recent reports (CH2M, 2017) deem the assets to be in variable condition (good to fair).

Many properties are situated adjacent to the frontage, see Figure 4, and are at risk of flooding from spray and wave overtopping during extreme events (CH2M, 2017).

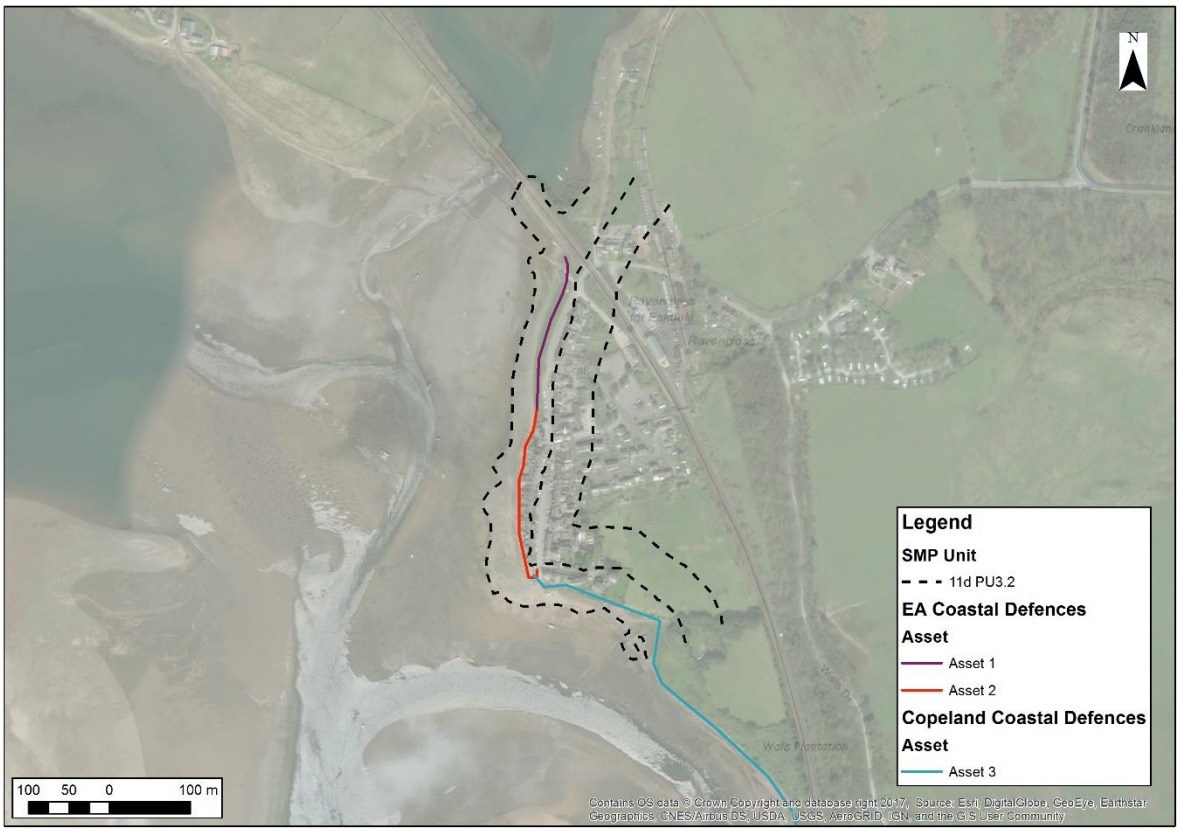

Figure 5 Overview map of policy unit 11d3.2

2.2.2 Strategy considerations

The village of Ravenglass is economically important to the local area and represents commercial, residential and tourism interests. The Cumbria Coastal Railway Line runs close to the shoreline to the south of Ravenglass; this is an important transport link in this area. The U4057 highway runs adjacent to the shoreline, with protection afforded by an earth embankment. United Utilities assets (pressurised mains) run beneath the road, whilst gravity sewers are located within the fronting embankment. There is also a pumping station and waste water treatment works (WwTW) located to the south of the village.

Coastal defences are understood to have been installed by the Environment Agency but it is understood that they do not regard them as their asset.

Flooding is a key risk to this frontage, which potentially affects part of Ravenglass village, railway and road. The shoreline is sheltered from wave action due to the protection afforded by the two spits at the estuary mouth. Vulnerability of the frontage may change in the future due to changes in channel position within the estuary. Overall, the estuary is believed to be close to a state of dynamic equilibrium, i.e. net saltmarsh and intertidal gain is similar to the net losses

The area has a high environmental value, designated as Drigg Coast, Morecambe Bay and Duddon Estuary SSSI, SPA, SAC. The nearshore and intertidal zone is now covered by Morecambe Bay and Duddon Estuary SPA, which was designated in 2017 and replaced two individual sites, Morecambe Bay SPA and Duddon Estuary SPA, involving an extension to include the Ravenglass Estuary and intervening coast and the shallow offshore area off south west Cumbria coast. The current status of the SSSI sites are favourable (last assessed in 2011), although the railway embankment was recognised as creating an artificial barrier to the marsh between the viaducts. It was also recorded that recreational use of the foreshore along this stretch means that the marsh below Ravenglass in particular is fragmented, though species diversity is high. The assessment did conclude that normal coastal processes are well demonstrated.

The frontage lies within the English Lake District National Park and World Heritage Site. Ravenglass was an important Roman site, with Ravenglass Roman Fort (and Bathhouse) a Scheduled Monument, and there are two listed buildings within the village itself. There is also high potential for undiscovered archaeology in this area. Muncaster Castle, which lies inland of the railway embankment is a Registered Park and Garden.

The village and surrounding area is popular with tourists; the proposed England Coast Path follows the coastal road and then an existing trail across a grass embankment at the back of the beach.

North West Coastal Connections are considering routes across Ravenglass, the project is to address a need for reinforcement of the National Electricity Transmission System (NETS) in the North West of England (National Grid, 2015); see Figure 3 in section 2.1 above.

2.2.3 Discussion

There have been no significant changes to coastal risks since the SMP was developed and therefore there is currently no justification for any change in policy.

Possible options to address future risk could include:

- Rock toe works: this would involve the construction of a rock toe as required. This could address any future deterioration of the existing structures. There would be limited change in defence footprint therefore impacts on the foreshore and the SSSI would be unlikely to be significantly affected. The impact on the landscape would also be small. This would only sustain the existing defences for a short period of time and not address the increasing flood risk.
- Full height rock revetment: would be in front of the existing defence lines due to the number of properties close to the channel. It would involve an increased footprint, with an impact on the foreshore, which would require various consents.
- Modifications to the existing structures: there may be potential to modify some sections of the existing structures, such as constructing an upstand wall to reduce risk of overtopping. This will require further information on the current defence design. There would be no change in defence footprint and the impact on the landscape would depend upon the materials used. This would not, however, reduce exposure of the structure and further works, e.g. to protect the toe, may be required at a later date.

Improvements or modifications to current defences are likely to require consent from Natural England also require a habitat regulations assessment (HRA) and AA (Appropriate Assessment) to appraise possible effects on the designations within the estuary.

Future actions include:

- Continued monitoring of intertidal and shoreline change, as part of the Northwest Regional Monitoring Programme, with a review of profile locations. CH2M (2018) recommended that the current beach profile monitoring be supplemented by remote sensing, namely LiDAR and aerial photograph surveys, to identify wider change that is taking place both across the estuary and within the dune areas, which are inaccessible due land ownership arrangements. In addition, it was also recommended that a multi beam hydrographic survey of the whole of the estuary be undertaken, recorded coincidently with collection of LiDAR data, would also provide useful data in identifying change and support qualitative understanding.
- Continued inspection and maintenance of defences, with repairs and remedial works undertaken by Copeland Borough Council as necessary.
- Appraisal of wider benefits that can be attributed to this policy area and development of a funding strategy if future works are likely.
- Any changes to the existing structures would require consent from Natural England due to the designation of the intertidal zone. Therefore, early discussions with Natural England are

recommended. Consultation with Historic England would also be required, due to potential impacts on heritage and landscape features in the area.

2.3 11d3.3 Ravenglass to Drigg Point

2.3.1 Existing approach to flood and coastal erosion risk management

The existing SMP2 policy along this frontage is No active intervention from the short term. This does allow maintenance or additional works to reduce risk to the viaduct and mainline railway as long as it is in operation, subject to consent. The primary justifications for the policy included insufficient economic justification for new defences, and the need to maintain natural coastal processes to appease national and international designated sites within the policy unit.

Defences within this policy unit consist of predominately an earth embankment with some masonry embankments protecting the railway line, viaducts and short section of frontage (~100 m) near a caravan site in Saltcoats. No information exists regarding the condition of these assets although the latest inspection data (CH2M, 2017) states that the stone revetment between Ravenglass and Low Saltcoats (near the caravan park) is in reasonable condition requiring only minor maintenance in the short term. A limited number of properties (Caravan Park) and recreational assets (narrow gauge rail line) are at risk of flooding.

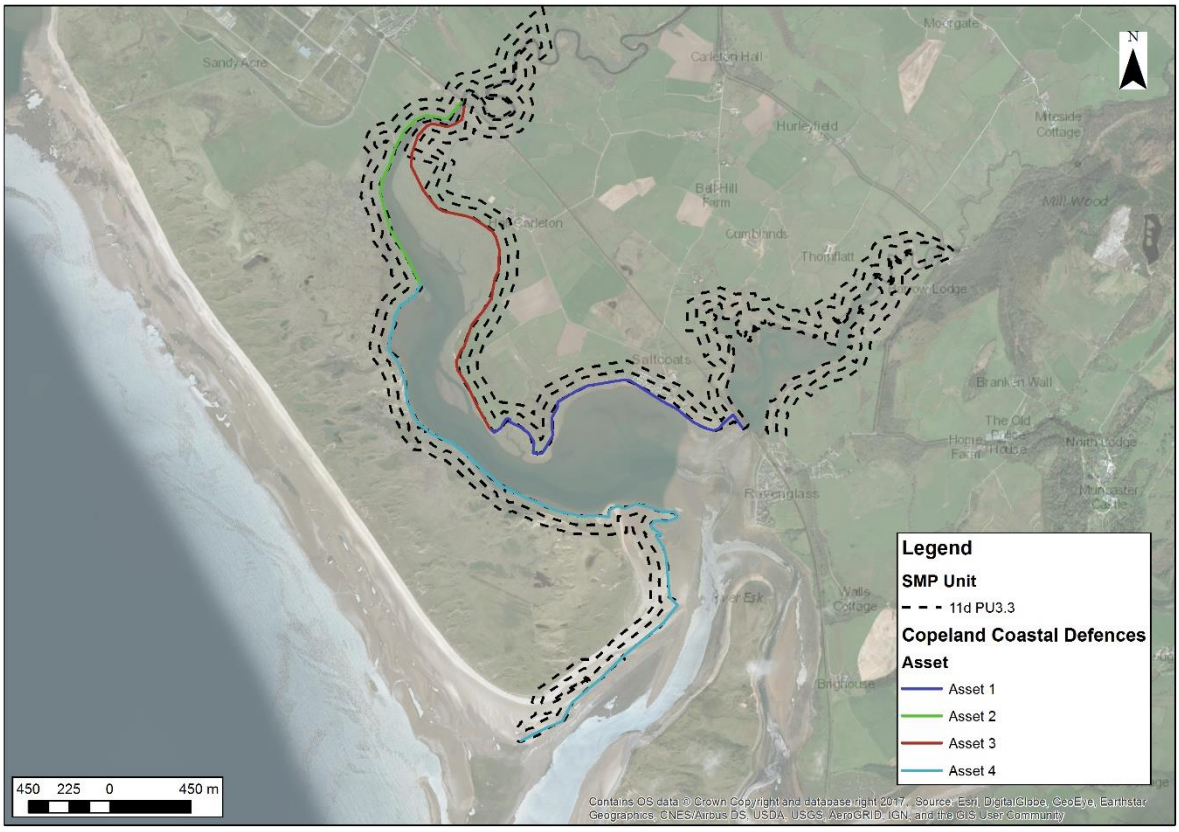

Figure 6 Overview map of policy unit 11d3.3 including assets within.

2.3.2 Strategy considerations

Flooding is a key risk to this frontage, which potentially affects part of Saltcoats village, road (U4055) and railway. A pressurised mains (United Utilities asset) runs beneath the earth embankment and follows the U4055 inland. The proposed route of the England Coast Path also follows the earth embankment to the south of Saltcoats before running inland, following the road to Hall Carleton.

The shoreline is sheltered from wave action due to the protection afforded by the two spits at the estuary mouth. Vulnerability of the frontage may change in the future due to changes in channel position within the estuary. Overall, the estuary is believed to be close to a state of dynamic

equilibrium, i.e. net saltmarsh and intertidal gain is similar to the net losses. Morphological modelling of the Irt estuary indicates the estuarine morphology is expected to be relatively stable over the next 5000 years (Fish et al. 2010). There are, however, localised areas of erosion and accretion, including an area of erosion at Saltcoats. Monitoring, undertaken as part of the North West Regional Monitoring Programme has indicated that at Saltcoats the edge of the thin strip of saltmarsh at the end of the slipway has receded almost 5 m since 2009 and may require intervention in the future to protect the toe of the slipway.

The area has a high environmental value, designated as Drigg Coast, Morecambe Bay and Duddon Estuary SSSI, SPA, SAC. The nearshore and intertidal zone is now covered by Morecambe Bay and Duddon Estuary SPA, which was designated in 2017 and replaced two individual sites, Morecambe Bay SPA and Duddon Estuary SPA. The status of the SSSI sites are favourable and the SMP policy is in accordance with the management principles for this designation, which is to allow "coastal processes to proceed freely", which is considered essential for the "for maintaining the range of habitats and associated species" (Natural England Views About Management (VAM) statement, 2005[2]).

The frontage lies within the English Lake District National Park and World Heritage Site. There are no Scheduled Monuments or listed buildings at risk but given the heritage value of the wider area (including the Roman Fort at Ravenglass) there is potential for buried archaeology.

2.3.3 Discussion

Although there is evidence of erosion at Saltcoats, there is currently no justification for any change in policy, which supports the environmental designations for this frontage. Therefore, the recommendation would be for the policy to remain. It is recognised, however, that privately owned defences exists within the unit and it is assumed that the SMP policy would allow these to be maintained at least in the short term.

Future actions include:

- Continued monitoring of intertidal and shoreline change, as part of the Northwest Regional Monitoring Programme, with a review of profile locations. CH2M (2018) recommended that the current beach profile monitoring be supplemented by remote sensing, namely LiDAR and aerial photograph surveys, to identify wider change that is taking place both across the estuary and within the dune areas, which are inaccessible due land ownership arrangements. In addition, it was also recommended that a multi beam hydrographic survey of the whole of the estuary be undertaken, recorded coincidently with collection of LiDAR data, would also provide useful data in identifying change and support qualitative understanding.
- Confirm ownership of defence at Saltcoats. This is thought to be in reasonable condition and likely to require only minor maintenance in the future. However, any modification or extension of the existing structure would require consent from Natural England due to the designation of the intertidal zone and the potential wider impact on the estuary would also need to be considered.
- Monitoring of the risk to the earth embankment to the south of Saltcoats – this is currently protected by marsh, but should this start to erode (as has occurred along the Saltcoats frontage) this would become more exposed to tidal currents. As well as there being United Utilities assets along this bank, this is also the route of the England Coast Path.

[2] The VAM is available online: https://designatedsites.naturalengland.org.uk

3 References

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