Cell 1 Regional Coastal Monitoring Programme
Walkover Inspection Surveys 2022

Redcar & Cleveland
Borough Council

August 2022

Redcar & Cleveland Borough Council

Walkover Inspection Surveys 2022

Contents Amendment Record

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Contents

Appendices

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[1] Scarborough Borough Council is acting as client on behalf of all Local Authorities within 'Coastal Cell 1'.

Preamble

The Cell 1 Regional Coastal Monitoring Programme covers approximately 300km of the north-east coastline, from the Scottish Border (just south of St. Abb's Head) to Flamborough Head in East Yorkshire. This coastline is often referred to as 'Coastal Sediment Cell 1' in England and Wales (Figure 0-1). Within this frontage the coastal landforms vary considerably, comprising low-lying tidal flats with fringing salt marshes, hard rock cliffs that are mantled with glacial till to varying thicknesses, softer rock cliffs, and extensive landslide complexes.

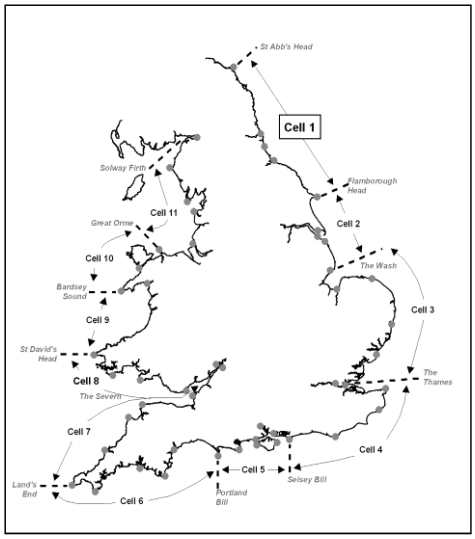


Figure 0-1 - Sediment Cells in England and Wales

The work commenced with a three-year monitoring programme in 2008[2] that was managed by Scarborough Borough Council on behalf of the North East Coastal Observatory. It is funded by the Environment Agency, working in partnership with the following organisations.

Northumberland County Council
Northumberland Coast AONB
North Tyneside Council
South Tyneside Council
Sunderland City Council
Durham County Council
Redcar & Cleveland Borough Council
Hartlepool Borough Council
Scarborough Borough Council
East Riding of Yorkshire Council
Environment Agency
Natural England
The National Trust

[2] [2] Prior to 2008, coastal monitoring was undertaken on a consistent basis across Northumberland and North Tyneside as part of the (then) Northumbrian Coastal Authorities Group's monitoring programme which commenced in 2002, whilst several authorities between the River Tyne and Flamborough Head undertook their own local monitoring programmes.

The main elements of the Cell 1 Regional Coastal Monitoring Programme involve:

- beach profile surveys
- topographic surveys
- cliff top recession surveys
- real-time wave data collection
- bathymetric and seabed characterisation surveys
- aerial photography
- walkover inspection surveys

Royal HaskoningDHV has been appointed to provide Analytical Services in relation to the present phase of the Cell 1 Regional Coastal Monitoring Programme, between 2016 - 2027.

The present report is **Walkover Inspection Surveys 2022** and provides a summary of the main findings from the walkover inspections of Redcar & Cleveland Borough Council's frontage that are undertaken once every 2 years.

In addition, separate reports are produced for other elements of the programme as and when specific components are undertaken, such as beach profile, topographic and cliff top surveys, wave data collection, bathymetric and seabed sediment data collection, and aerial photography.

1. Introduction

1.1 Study Area

Redcar & Cleveland Borough Council's coastal frontage extends from South Gare at the mouth of the River Tees in the north, to Cowbar Nab in the south, and is shown in **Figure 1-1**. Detailed maps showing the location of each of the coastal defence assets considered in this report are presented in **Appendix A**.

In addition, the cliffs within the frontage have been classified according to their characteristic behaviour condition and a series of Cliff Behaviour Units (CBUs) have been defined and mapped. The location of the CBUs is presented in **Appendix B**.

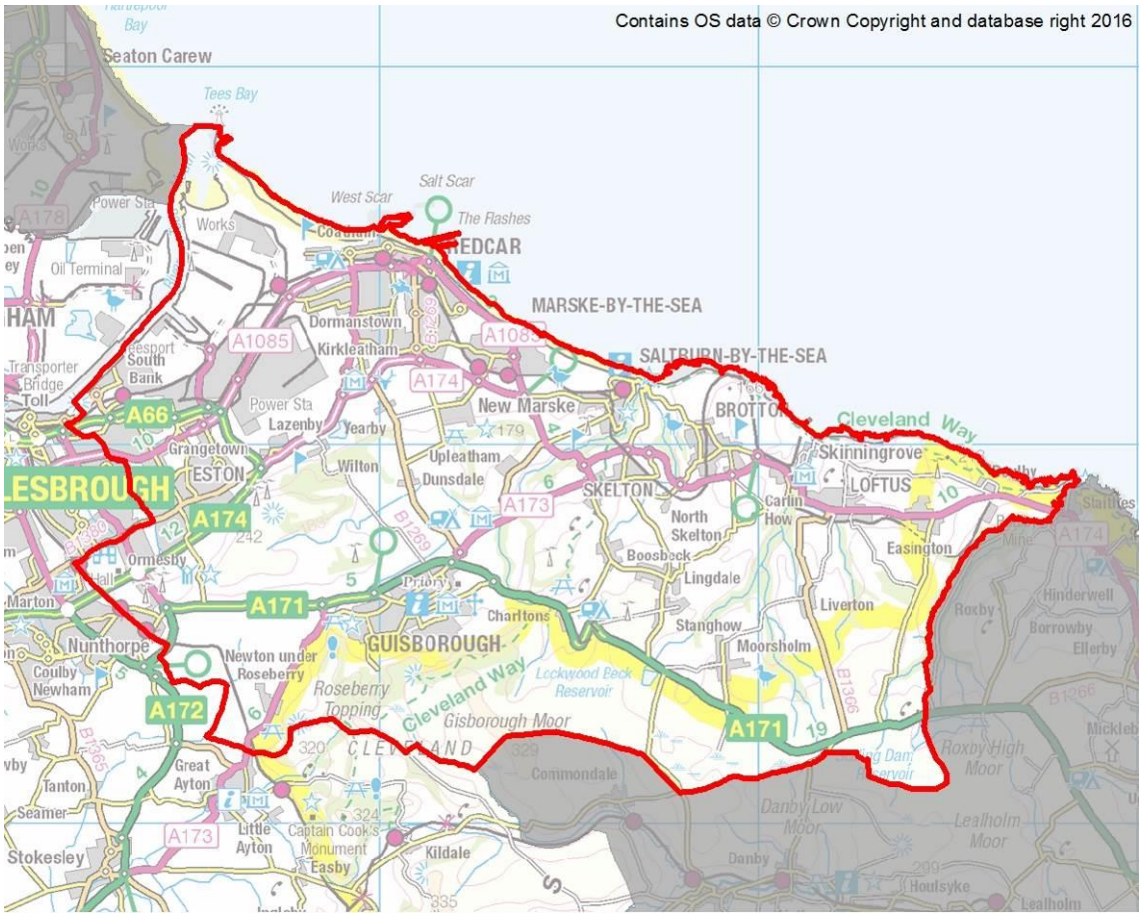


Figure 1-1: Redcar & Cleveland Borough Council study area

1.2 Methodology

This section presents the approach taken by the asset inspectors for the Redcar & Cleveland Borough Council coastal frontage.

The walkover inspection surveys for the Redcar & Cleveland Borough Council frontage were undertaken on 26th and 29th July 2022. The weather experienced during the inspections was clear and dry with no access or visibility problems caused by adverse weather.

The frontage has been split into a number of 'asset lengths' (Appendix A), as defined in the National Flood and Coastal Defence Database (NFCDD) that was established by the Environment Agency.

The walkover inspections cover both built defence assets and natural defence assets such as cliffs, slopes and dunes. All assets were visually inspected, photographed and graded based on their condition and an estimate made of their residual life.

For built assets the grading classification was undertaken in accordance with the Condition Assessment Manual (EA, 2012), with estimates made of the urgency of any necessary repairs. An extract of the grading classification for built assets is presented in ***Table 1-1***. For ease of reference the built asset photographs presented in this report have also been bordered with the colours key indicated below.

Grade	Rating	Description
1	Very Good	'As built' condition or cosmetic defects that have no effect on performance.
2	Good	Minor defects that will not reduce overall performance of the asset.
3	Fair	Defects that could reduce overall performance of the asset.
4	Poor	Defects that would significantly reduce overall performance of the asset.
5	Very Poor	Severe defects resulting in overall performance failure of the asset.

Table 1-1: Condition assessment grading for man-made assets.

In addition to the above grading classification, for natural assets such as cliffs and slopes the same five point activity scale used in previous walkover inspections within Cell 1 was used. This grading classification is presented in ***Table 1-2***. For ease of reference the natural asset photographs presented in this report have also been bordered with the colours key indicated below.

Grade	Class	Description
1	Dormant	Features with no interaction with marine processes.
2	Inactive	Features with no visible evidence of erosion or landsliding activity.
3	Locally active	Features with localised evidence of small erosion or landsliding activity.
4	Partly active	Features with widespread evidence of small erosion or landsliding activity or areas of intense erosion or landsliding.
5	Totally active	Features with large-scale or intense erosion or landsliding.

Table 1-2: Condition assessment grading used for natural assets (cliffs/ slopes).

This report provides an overview of the findings from the walkover inspections, summarising each locality in general but also specifically identifying individual assets in ‘poor’ or ‘very poor’ condition. It is anticipated that this summary will help identify areas for maintenance or capital investment. Full details of the inspection of each asset are provided in **Appendix B**.

In addition to this report, full details of the inspection and a selection of appropriate photographs have been entered into the SANDS (Shoreline And Nearshore Database System) database and provided along with this report with SANDS viewer software.

2. Overview

The following significant findings were observed during the 2022 walkover inspection surveys:

- **South Gare Breakwater** – The breakwater remains in poor condition and is comprised of numerous ad hoc repairs particularly along its northern flank. A large number of defects were noted including extensive cracking and spalling, exposure of reinforcing steel, missing mortar, open joints, damaged render and missing masonry blocks. At the root of the structure the slag embankments are being undercut and in places void formation is evident. The historic western pier arm structure has failed. Concrete Accropode and rock armour units have been placed around the seaward end of the structure. The blocks do not appear to have a good interlock and the more historic blocks show extensive signs of displacement and damage. There are many recent repairs to the deck slab, some of which have now failed in particular, a cracked and lifted deck slab on the south facing root of the structure which was reported in the 2018 report had been repaired by the time of the 2020 inspection, however this has now failed again.

- **Coatham Sands** – The dunes remain stable and well vegetated particularly in the north, however there is extensive ongoing erosion of the dune crest fronting the caravan site at the southern end of the asset. It is recommended that dune management measures are put in place to halt the continued degradation of the dune system fronting the caravan park.

- **Redcar** – The improved sea defences, completed in 2013, generally remain in good to very good condition. Several minor defects were noted along the frontage. These included minor cracking in larger *in situ* concrete panels at access ramps, staining of the concrete beneath drainage outfalls and localised vegetation growth on the stepped revetment. In early 2022 works to the Regent Cinema and seawall were completed, improving the worst condition section of this frontage to an as-built (very good) condition. Elsewhere, there was little change to the condition of the defence assets from the 2020 survey. The seawall fronting the Redcar Beacon remained an area of concern and still appeared to be missing flexible sealant in many of the joints, with filler board visible indicating that sealant was never present. Similarly high beach levels than those recorded in previous inspections obscured previously reported undercutting of the north-east corner of the massive seawall to the rear of the derelict cinema.

- **The Stray** – The groynes appear to be in fair condition and performing satisfactorily. Beach levels are being maintained and there is a reasonable accumulation of pebble and cobble size material to the rear of the beach. Several timber elements are missing from the groynes, particularly towards their seaward ends. Recent repairs to the landward end of several groynes were found to be in good condition.

- **Saltburn-by-the-Sea** - Missing coping stones and local damage (cracking and spalling) to the concrete wall, access ramp surface and slipways were noted, as in previous inspections. Two sections of missing handrailing along the promenade. At the eastern end of the frontage, the masonry and concrete seawalls and concrete aprons protecting the public house and land to the east of the slipway are in poor condition. Low beach levels have exposed voids and undercutting beneath the concrete apron/revetment poured to east of the defence. A series of masonry walls higher up the slope were also noted as being undercut.

- **Skinningrove** – A recent coastal defence scheme (completed in 2015) has repaired and improved the previously poor condition of the Skinningrove Jetty. As noted in 20120 a number of small defects remain, including heavily corroded steel sheet piling, cracked and abraded concrete and some of the new works have poorly inserted sealant in construction joints and exposed reinforcement bars, which could lead to future maintenance problems. On the inner face of the structure there is evidence of concrete cracking and a large number of voids including one which is notably deep. The lighting cable conduit was noted as having become detached from the crest wall and severed in a number of locations. The rock armour revetment and path leading from the jetty to the village remain in good condition.

- **Cowbar** - An area of particular and long standing concern is adjacent to Cowbar Lane. Here an upper till unit is undergoing severe erosion and there is evidence of recent rockfall from the lower part of the cliff. This is resulting in the loss of the now abandoned parts of Cowbar Lane. Following rockfall in 2016 the National Trust access to the Nab was closed due to further slippage of the till cliffs. Ongoing minor slippage and activity was visible by approaching the base of the cliffs from the foreshore. In 2020 the Heras fencing and warning signs had been removed at the access to the Nab meaning access was possible. However, due to dense vegetation on Cowbar Nab it was not possible to follow the footpath route to inspect the upper reaches of the cliff. During the 2022 inspection heras fencing had been reinstated prohibiting access however it appeared that works were underway to construct a more formal gravel path access on to Cowbar Nab. It is unclear whether this will re-open to the public.

3. Condition Assessment

3.1 Coatham Sands

Coastal Slope Condition Assessment

As reported in previous inspections from 2008 onwards, the sand dunes along Coatham Sands were generally stable with a good coverage of established vegetation. Erosion, loss of vegetation and lowering of dune crest was evident locally at the more frequently used beach access points (the northern and southern extents of the dunes). This was particularly significant alongside the caravan park to the south where the continuing roll-back of the dunes is now encroaching significantly into the caravan park and former site compound areas. This is evidenced by the loss of pitches along the seaward facing row of caravans in recent years. It is recommended that proactive dune management options are considered in this area to help restore the condition of the dunes fronting the caravan park. This could include restricting pedestrian access through the dune system, or the installation of picket fencing to reduce sand depletion and increase accretion.

A healthy beach level was maintained throughout Coatham Sands. At the outfall the beach appeared to be higher than in 2020.

Looking south east across the dunes and Coatham Sands (/C0507C01)

Outfall on Coatham Sands in poor condition, beach levels higher than 2020 (/C0507C01)

View looking south west from caravan site (/C0507C01)

View looking north west from caravan site (/C0507C01)

The northern extent of Redcar & Cleveland Borough Council's coastal frontage is marked by the South Gare Breakwater. The structure has been graded in poor condition from the 2008 survey and this remains the case in 2022. Despite the poor condition of the asset, it still continues to provide protection to the navigation channel to the west and control of Coatham Sands to the east.

The structure is privately owned by PD Teesport and signage was present to instruct members of public not to progress onto the structure beyond the boundary fencing for the existing navigation infrastructure. No physical barriers prevented access and it is understood that members of the public, in particular anglers, frequently venture onto the structure. During the 2022 inspection it was noted that a large LCD warning screen has been installed on the structure displaying a range of warning messages.

Large void in western face has worsened in 2022 (/C0506C01)

Western face (/C0506C01)

Historic repairs to deck slab along eastern face (/C0506C01)

Repaired deck slab has now failed along eastern face (/C0506C01)

Repairs to wall on breakwater crest (/C0506C01)

Northern extent of upper structure in poor condition (/C0506C01)

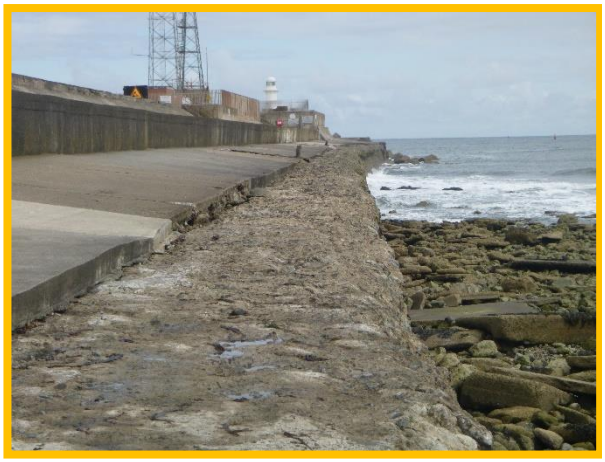
Numerous significant defects were observed along the structure. These included extensive cracking and spalling, exposure of reinforcing steel, missing mortar and masonry, open joints and damaged render. Additionally, it was noted that voiding and undercutting of the slag embankments at the root of the structure continue to worsen and the historic western pier structure is now totally collapsed. Along the seaward face of the structure, damaged rock armour and concrete Accropode units were noted, with generally poor profile, coverage and interlock. During the 2022 inspection it was noted that there have been a number of new concrete blocks placed at the end of the structure, in places these are higher than the deck of the pierhead.

In several locations, the concrete deck slab beneath the wave return wall was lifted above the coping stones and in one location was missing entirely.

Multiple patchwork and ad-hoc repairs to both the deck slab, and face of the pier walls were evident throughout. The effectiveness of repairs differed greatly, with some of the more recent concrete encasements appearing in fair condition. One area of concern, noted in the 2018 report, comprised of a lifted and cracked deck slab on the southern lower deck, near the root of the structure was repaired prior to the 2020 inspection. In the 2022 inspection the repair has now failed and the slab has lifted again.. Further historic repairs such as the grouted rubble revetment continued signs of voiding and collapse. As noted in previous surveys, a detailed survey of the structure is beyond the scope of the present inspections and a full structural survey of the breakwater is recommended in order to establish the full extent of the damage and identify any remedial works.

New LCD warning screen (/C0506C01)

Recently placed concrete blocks at seaward end of structure (/C0506C01)



Failed coping slab along eastern face (/C0506C01)

Potential voids visible beneath failed deck slab along eastern face (/C0506C01)

To the west of Redcar, defences comprise a concrete crest wall with grouted stone revetment fronting the promenade and car park. These remained in fair condition at the time of the inspections. Beach levels were broadly similar to 2020 and as such, exposure/undermining of the north-eastern extent of the wall and promenade noted in previous reports was not observed. Other localised damage included missing blocks from the grouted stone revetment. The concrete wall remains in fair condition, with the approximately two metre gaps towards the north-eastern extent still present. The grouted stone revetment is in poor condition beneath the gap due to loss of grout and some stones.

The beach remains in good condition; however it appears that the active grading and maintenance (using tractor and rotavator) has now ceased. This has led to further accumulations of sand on the seaward face of the wall and in some places on the upper beach there are small plants colonising the beach surface. On the promenade there was a near continual accumulation of sand against the landward side of the crest wall. This results in almost all drainage holes through the wall being blocked. It is recommended that the sand on the promenade is removed so that the drainage holes are clear.

View looking east, note high beach levels (/C0601C01)

High beach levels have covered previously recorded undercutting of western corner of the asset (/C0601C01)

Grouted stone revetment, partially covered due to high beach levels(/C0601C01)

Gap in concrete visible (/C0601C01)

3.2 Redcar

Coastal Slope Condition Assessment

CBU **E52/11** which runs along the rear of the promenade along The Stray retains a Dormant grading as it has done since 2012. The vegetated slopes along this frontage are afforded ample protection from the upgraded blockwork revetment and the beach material retained by the refurbishment of the groynes.

Coastal Protection Asset Condition Assessment

The Environment Agency funded extensive capital works to upgrade the 2.7km of coastal defence assets from Coatham to the eastern extent of The Stray. These works were completed in 2013 and as such were inspected 'as built' during the 2014 walkover survey. The new defences follow similar alignments to the previous assets and, for the purposes of this report, the original NFCDD references have been retained, as they were in 2020. The GIS linework was amended as part of the 2016 survey.

The assets generally remained in very good to good condition, although several minor defects were noted. Minor cracking was observed in larger *in situ* concrete panels particularly at access ramps and staining of the concrete was evident beneath drainage outfalls. Particularly concerning was the lack of flexible sealant between numerous joints in the seawall fronting the Redcar Beacon. It was noted in the 2016 and 2018 reports that filler board was visible in certain joints indicating that joint sealant was never present. There was no discernible change to the condition of the assets in 2022, however the high beach levels did mean that inspection of the toe of the structures was not possible.

One area of developing concern is the presence of vegetation growth on the defence at various points. This concern was reported in 2018 and 2020, however no remedial action has been undertaken. Although the issue is very localised it requires urgent attention. The vegetation should be removed and condition of joints in these locations inspected thoroughly.

Mass concrete transition in fair condition. Note; horizontal and vertical cracks and damaged drain outfall (/C0602C06)

Vegetation growth on stepped revetment. (/C0602C06)

Slipway in good condition (/C0602C06).

In-situ cast transition unit between stepped revetment and new cinema wall *(/C0602C06) & (/C0602C05)*

Cinema seawall in as-built condition (/C0602C05)

New Regent Cinema seawall (/C0602C05)

Pre cast concrete wall (/C0602C05)

Outfall structure has been re-constructed and is in as-built condition (/C0602C05)

In early 2022 works to the new Regent Cinema were completed. The works involved the demolition and reconstruction of the Cinema and a new concrete wall surrounds the complex. The wall is comprised of vertical pre-cast concrete panels with drainage holes in the upper course. The cinema complex to the rear of the new wall is entirely new and rises three storeys above the promenade level with a balcony overlooking the seaward edge. The new seawall is in as-built condition and there are no major defects however, it was noted during the 2022 inspection that there were several areas of missing flexible joint sealant on the southern face of the wall between the most landward pre-cast

wall panels. Furthermore at the northern and southern transitions between the new seawall and the adjacent stepped revetments there are new sloped in-situ cast concrete slabs. These should be monitored for cracking or displacement.

The beach levels around the new seawall the area appeared high so it was not possible to inspect the toe of the structure. However, the previous historic cinema structure experienced significant undercutting and so beach levels in this area should be monitored.

South of the cinema seawall is a concrete dog-legged outfall structure. The outfall structure appears to have been recently re-constructed, possibly at the same time as the cinema seawall was replaced. The outfall structure appeared in as-built condition. It was noted that a small section of the lower part of the adjacent pre-cast stepped revetment *(/C0602C04)* appears to have been broken out in order to construct the outfall. The broken out section of stepped revetment has been replaced with an in-situ cast concrete stepped section which is in fair condition. However, the joints between the in-situ cast repair and the surrounding pre-cast unit was not smooth and there is a risk of the in-situ concrete fragmenting or cracking at this point.

Slipway in very good condition (/C0602C04)

Stepped concrete revetment with recurve wall in very good condition (/C0602C03)

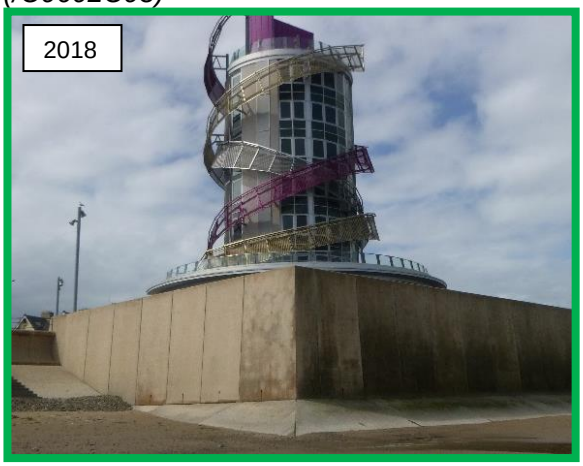
In situ concrete repair in fair condition (/C0602C04)

Close up of repair (/C0602C03)

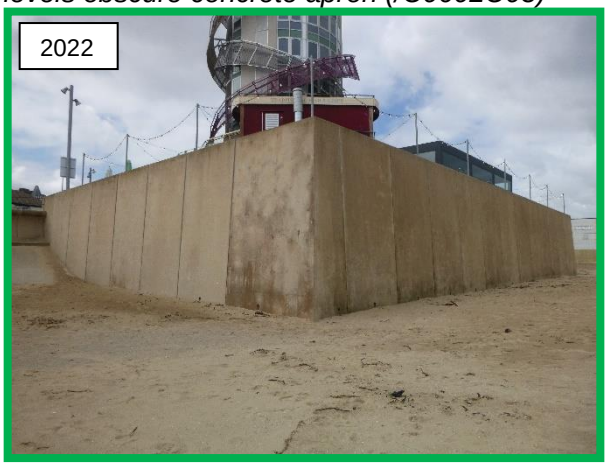
The Redcar Beacon wall remained unchanged from the 2020 inspection; beach levels were similarly high in 2022 meaning that the sloped concrete toe of the structure was not visible.

Concrete sea wall at Redcar Beacon in 2018 (/C0602C03)

Concrete sea wall at Redcar Beacon note beach levels obscure concrete apron (/C0602C03)



Concrete sea wall at Redcar Beacon in 2018 (/C0602C03)



Concrete sea wall at Redcar Beacon note beach levels obscure concrete apron (/C0602C03)

Stepped concrete revetment and recurve wall in very good condition (/C0602C03)

In-situ cast concrete transitions in good condition (/C0602C03)

Slipway in good condition (/C0602C03)

Joint sealant on slipway in fair condition (/C0602C03)

South of the Redcar Beacon and the slipway on asset *(/C0602C03)* the stepped revetment and recurve wall continue. There are three more slipways along this asset length in generally good condition. The stepped revetment and recurve wall *(/C0602C02)* remain in good to very good condition. However there are frequent open joints where sealant is missing. At the southern end of the frontage sand continues to accumulate against the defence and beach levels are high.

Open joints in stepped concrete revetment. Overall condition remains as very good (/C0602C02)

Evidence of repaired sections of the stepped concrete revetment in good condition (/C0602C02)

Slipway in fair condition (/C0602C02)

Slipway in fair condition with some spalling and abrasion damage (/C0602C02)

South eastern access ramp. Loss of concrete render exposing grouted stone fill beneath concrete deck slab (/C0602C01).

Slipway deck in fair condition (/C0602C01).

Concrete apron of slipway in good condition, despite being exposed.(/C0602C01).

Cracking and damage to corner of slab on slipway (/C0602C01).

Sand accumulated in 2016 had been lost during the 2018 survey seen above (/C0602C01)

Accretion of sand along southern end of defence in 2022 (/C0602C01)

Vegetation growth in front of revetment indicating stable high beach levels (/C0602C01)

Concrete slipway in good condition (/C0602C01)

3.3 East Redcar to Saltburn-by-the-Sea

Coastal Slope Condition Assessment

The CBUs between Redcar and Saltburn show evidence of recent instability.

Unit **E52/10** remains classified as Partly Active during the 2022 inspection as it has been since 2013. The whole unit was showing signs of continuing erosion, particularly around the subtle headland approximately mid-length of the unit. This continues to be the case and the status of Partly Active has been retained. A concrete outfall structure is present within this unit and there is evidence of scour around the structure. The gabion baskets and concrete blockwork scour protection which front the outfall have failed. The baskets themselves are split and fill material has begun to wash out. The scour protection shows signs of settlement and many blocks are displaced or missing entirely. An informal access ramp, formed of crushed stone was present at the interface with the hard defences at the south eastern extent of The Stray this was in good condition and appears to be regularly maintained and topped up.

View looking south east (/C0701C01) CBU E52/10

CBU E52/10 (left) and *informal access* ramp *(right)*

CBU E52/10 (left) and *informal access* ramp *(right)*

Looking south east along CBU E52/10 Partly Active in 2022.

The cliffs in Units **E52/9** and **E52/8** are afforded some protection by the wide beach at the toe, particularly at **E52/9** where there is a substantial coarse (cobble-size) fraction in the beach material, despite this the unit showed evidence of dune degradation and as such both units are now classed as Locally Active. The cliff units are prone to localised periodic slips, particularly around several field drain outlets. Furthermore, pedestrian access is causing further degradation and erosion adjacent the carpark. As with elsewhere along the frontage it is recommended that signage and fencing is installed to deter the public from further damaged this section of lower lying dune.

View looking north west (CBU E52/9)

Evidence of recent shallow seated slips CBU E52/8

Immediately to the north of Marske, **E52/7** remains classified as Dormant as it has done since 2008. The asset is defended at its toe by low level sand dunes and a series of masonry and concrete walls, is well vegetated and shows no evidence of recent activity.

Well vegetated slope above masonry wall CBU E52/7

Well vegetated slope above masonry wall CBU E52/7

At the headland at Marske, **E52/6** the low dunes appear to have remained stable since 2018. The unit remains classified as Locally Active in 2022. At the access shown in the images below, the beach level continues to further expose the timber piles at the foot of the concrete path.

Exposure of timber piles at foot of concrete footpath (CBU E52/6)

Further exposure of timber piles at foot of concrete footpath (CBU E52/6)

From Marske to Saltburn the height of the coastal slopes increases, and the slopes become increasingly active. **E52/5** and **E52/4** show ongoing evidence of toe erosion and localised activity on their upper slopes and remain classified as Locally Active. Generally the toe of both units is stable, with erosion seemingly reduced by aided by the impact of higher beach levels in 2022.

North western extent of CBU E52/5, some activity to inner dune face.

View looking south east, note stable dune toe(CBU E52/5)

View looking south east (CBU E52/4) seaward face of dune generally stable.

Southern extent of CBU (CBU E52/4)

Coastal Protection Asset Condition Assessment

The frontage to the east of Redcar along The Stray to Mill Howle consists of concrete block revetment and concrete promenade constructed as part of the Redcar Coastal Defence Scheme which remained in very good condition.

As has been observed in previous surveys, several timber elements were missing from the groynes, particularly towards the seaward ends. Beach levels were generally high, similar to 2020, meaning that the extent of damage was less pronounced. At the landward end of several groynes recent repairs had been undertaken comprising of concrete tie-ins to the existing sloped revetment, new horizontal timber elements supported from metal columns. The condition of the repairs was good, and they were partially buried beneath a healthy accumulation of beach material.

View on The Stray frontage looking south east (/C0603C01)

Recently repaired step at The Stray (/C0603C01)

Recently repaired groyne along The Stray (/C0603C01)

Slipway in very good condition at The Stray (/C0603C01).

Outfall at south eastern end of (/C0603C01

Transition of revetment into natural defence (/C0603C01

The coastal defences at Marske are protected by a wide beach and so only exposed to marine action during storm events. The low masonry wall and revetment around the headland to the north west of the beach access at Marske was largely covered by beach levels. Where exposed, the wall and revetment remained in fair condition. As identified in previous inspections there were some missing coping blocks and there is evidence of historic lateral movement / displacement of the wall However there were no changes noted since 2020.

The concrete wall at the toe of the vegetated slope was reported as cracked through its full height in all inspections from 2008 onwards, however the defect appeared to be of the same width and extent in the present inspections. The slope above showed no evidence of recent movement or any placement of excessive loading on the structure. An area of potential concern was the lower section of masonry wall towards the west of the asset, where there appears to have been some lateral movement. This has been noted since 2018 inspection however there does not appear to have been any further movement in this location. It is recommended that this is monitored as failure of the wall would have a significant impact on the slope to its rear. At the southern end of the wall there is a set of access steps, during the 2022 inspection it was noted that a handrail has been constructed down the steps where previously there was none.

Crack in wall – no apparent change (/C0702C03)

Masonry wall showing signs of lateral movement (/C0702C03)

Wall in fair condition some missing mortar and open joints (/C0702C03)

Steps in fair condition new handrail fitted since 2020 (/C0702C03)

High beach levels obscure masonry wave wall and north west of beach entrance (/C0702C02)

High beach levels and vegetation revetment north west of beach entrance (/C0702C02)

Little change was noted to the masonry wall to the southeast of the beach access at Marske. Settlement cracks were evident throughout the full height and missing bricks at the seaward end, with scour evident to the rear of the structure. The landward, concrete wall was generally in fair condition, although as reported in previous surveys, displayed vertical cracks locally.

Masonry wall south east of beach entrance (/C0702C01)

Masonry wall south east of beach entrance (/C0702C01)

3.4 Saltburn-by-the-Sea

Coastal Slope Condition Assessment

The CBUs in and directly around Saltburn-by-the-Sea do not show much evidence of recent instability.

Units **E52/3b and E52/3a** above Saltburn Sands are again classified as Inactive in 2022, these units are defended at the toe by a sea wall and are well vegetated. Several unvegetated areas where shallow failures had exposed underlying material were noted in December 2013, but these do not appear to have developed since and vegetation appears to be re-establishing.

E52/2 remains graded as Dormant unchanged since the 2016 survey due to a lack of evidence for failures in this section of cliff.

CBU **E52/1** shows a little more activity, with loose materials and localised erosion at the head of the large mound situated just east of Saltburn Gill. However, the activity is minimal, and this unit was

downgraded from Locally Active to Inactive in 2014 and retained this status to 2016. In 2018 the unit was further downgraded to dormant. In 2022 there was no evidence of failures or erosion and as such the unit remains classified as dormant.

CBU **E53/5** was classified as Locally Active in 2012 due to shallow slumping which occurred on the cliff face and the unit was reclassified as Locally Active. The slumping has occurred despite the presence of toe protection and probably occurred in response to the wet weather experienced in the latter half of 2012. Evidence of activity still remains, so a status of Locally Active has been retained for this unit in 2022.

View looking east (E52/3b)

View east towards pier (/E52/3a)

(E52/1)

(E53/5)

Coast Protection Asset Condition Assessment

Hazel Grove Foot marks the north western extent of the hard defences which run along the Saltburn frontage. Missing coping stones and local damage (cracking and spalling) to the concrete wall and access ramp surface were present, as noted since 2014, and do not appear to have worsened resulting in retention of a fair condition grading.

During the 2016 survey it was noted that the security grille was open, presenting a health and safety risk. In 2018 this had been remedied and the grille was found to be sufficiently secured in place, however some of the bars were obviously damaged and the resulting opening was noted as being of a sufficient size to allow access to small children and animals. The grille appeared unchanged from 2020 and is still showing signs of damage. Due to the nature of this beach and the high footfall it receives it is recommended that the security grille be replaced to ensure access is restricted. It was notable in 2020 that there was an accumulation of pebbly beach material below the outlet in 2022

the pebbly beach material has eroded and the outfall channel has returned to a similar state as pre-2020.

Missing coping stone exposing fill beneath promenade surface (/C0703C02)

Security grille damaged (/C0703C02). Note accumulation of beach sediment around base of outfall.

South of Hazel Grove Foot, the frontage is defended by a masonry seawall. The shingle/cobble beach levels were similar to those observed in 2020 meaning that some defects previously reported along the masonry wall were not visible. The masonry and historic repointing works remained in good condition. Most mortar joints were in good condition as in 2020 with the exception of some localised areas of missing mortar and coping stones particularly seawall beneath the historic pier. In 2020 it was noted that there was a section of the southern lifeguard slipway ramp where coping blocks were missing, these were noted as having been repaired in the 2022 inspection.

Further localised damage was present along the low concrete wall to the rear of the promenade, comprising local cracking and abrasion. In 2022 it was noted that several of the cracks to this low concrete wall are full height and there was some evidence of localised instability of the slopes in these areas. Additionally, two sections of damaged handrailing were noted in the 2022 inspection.

View looking northwest. Lower beach higher than in 2018. (/C0702C04)

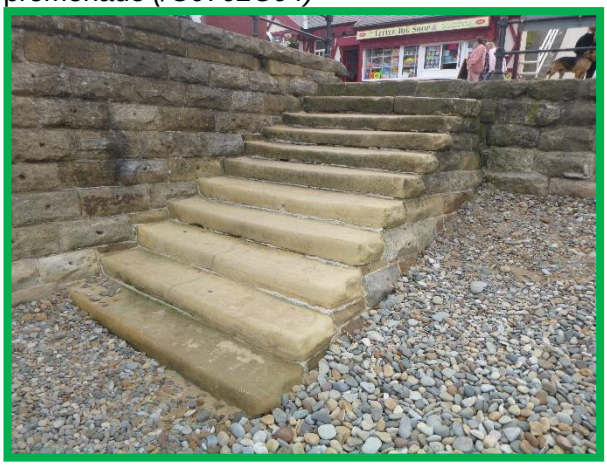
Slipway (/C0702C04)

Repaired section of slipway coping (/C0702C04)

Damage to handrailing along promenade (/C0702C04)

Defects to shallow retaining wall at rear of promenade *(/C0702C04)*

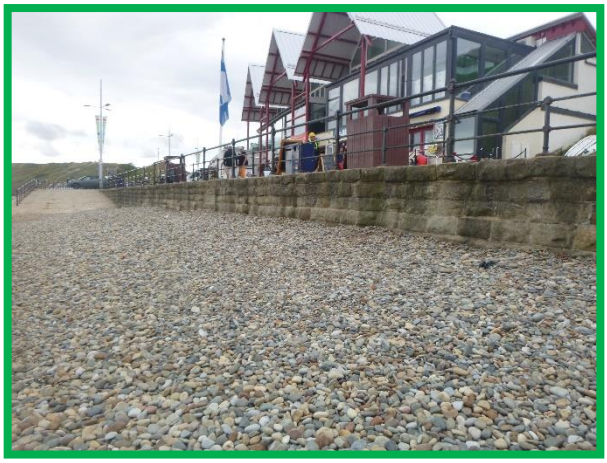
Further damage to shallow retaining wall *(/C0702C04)*



Beach access steps north of Saltburn Pier (/C0702C04)

Beach access steps south of Saltburn Pier (/C0702C04).

Masonry wall beneath Saltburn Pier (/C0702C04)



Looking south east along masonry wall south of pier (/C0702C04).

To the south east of the pier, the defences comprise a masonry blockwork revetment which is generally in good condition with some missing mortar observed locally. Cobble beach levels were similar to 2020. The accumulation of material noted at the 'apex' of the curve of the structure has been retained since 2020 after it was reported as having been eroded in 2018.

The concrete blockwork wall to the west of Skelton Beck remains in fair condition. A section of the wall is missing coping stones, leaving the footway fill material exposed, however there was no deterioration noted since 2020. The grouted masonry apron and masonry abutments to pedestrian bridge appeared to be in fair condition as reported in 2020.

Slipway south east of Saltburn Pier (/C0704C01)

Missing / damaged blocks at apex of structure (/C0704C01)

Damage to coping stones along low blockwork wall (/C0704C06)

Repairs to steps in fair condition (/C0704C06)

Grouted rock revetment to north of beck in fair condition (/C0704C06)

Grouted rock revetment to north of beck in fair condition (/C0704C06)

Exposed crest of grouted rock revetment to south of rock revetment (/C0704C06)

Undercutting of rock revetment apron (/C0704C06)

In the 2020 inspection construction works were underway adjacent to Skelton Beck. In 2022 these were completed and a new rock armour revetment has been constructed along the south side of Skelton Beck upstream from the bridge.

New rock armour revetment at Skelton Beck, looking upstream from the Saltburn Road bridge.

To the east of Skelton Beck, the frontage is undefended past the boat/car park. Further erosion/lowering of the cobble beach was evident at the eastern extent. Vegetation had begun to establish toward the crest of the shingle although local erosion was apparent, potentially as a result of members of public accessing the beach from the car park. Possibly a general lowering of beach levels on the east bank of Skelton Beck indicated by the exposure of the crest of the grouted rock revetment (although there was no significant change from 2014).

Vegetation establishment fronting car park (/C0704C02)

Exposure of corner of car park (/C0704C02)

To the south of the boat park is a set back wall protected by a high cobble beach. The wall remains in a good condition and shows signs of recent repairs and paintwork. There remain some local defects such as minor cracking and loss of render as noted in 2020. The recently refurbished concrete slipway remains in good condition, however flexible joint sealant was observed to be locally loose and missing in places, particularly at the seaward end between deck slab and eastern facing side slope. The vertical face of the slipway was visible on the western side of the structure and minor abrasion was evident (the southern face of the structure remains obscured by the high cobble beach.

View looking west (/C0704C03)

Concrete slipway adjacent Ship Inn car park (/C0704C03)

The most southerly section of coastal defences at Saltburn comprises the masonry and concrete seawalls and concrete aprons protecting the public house and land to the east of the slipway. The condition of the assets remains in poor condition as has done since 2016. The masonry and concrete seawalls show extensive signs of cracking and abrasion, particularly towards the eastern end. It was noted during the 2020 survey that the boundary wall fronting the public house car park has collapsed. In 2022 the wall was noted as having been repaired.

The concrete apron/revetment poured to east of the defence is severely undercut with numerous voids forming, and in parts has shown signs of collapse. The masonry walls higher up the slope were also undercut, as noted in 2020.

Slipway in fair condition higher beach levels cover previously reported undercutting (/C0704C05)

Open joints missing sealant (/C0704C05)

Undercutting of concrete apron (/C0704C05)

Ad hoc repairs to seawall in poor condition (/C0704C05)

Undercutting of mass concrete apron (/C0704C05)

Undercutting and voiding in mass concrete apron (/C0704C05)

3.5 Cliffs northeast of Saltburn

Coastal Slope Condition Assessment

Northeast of Saltburn the cliffs have a slope-over-wall form, with a weak till overlying a steep hard rock cliff. The till is subject to periodic mudslides, which result in material falling over and staining the cliffs and deposition of a debris apron along the cliff toe. The debris apron is partly-vegetated, indicating periodic activity in the form of wave erosion and debris falls.

Following the 2014 inspection, cliff units E53/5 to E53/1 were classed as Locally Active except E53/2 which remained as Partly Active. The condition in 2022 was similar to as observed in 2020. The more westerly slopes (E53/5 – E53/3) are Locally Active and remain vegetated with some minor slips evident along the head scarp. In several locations, the Cleveland Way path is significantly exposed and at risk of being undercut particularly in the E53/2 locality and as such is observed as remaining Partly Active. Towards Hunt Cliff (E53/1) the cliff becomes steeper and less vegetated and appears to be only Locally Active.

E53/3 to E53/5 Generally small-scale slumping in the till layer of the cliff northeast of Saltburn (Locally Active in August 2022).

E53/2 Ongoing headscarf recession with some slumping of the till layer of the cliff northeast of Saltburn (Partly Active)

E53/5 Slumping adjacent the concrete wall at the east end of Saltburn (Locally Active).

E53/5 ongoing erosion of the toe directly east of Saltburn (Locally Active).

E53/2 (right) Partly Active in 2022 due to ongoing frequent headscarp recession and erosion of material at tow. **E53/1** (left) Locally Active in 2020 due to a more stable headscarp and upper slope.

E53/3 (foreground) Locally Active in 2020 **E53/2** is obscured by minor headland and **E53/1** (visible in background) Locally Active in 2020.

Coast Protection Asset Condition Assessment

There are no coastal assets within this area.

3.6 Hunt Cliff and Warsett Hill

Coastal Slope Condition Assessment

The cliffs are characterised a slope-over-wall form, comprising vertical rock cliffs capped by weaker till. There is evidence of localised and recent rock fall activity in the cliff and mud sliding. These high, steep cliffs were all classed as Partly Active during the 2022 walkover survey, apart from E54/4 and E54/1 which were observed to be Locally Active.

During the 2020 inspection it was noted that the Cleveland Way path continues to be at significant risk of being undercut, particularly at the apex of the corner on the railway line. There are recent rockfalls and the fencing in parts is at risk of collapse due to the retreat of the escarpment.

E54/4 looking northwest along Hunt Cliff showing active cliff face and debris apron (Partly Active)

E54/3a proximity of footpath and railway line to actively eroding cliff top (Partly Active)

E54/3b unguarded section of footpath Hunt Cliff showing active cliff face and debris apron (Partly Active)

E54/2a proximity of footpath and railway line to actively eroding cliff top (Partly Active)

Coast Protection Asset Condition Assessment

There are no coastal assets within this area.

3.7 Cattersty Cliff and Skinningrove

Coastal Slope Condition Assessment

The cliffs in this area reduce in height towards Skinningrove and are generally less active than those around Warsett Hill. They have a characteristic slope-over-wall form, comprising a thin layer of till overlying the hard rock cliff.

E54/1 is characterised by a vegetated layer of till, which sits above the Lower Jurassic bedrock. Lower down the cliff, the cliff face is largely obscured by periodically active debris lobes that are undergoing marine erosion at the toe. This unit was observed to remain as Locally Active in 2022.

Units **E55/3, E55/2 and E55/1** have a small, steep debris apron that is sparsely vegetated. The debris apron shows evidence of recent activity and is subject to ongoing toe erosion. The till in the upper cliff is subject to localised mudslide development and headscarp recession. These units were classed as Partly Active in 2018 and retain that status in 2022, despite showing some general signs of increased stability

E55/2 Vegetated layer of till, which sits above the Lower Jurassic bedrock. Partly Active. .

E55/3 (left) Partly Active in 2020 **and E54/1** (right) Locally Active in 2020.

Evidence of past mudslides and erosion along the toe of **E55/1.**

E56/2a and 56/2b Cliffs above Cattersty Sands, looking towards Skinningrove (Locally Active)

Unit **E56/2a and 56/2b** are above Cattersty Sands (immediately west of the jetty). The cliffs here have a shallower gradient with extensive vegetation cover. They are also provided protection at their base by a set of developing embryo dunes. The development of these dunes and lack of erosional activity within this unit is due to the protection afforded by the adjacent jetty. The overall unit remains

classed as Locally Active, it could be argued that the more southerly of the two sections (**E56/2a**) be downgraded to Inactive, due to the low level of activity observed. However, the locally active status is retained due to the low possibility of activity along the headscarp.

Unit **E56/1** is located to the east of the jetty and adjacent to the mouth of the beck. The slopes within this unit are well-vegetated. There is no evidence of recent sliding activity and since modification of the rock revetment, the unit retains its inactive status in 2022.

Coast Protection Asset Condition Assessment

Although Skinningrove Jetty (Asset Ref No. 1221D901D0201C02) is redundant for its original purpose, the export of pig iron, and until recently has been in a failing state, the massive structure provides some coastal stabilisation, fixing the orientation of the adjacent bay to the east and giving some protection to Skinningrove village to the south east. It also helps hold the beach in front of the undefended cliffs to the west.

Refurbishments works were undertaken in 2015 to repair a failed section of crest wall and damaged jetty decking, whilst placing additional rock armour protection on the collapsing seaward side. These works are improved the condition of the jetty from poor to good. A number of small defects remain however, including corroded steel sheet piling, cracked and abraded concrete and some of the new works have poorly inserted sealant in construction joints and exposed reinforcement bars, which could lead to future maintenance problems.

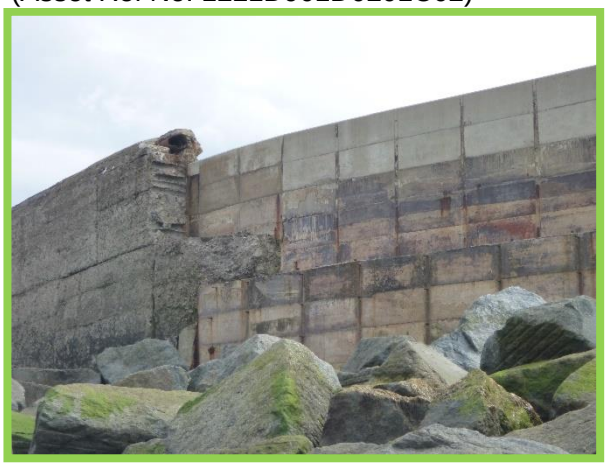
The condition of the asset has not changed since 2016, other than staining of the seaward face of the repaired wall due to corrosion of reinforcement as highlighted since 2016.

View of crest from access gate showing missing section of crest wall and damaged deck in 2014 (Asset Ref No. 1221D901D0201C02)

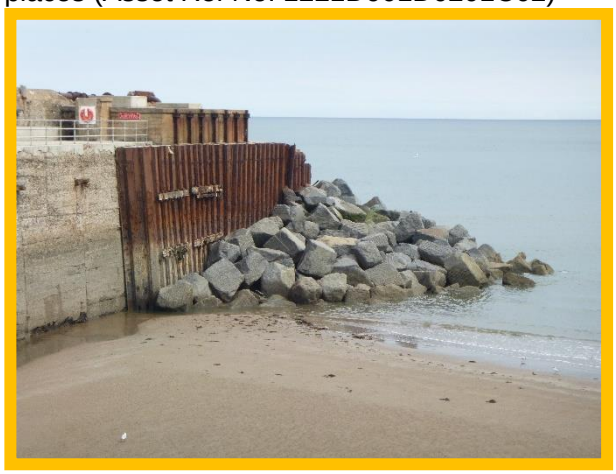
Voiding and collapse of west side of jetty structure in 2014 (Asset Ref No. 1221D901D0201C02)

Inner face and deck of structure (Asset Ref No. 1221D901D0201C02)

Seaward face of wall. Rock armour profile poor in places (Asset Ref No. 1221D901D0201C02)



Seaward face of repair. Exposed re-bar and corrosion staining (Asset Ref No. 1221D901D0201C02)



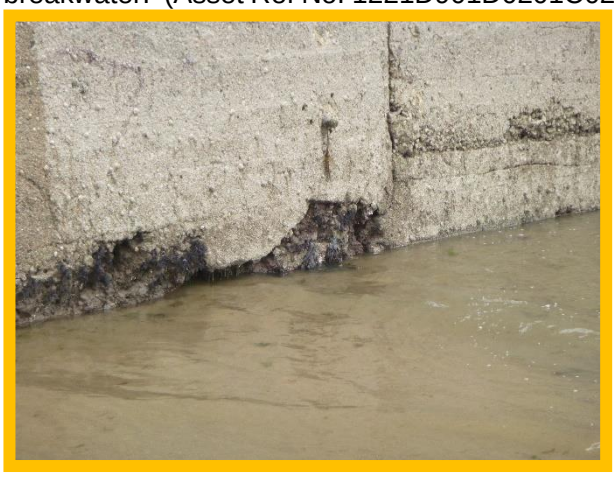
Heavily corroded sheet piles and rock armour around nose of orignal jetty structure.

The inner face of the breakwater is in poor condition These were reported in the 2020 inspection report and do appear to have worsened.
During the 2022 inspection it was noted that there are a number of significant defects which appear to be worsening and are providing cause for concern. The defects are located on the inner face of the structure and are principally concerned with the continuing degradation of the concrete face. There is extensive evidence of longitudinal cracking along historic cold joints, vertical cracking, void formation and washout of fill material. In particular there is one large open void in the wall face approximately 6m long and 3m high with average depth of ~300mm. Within the wider void there is a smaller more cylindrical hole which appears to pass directly into the structure. It was apparent that there has been some washout of fill material.

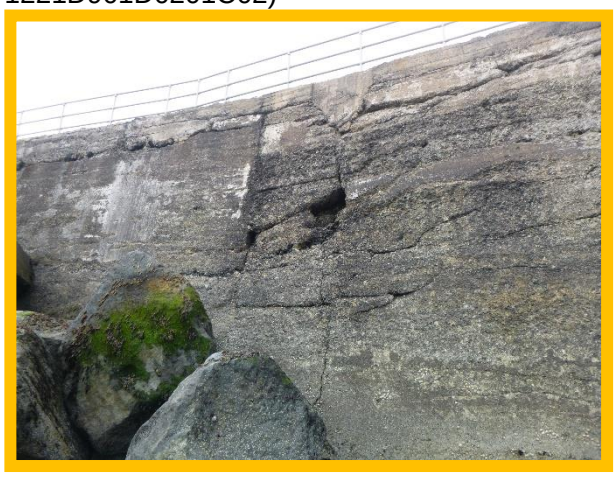
Elsewhere along the inner face of the structure there was evidence of scour along the base of the wall, and further small voids visible along the base of the concrete wall and sheet pile section.

Large void visible halfway along inner face of breakwater. (Asset Ref No. 1221D901D0201C02)

Close up of hole in void (Asset Ref No. 1221D901D0201C02)



Scour visible at base of breakwater (Asset Ref No. 1221D901D0201C02)



Void visible at root of breakwater (Asset Ref No. 1221D901D0201C02)

Void visible In base of sheet pile at seaward end of structure (Asset Ref No. 1221D901D0201C02)

Large wishbone shaped crack on inner face of breakwater
(Asset Ref No. 1221D901D0201C02)

The nose of the original structure remains in poor condition with heavily corroded sheet piles visible on the landward face, and some rock armour placed around the seaward face. The poor condition does not seem to affect the structures performance however and it only recommended that ongoing monitoring of this is undertaken.

Lighting units were installed along the jetty and revetment leading to the village of Skinningrove which provided an obvious health and safety benefit. During the 2022 inspection the conduits which house the power cables for these lights was found to be detached from the wall or completely severed rendering the lighting fixtures redundant. Some of the light fixtures have also caused notable corrosion staining along the repaired section of concrete crest wall.

Damaged lighting conduit at head of breakwater.

Severed conduit to light and rust staining

The rock armour defence between Cattersty Jetty and Skinningrove village, (Asset Ref No 1221D901D0202C01) was re-profiled as part of the recent Skinningrove coastal defence works, with an extension of the armour around the inner face of the jetty. The revetment appears to offer good protection against overtopping as there was no evidence of slippage in the backing slopes. The crest of the berm has also been surfaced as part of those works.

There is an ongoing loss of surface material from the path, particularly at the southern end of the revetment. This is likely caused by surface water runoff from the slope behind the path. It is recommended that footpath levels are monitored, particularly following heavy rainfall as they may present a health and safety risk if they increase significantly in size and depth.

General view of rock armour revetment in 2022. Good profile and interlock. (Asset Ref No. 1221D901D0202C01)

Evidence of washout of surfaced path.
(Asset Ref No. 1221D901D0202C01)

Modified rock revetment protecting inner face of jetty (Asset Ref No. 1221D901D0202C01)

The masonry wall behind the rock revetment (asset ID 1221D901D0202C02) remains unchanged from 2020. The masonry wall was severely overtopped prior to the works at the breakwater and along the Beck.

Rock armour revetment fronting properties .
(Asset Ref No. 1221D901D0202C02)

Blockwork wall at rear of revetment (Asset Ref No. 1221D901D0202C02)

Rock armour protection along eastern edge of Kilton Beck.
(Asset Ref No. 1221D901D0202C05)

Rock armour groyne and concrete slipway (Asset Ref No. 1221D901D0202C05)

Outflanking of concrete slipway (Asset Ref No. 1221D901D0202C05)

Undercutting of concrete slipway (Asset Ref No. 1221D901D0202C05)

Defences to the east of Kilton Beck were also modified during the 2015 works, with the fishtail groyne being reduced in size and a small, detached breakwater being constructed. The concrete slipway which forms part of the asset (Ref No. 1221D901D0202C05) has been outflanked and undercut along its eastern edge. The undercutting of the slipway will likely result in the slipway deck cracking as the material beneath it is washed out. It is recommended that the void beneath the slipway deck is filled and some of the smaller armour stones from the adjacent section of groyne are moved alongside the slipway to prevent further undermining.

Future monitoring and inspections should be used to determine the location and scale of beach changes that may result as a consequence of the modifications made to the groyne and breakwater.

Original defences to the east of Kilton Beck, 2014

Modified defences to the east of Kilton Beck, 2022. **Note:** *detached breakwater*

3.8 Skinningrove to Boulby

Coastal Slope Condition Assessment

Many of the cliffs in this area have been subject to alum quarrying of their uppermost sections, resulting in a characteristic excavated upper part and a natural lower part. In some parts, the whole cliff face has been subject to quarrying and the coastline is formed in quarry waste.

Directly to the east of Skinningrove the Cleveland Way path rises sharply towards Hummersea Cliff. The path appears to have been recently repaired and in parts the head scarp of the cliff is encroaching upon the path. Three distinct large rockfalls were observed on the beach at the toe of E57/7. Other sections of the lower cliff face appeared loose and crumbling with some large cracks visible. The headscarp of the unit was found to be encroaching further upon the Cleveland Way in several locations. As such **E57/7** was downgraded to Totally Active in 2020 due to the extent of activity across the unit, the unit retains this status in 2022. **E57/6** is a high rock cliff with a thin cap of till above which is deemed to be Locally Active in 2022.

E57/7 Slumping and recession along headscarp (Totally Active)

E57/6 High rock cliff with till cap (Locally Active)

E57/7 evidence of multiple significant rockfalls (Totally Active)

E57/7 evidence of multiple significant rockfalls (Totally Active)

To the east of Hummersea Point the cliffs generally become less steep and area known as Hummersea Bank is heavily vegetated. The cliff units **E57/5** through **E57/3** remain locally active. During the 2022 inspection the footpath onto Hummersea Scar was noted as being open to the public, albeit overgrown with vegetation indicating only occasional use. During the 2018 inspection the footpath was temporarily closed due to instabilities in the cliff face.

E57/3 Hummersea Bank

E57/1 to E57/5 looking across Hummersea Bank.

To the east of Hummersea Bank the cliffs are characterised by an upper till layer with some vegetation cover and localised mud sliding and consequent recession at the headscarp. The lower rocky cliff is free of vegetation and has evidence for on-going erosion. **E57/2** and **E57/1** remain classed as Locally Active, however due to access restrictions and the footpath leading down into The Warren being heavily overgrown it was not possible to observe any potential activity on the lower slopes.

Unit **E58/6** cover a section of cliff known as 'The Warren' and represents a change in behaviour between the naturally formed cliffs to the west and the cliffs formed, at least in part, by quarrying and tipping of waste. This unit is classified as Locally Active in 2022, unchanged since 2012.

To the east of The Warren, the sea cliffs rise to become some of the highest in Britain. Here the cliff form owes its character to the large, abandoned alum quarries which were operational in this area during the 19th Century. Units **E58/5 to E58/2** each has an upper and lower unit. The upper parts of the quarry units are backed by steep sandstone cliffs and feature heavily vegetated, undulating

terrain, possibly the product of past rockfalls as a result it is classified as Locally Active in 2022, unchanged since 2012. The lower part of the cliff is exposed to marine attack, is steep and comprises exposed shales that are heavily weathered and prone to ongoing and intense erosion. Consequently, these lower units all remain classified as Partly Active in 2022, unchanged since 2012. Below Rockhole Hill there is a unit (**E58/1c**) classified as Partly Active, **E58/1a** and **E58/1b** remain classified as Partly Active.

It is worth noting that observations of activity along **E58** were generally made from afar due to the limited access and exposure within the abandoned quarries along Rock Cliff.

E58/5 Upper looking towards Rock Cliff. Locally Active upper sections and Partly Active lower sections.

E58/5 Locally active upper unit

E58/5 Active erosion of headscarp

E58/3 – E58/4 Upper looking across Rock Cliff and the Loftus Alum Quarries. Locally Active upper sections and Partly Active lower sections.

E58/2 Upper showing signs of ongoing headscarp recession.

E58/5 Upper further signs of headscarp recession presenting an imminent risk to footpath stability.

Coast Protection Asset Condition Assessment

There are no coastal protection assets within this area.

3.9 Boulby to Cowbar Nab

Coastal Slope Condition Assessment

In the coastal section between Boulby and Cowbar Nab the cliffs are much lower than those adjacent to the west. The majority of CBUs within this area are classified as Partly Active. They are characterised by a soft upper till unit which supports a variable vegetation cover and is subject to landsliding and consequent headscarp recession. Lower down the cliff the harder rock unit is largely bare except where covered by debris cones, reflecting localised rockfall activity.

E58/1 to E59/8 Soft, slumping, upper till resting upon harder rock (Partly Active). E59/9 (Locally Active) fronts the properties.

E59/5 to E59/4 Soft upper till resting upon harder rock subject to rock fall (Partly Active)

E58/1a headscarp recession encroaching on footpath.

E58/1a headscarp recession encroaching on footpath.

An area of particular and long-standing concern along this stretch is adjacent to Cowbar Lane. Here units **E59/5** to **E59/1** are all classified as Partly Active in 2022, unchanged from 2012. They are characterised by an upper till unit which is undergoing severe erosion and there is evidence of recent rockfall from the lower part of the cliff. This is resulting in the loss of the now abandoned parts of Cowbar Lane. Rock armour is also locally present along the toe of unit **E60/1b**, which is acting to locally protect the base of the cliffs but is not able to prevent failures in the till materials above. However, a fresh rockfall occurred in 2016 immediately adjacent to the rock armour, leading to further slippage in the till cliffs above and closure by The National Trust of public access to Cowbar Nab. In 2022, it was noted that the nearly the abandoned section of Cowbar Lane is now affected along almost its entire seaward facing side.

E59/3 and E59/4 Loss of road due to ongoing erosion at Cowbar Lane

E59/3 and E59/4 Loss of road due to ongoing erosion at Cowbar Lane

E59/4 Ongoing erosion of soft till layer leading to collapse of road (Totally Active).

E59/3 Ongoing erosion of soft till layer leading to collapse of road (Totally Active).

In 2016 and 2018 access onto Cowbar Nab was prohibited via means of Heras fencing and temporary barriers. During the 2020 walkover survey access onto Cowbar Nab was possible, as the temporary access restrictions now having been removed. The stile and gateway were in poor condition and the footpath on Cowbar Nab was overgrown and difficult to follow. During the 2022 walkover survey the access was once again closed off with Heras fencing however there were signs of recent construction works to form a wide gravel track onto the Nab. It is not known if the access path onto Cowbar Nab has been constructed to enable public access or to enable access for servicing the radio masts on the Nab. Although the level of activity appears to have stalled in recent years Cowbar Nab (**E60/1b**) is still a highly active cliff complex and presents a significant risk to members of the public who may access the cliff top, and also those accessing the rocky foreshore below around the low tide. In 2021 The Yorkshire Post reported on several smaller rockfalls around Cowbar Nab and during the 2022 inspection there was evidence of continued recent rockfall.

E60/1 Closure of access to Cowbar Nab in 2016, in 2018 the access appeared in very similar state with the same Heras fencing and plastic barriers still in use.

E60/1 In 2022 the access was no longer marked as closed although the path onto the Nab is overgrown.

E60/1 in 2022 a new path onto the Nab has been constructed however access was once again prohibited.

E60/1a and E60/1b Totally Active in 2022.

Coast Protection Asset Condition Assessment

Although the NFCDD records show no specific coastal defence assets within this area there are two sections of rock armour that give some protection to the cliff toe adjacent to local 'pinch points' next to the cottages on Cowbar Lane, constructed as part of the 2002 scheme at Staithes harbour. The rock armour was not inspected from the foreshore during the 2022 inspection due to the encroaching tide. However the rock armour was partially visible from the cliff top and appeared to be in fair condition, similar to that observed in previous years. The rock armour comprises of a mixture of imported granite and smaller locally sourced rock. The crest level is relatively low, and the length of cliff protected short, so appears to be designed as an adaptive measure to slow the rate of erosion locally. In addition, netting has been used to help stabilise the till slopes in local sections along Cowbar Lane.

E59/1 Rock armour located at toe of cliff to the west of Cowbar Cottages

E60/1b Rock armour located at toe of cliff to the north of Cowbar Cottages

E60/1 netting has been placed on the upper till slope adjacent Cowbar Cottages to locally decrease the rate of erosion.

E60/1b Rock armour located at toe of cliff to the north of Cowbar Cottages. Active upper till slope above rock armour.

4. Comparison with Previous Assessment

The previous formal assessment across the whole study frontage was undertaken in summer 2020.

Between 2014 and 2016, Skinningrove in particular benefited from a capital investment in repairs and improved defences. The repairs and improved defences appear to be in good condition to the present date and are having a positive impact on beach conditions and use of the shoreline features such as the surfaced path between Cattersty Jetty and Skinningrove itself. Despite the capital investment works the inner face of Skinningrove Jetty continues to degrade and is now in need of urgent capital maintenance.

In Redcar the recently constructed Regent Cinema and seawall have significantly improved the condition of the defences in this location.

Elsewhere, in the two years since the previous inspection there has been little change to the defended and undefended assets. High beach levels along much of the Redcar and Saltburn frontage meant that previously reported defects were not visible in places. Of the remaining areas, the most major changes since 2020 exist along undefended cliffs, especially along Cowbar Lane where the rapid erosion of the upper cliff continues. Generally, however, the cliff behaviour categories remain largely unaltered from the 2020 inspections, except for a few areas where the classification has been downgraded.

There are several built assets which retain a poor condition grading, most notably the South Gare Breakwater the condition of which has continued to deteriorate.

5. Problems Encountered and Uncertainty in Analysis

During the 2022 inspections very few issues were encountered across the frontage. Access issues posted the largest risk; however, most assets are located within public spaces and therefore were freely accessible.

All assets were inspected at an appropriate stage in the tidal cycle and due care was taken when accessing the more remote assets. Beach levels in 2022 were generally similarly high to the 2020 inspections meaning that undercutting and voiding visible in the 2018 inspection was generally not visible.

The South Gare Breakwater is not accessible to members of the public and therefore inspection of this structure is limited.

Views of the lower part of the cliffs were sometimes limited, especially between units **E58/5** to **E58/1c** due to the steep, complex terrain of the former quarries. At locations where observations were difficult, judgements about cliff behaviour activity status were made based on the visible cliff sections and informed by previous assessments and additional data derived from aerial survey data collected as part of Cell 1 Regional Coastal Monitoring programme.

6. Conclusions and Recommended Actions

Further to the visual inspection of all assets, specific conclusions and recommendations for individual assets are given in **Appendix C**. The main urgent recommendations are:

- South Gare Breakwater – Survey required to ascertain nature and extent of defects. Repairs are required to maintain the integrity of the structure. Potential health and safety issues due to the ease of access to the seaward elements of the structure.

- Skinningrove Jetty – the inner face of the Jetty is in poor condition due to a large number of voids, cracking and scour. Urgent capital or maintenance works are required in order to prevent washout of fill material and halt the propagation of voids in the structure.

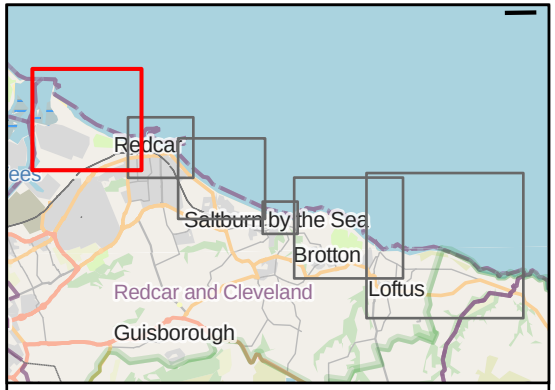
- The damaged lighting conduit on Skinningrove Jetty should be repaired to prevent damage to the structure and restore an effective lighting system to the pier reducing health and safety risk to the public.

In addition, the cliffs have been characterised according to their present activity status and details are given in **Appendix D**.

All condition assessment data and selected photographs have been uploaded to SANDS (Shoreline And Nearshore Database System).

Appendices

Appendix A
Asset Location Maps



Legend

Coastal Asset location

NFCDD Asset Number

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 1 - Map 1

COASTAL ASSET LOCATIONS

Redcar & Cleveland Borough Council Frontage

Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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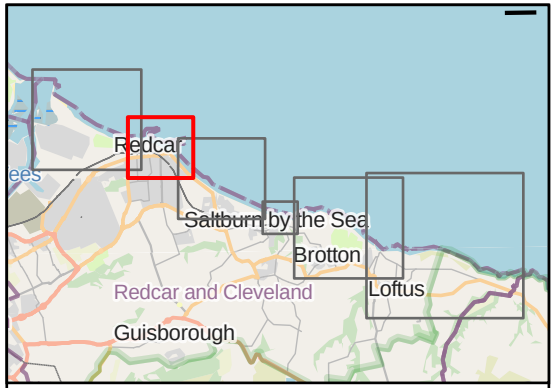
Co-ordinate system: British National Grid

Royal HaskoningDHV
Enhancing Society Together

North East Coastal Observatory



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Coastal Asset location

NFCDD Asset Number

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 1 - Map 2

COASTAL ASSET LOCATIONS

Redcar & Cleveland Borough Council Frontage

Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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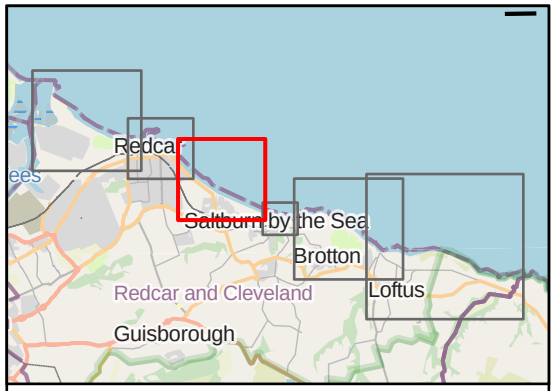
North East Coastal Observatory



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Coastal Asset location

NFCDD Asset Number

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 1 - Map 3

COASTAL ASSET LOCATIONS

Redcar & Cleveland Borough Council Frontage

Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

Royal HaskoningDHV
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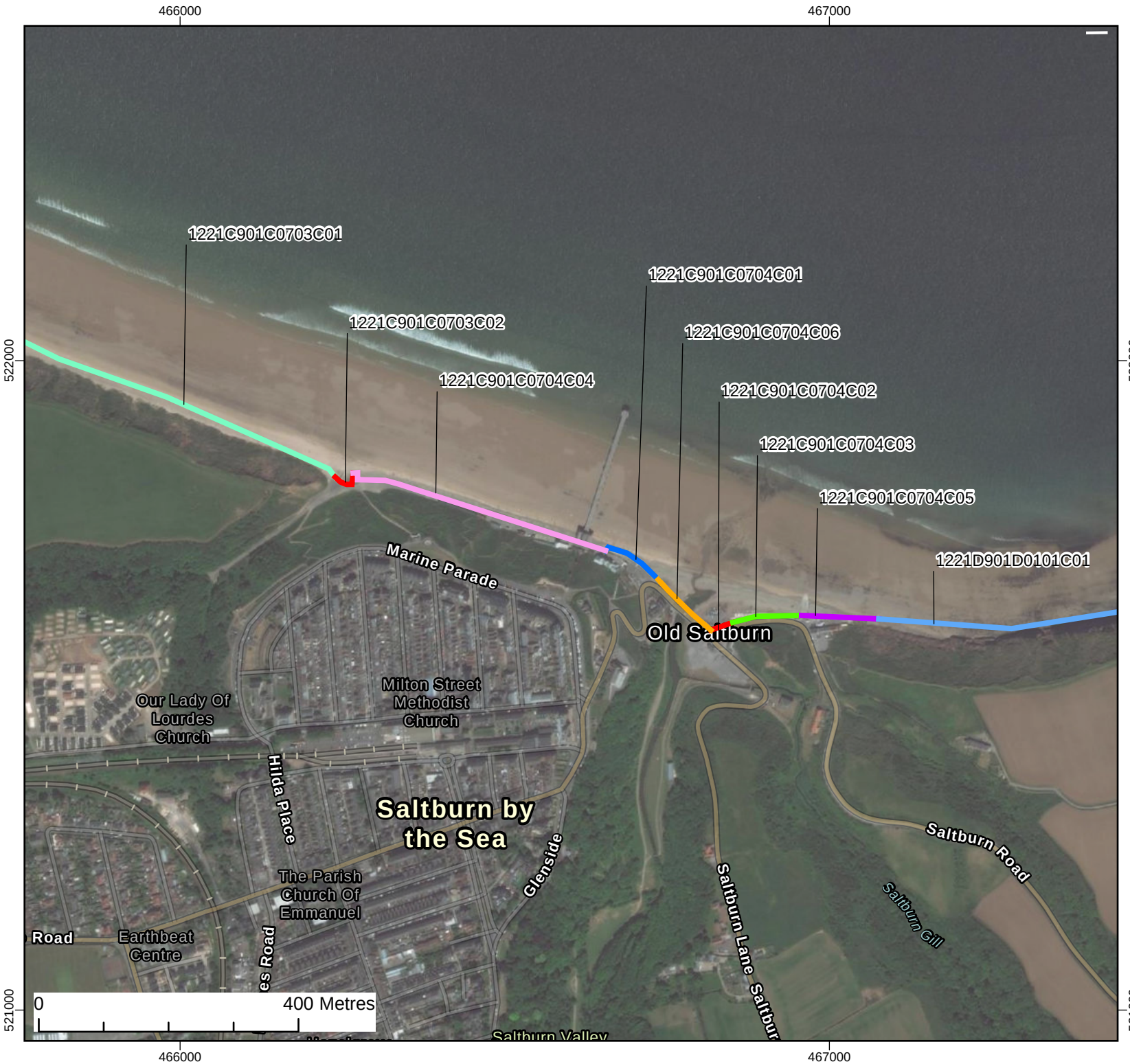
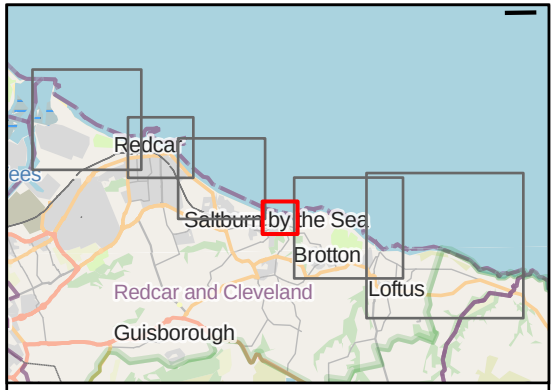
North East Coastal Observatory





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Coastal Asset location

NFCDD Asset Number

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 1 - Map 4

COASTAL ASSET LOCATIONS

Redcar & Cleveland Borough Council Frontage

Report:

Asset Inspection Report

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Co-ordinate system: British National Grid

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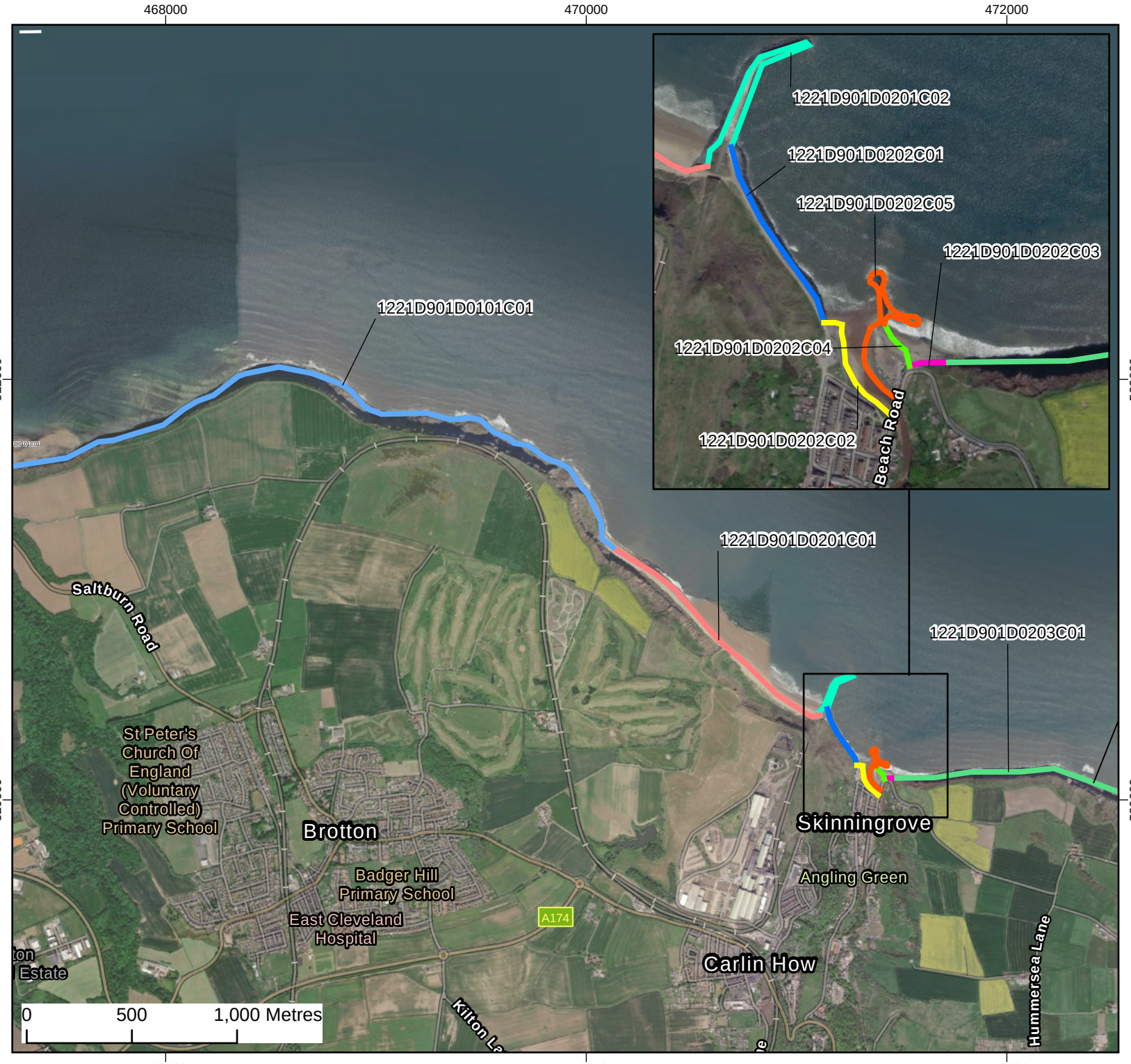

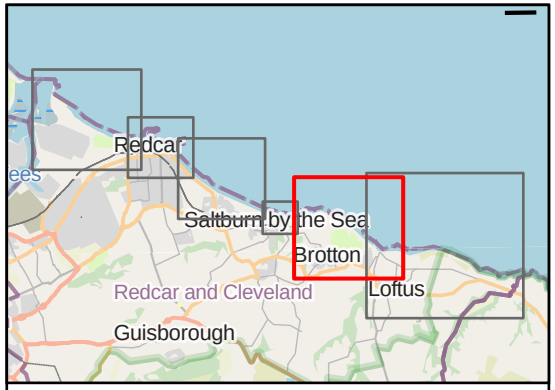

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Coastal Asset location

NFCDD Asset Number

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 1 - Map 5

COASTAL ASSET LOCATIONS

Redcar & Cleveland Borough Council Frontage

Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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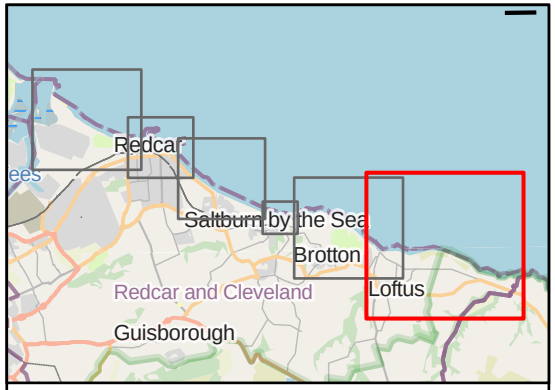

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Coastal Asset location

NFCDD Asset Number

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 1 - Map 6

COASTAL ASSET LOCATIONS

Redcar & Cleveland Borough Council Frontage

Report:

Asset Inspection Report

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Co-ordinate system: British National Grid

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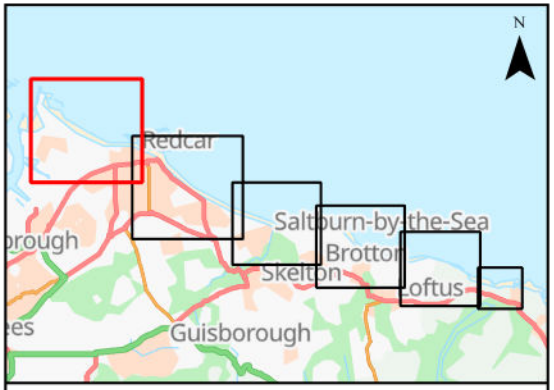
Appendix B
Cliff Behaviour Units



Legend

Cliff Activity Status

- Dormant
- Inactive
- Locally Active
- Partly Active
- Totally Active

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 2 - Map 1

COASTAL SLOPE CONDITION 2022

Redcar & Cleveland Borough Council Frontage

Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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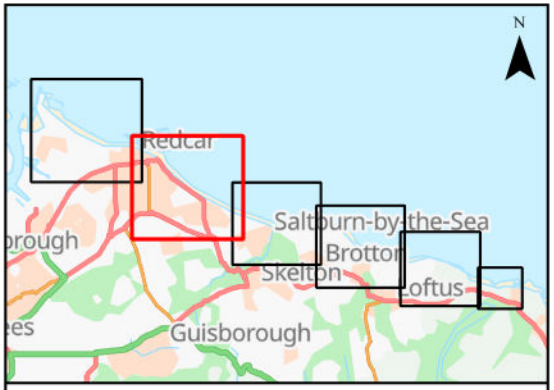

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Cliff Activity Status

- Dormant
- Inactive
- Locally Active
- Partly Active
- Totally Active

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 2 - Map 2

COASTAL SLOPE CONDITION 2022

Redcar & Cleveland Borough Council Frontage

Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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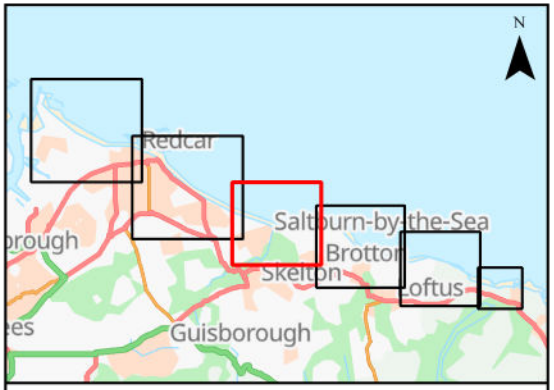

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Cliff Activity Status

- Dormant
- Inactive
- Locally Active
- Partly Active
- Totally Active

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 2 - Map 3

COASTAL SLOPE CONDITION 2022

Redcar & Cleveland Borough Council Frontage

Report: Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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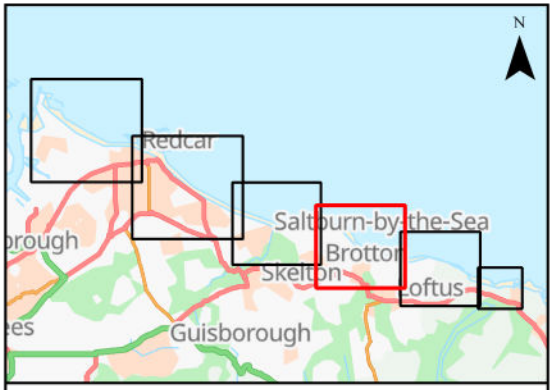

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Cliff Activity Status

- Dormant
- Inactive
- Locally Active
- Partly Active
- Totally Active

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 2 - Map 4

COASTAL SLOPE CONDITION 2022

Redcar & Cleveland Borough Council Frontage

Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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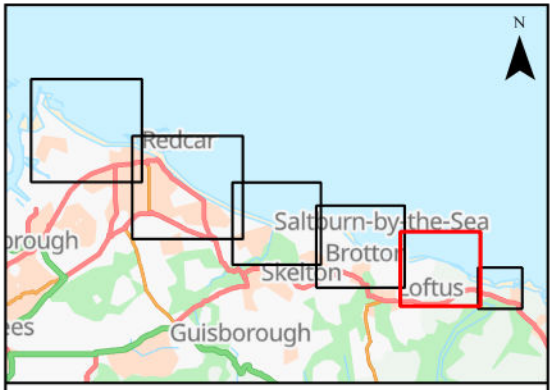

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Cliff Activity Status

- Dormant
- Inactive
- Locally Active
- Partly Active
- Totally Active

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 2 - Map 5

COASTAL SLOPE CONDITION 2022

Redcar & Cleveland Borough Council Frontage

Report: Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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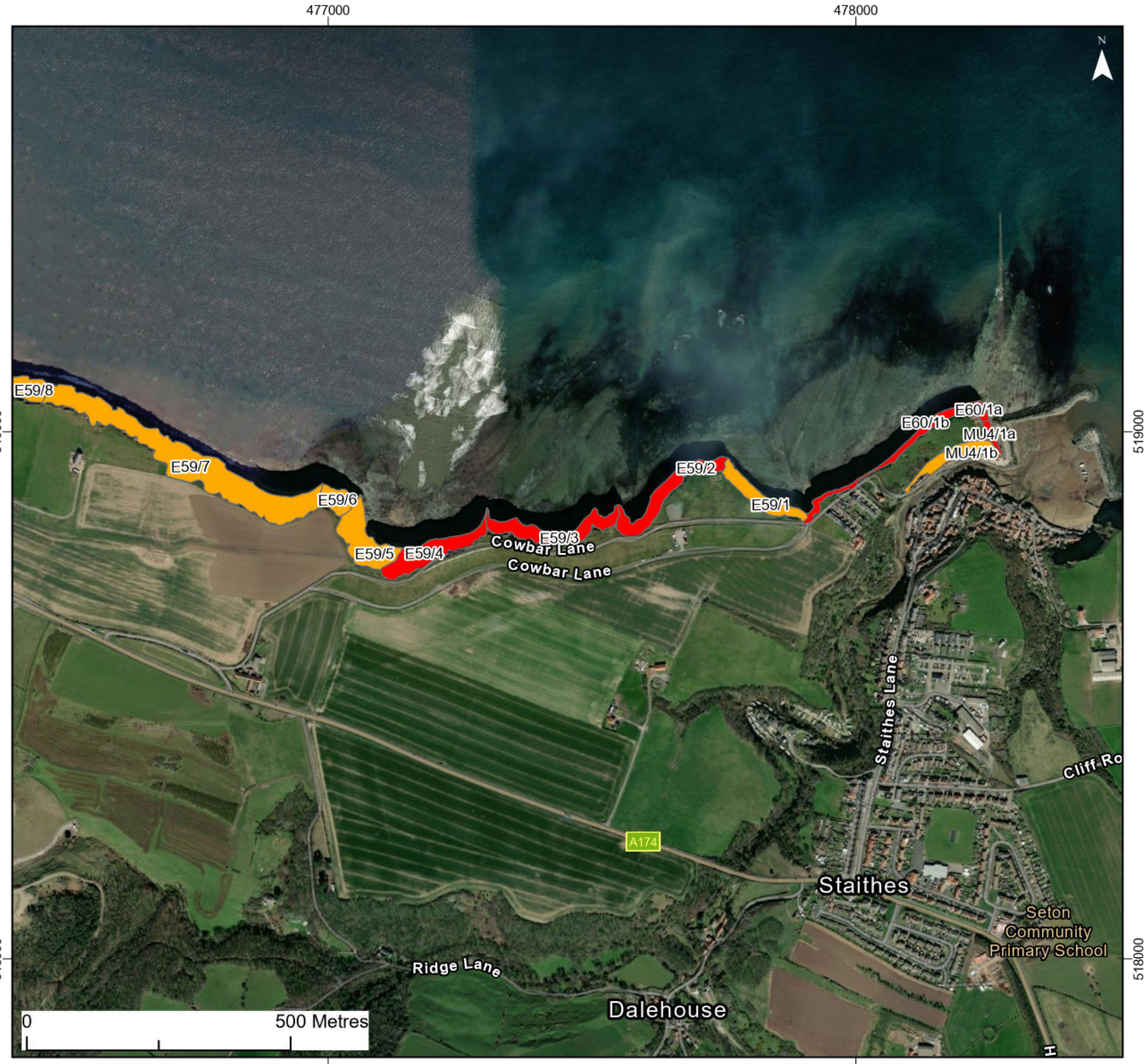

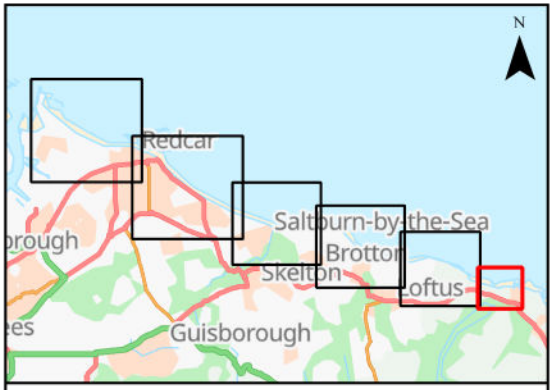

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Cliff Activity Status

- Dormant
- Inactive
- Locally Active
- Partly Active
- Totally Active

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 2 - Map 6

COASTAL SLOPE CONDITION 2022

Redcar & Cleveland Borough Council Frontage

Report: Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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Appendix C
Asset Condition & Recommendations

Asset Name	Description	Type	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0506C01	South Gare Breakwater. Protects Coatham Sands to south and Tees entrance to north.	Breakwater	1672.5	26/07/2022	Royal HaskoningDHV	Generally the structure remains in poor condition with further degradation noted from the 2020 survey. A repair undertaken prior to the 2020 inspection on the deckslab on the south facing wave return platform was in a failed state and in need of repair. Concrete blocks have recently been placed and repositioned at the seaward end of the structure however these have poor interlock and an unstable slope angle. Many other significant defects remain. These include missing, cracked and lifted deckslabs, missing coping stones, extensive cracking and spalling around the structure. Missing blockwork from the wall faces. Exposure of reinforcement steel, missing mortar, open joints, damaged render and void formation particularly on the northern face of the structure. The ongoing failure of the western pier arm structure, damaged and displaced rock armour and Accropode units with a poor interlock were also noted. Several sections of wall on the crest of the breakwater have been repaired and some access points blocked up, likely to attempt to prohibit access.	4	11 - 20	Repair failed deckslab on southern wave return wall. Structural inspection incl, boat/dive survey. Continue to monitor.	routine
1221C901C0507C01	Undefended	Undefended	4330.2	26/07/2022	Royal HaskoningDHV	Good coverage of established vegetation and dunes. Localised erosion due to public access was particularly apparent directly adjacent the South Gare breakwater and fisherman's huts. Degradation of the dune crest adjacent to the caravan park continues, with the defined crest having been lost at two beach access points. Seaward facing row of caravans now has only 4 occupied pitches. The beach remains wide and healthy.	3	>20	Dune management activity including restricting access fronting the caravan park. Installation of fencing to aid in dune accretion. Continue to monitor. Routine inspection & maintenance	routine
1221C901C0601C01	Concrete crest wall above part length of grouted stone revetment.	Revetment	861.5	26/07/2022	Royal HaskoningDHV	Some evidence of scour and mortar loss on grouted revetment below the gap in the crest wall. Generally grouted stone slope remain in fair condition. Localised areas of missing render visible along full asset length. Previously reported damage to blocks along toe not visible due to high beach levels. Ongoing undercutting and damage to the north end of the asset as previously reported. Sand accretion on promenade impacting drainage functionality.	3	11 - 20	Local repairs to damaged section of mortar. Infill gap in crest wall. Clear sand from promenade to enable drainage to function correctly.	routine

Asset Name	Description	Type	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0602C06	Stepped pre-cast concrete revetement with large pre-cast concrete recurve wall.	Revetment	82.1	26/07/2022	Royal HaskoningDHV	Stepped precast concrete revetment and precast concrete recurve wave return wall broadly remain in as built condition. Occasional vegetation growth through open joints.	1	>20	Remove any vegetation from open construction joints. Routine inspection and maintenance.	routine
1221C901C0602C05	Concrete wall surrounding Regent Cinema. Wall is comprised of vertical pre-cast concrete panels with drainage holes.	Wall	68.7	26/07/2022	Royal HaskoningDHV	Regent Cinema seawall and adjacent outfall replaced in 2022 and remain in as-built condition. In previous inspected low beach levels exposed a void under the north eastern corner of the former cinema building. During 2022 high beach levels meant that it was not possible to inspect the toe of the new seawall. On southern wall aspect two sections of flexible joint sealant were missing on the upper panel.	1	>20	Continue to monitor. Ensure flexible joint sealant is present in all panel joints.	no repairs
1221C901C0602C04	Stepped pre-cast concrete revetement with large pre-cast concrete recurve wall.	Wall	113.9	26/07/2022	Royal HaskoningDHV	Stepped precast concrete revetment and precast concrete recurve wave return wall remain in as built condition. Occasional vegetation growth through open joints. Small in-situ cast concrete infill in concrete revetment installed following installation of new outfall may be prone to cracking as it abuts a joint.	1	>20	Remove any vegetation from open construction joints. Routine inspection and maintenance. Monitor in-situ concrete for cracking.	routine
1221C901C0602C03	Stepped seawall to main sea frontage.	Wall	206.4	26/07/2022	Royal HaskoningDHV	Concrete seawall around Beacon. Missing flexible sealant in places, loose in others. In 2018 horizontal joints and joints in apron had no sealant and filler-board could be seen suggesting never sealant present. In 2022 high beach levels prevented inspection of the concrete apron.	1	>20	Replace/install flexible joint sealant. Routine inspection & maintenance.	routine
1221C901C0602C02	Stepped pre-cast concrete revetement with large pre-cast concrete recurve wall.	Revetment	480.7	26/07/2022	Royal HaskoningDHV	Stepped seawall and recurve wave wall, generally in as-built condition. Some damage to the in-situ concrete slope around slipway fronting King Street / The Esplanade. Cracking, spalling and staining of the slope was noted, in addition to a 'cluster' of grouted boreholes through the slab. The other slipways, in particular the RNLI slipway, showed signs of localised damage to the deckslabs and low beach levels exposed minor undercutting. No change since 2020.	1	>20	Local repairs to slipway. Routine inspection & maintenance	routine
1221C901C0602C01	Stepped pre-cast concrete revetement with large pre-cast concrete recurve wall.	Apron	559.2	26/07/2022	Royal HaskoningDHV	Stepped seawall and recurve wave wall in as-built condition. Further accretion of material and formation of embryo dunes/ vegetation toward SE end of asset. Some vegetation present along revetment.	1	>20	Routine inspection & maintenance.	routine

Asset Name	Description	Type	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0603C01	Grouted masonry revetment in front of promenade & The Stray. Concrete splash wall landward of promenade. Accretion of sand & dunes behind.	Splash Wall	1273	26/07/2022	Royal HaskoningDHV	Concrete block revetment tied into concrete promenade. As new condition. Some vegetation growth where sand has accumulated in joints. Timber groynes in good condition – repairs to groynes at landward end in good condition.	1	11 - 20	Continue to monitor. Routine inspection & maintenance. Local repairs to groynes.	routine
1221C901C0701C01	Undefended Frontage	Undefended Frontage	1765.3	26/07/2022	Royal HaskoningDHV	Informal access ramp at interface with hard defence and the till slope in fair condition, appears to have been recently topped up with loose gravel material. Along frontage the headwall of the outfall structure remains in fair condition, flexible tied concrete block mattress in a failed / very poor condition, several blocks missing with many misplaced and lifted. Localised scour to till slope across entire frontage. Generally more active in the NW and at 'headland', with more stable slopes in SE.	3	11 - 20	Continue to monitor. Replace or repair flexible tied concrete block mattress to ensure headwall and surrounding bank remain effectively defended.	routine
1221C901C0702C03	Lower masonry wall to path. Upper wall varies (concrete/masonry), coastal slope to rear.	Wall	125.9	26/07/2022	Royal HaskoningDHV	High beach levels. Accretion in front of wall with formation of dunes. Local defects to masonry wall – missing coping stones. Full height vertical cracks in rear concrete wall appear to be stable (noted since 2008).	3	11 - 20	Infill cracks. Replace missing blocks. Continue to monitor wall for movement.	routine
1221C901C0702C02	Masonry revetment to path and coastal slope above masonry wall. Coastal slope with access to properties above.	Revetment	122.2	26/07/2022	Royal HaskoningDHV	Extensive vegetation growth and high beach level largely obscuring blockwork revetment and wall. Visible sections in fair condition.	3	11 - 20	Repoint masonry, clear vegetation. Replace missing blocks.	routine
1221C901C0702C01	Brick wall enclosure of boat park and access. Short length of concrete wall with lower crest level.	Wall	97.2	26/07/2022	Royal HaskoningDHV	Damage to seaward end of masonry wall does not appear to have worsened significantly. Further scour and outflanking to rear. Landward concrete wall in fair condition with vertical cracks locally.	3	11 - 20	Repoint masonry, replace missing masonry/tidy seaward end of wall. Fill cracks.	routine
1221C901C0702C04	Undefended Frontage	Undefended Frontage	1011.6	26/07/2022	Royal HaskoningDHV	Low, accreting dunes fronting mostly vegetated slopes. Local erosion through pedestrian access. At SE extent, timber piles at toe of concrete ramp remain exposed and present a health and safety risk. Ramp is now significantly undercut and as such presents a health and safety hazard to the public and may be at risk of collapse in the near future.	3	11-20	Continue to monitor. Urgent repair to toe of concrete ramp to reduce risk to public. Extend ramp to prevent further undercutting in this location.	Urgent
1221C901C0703C01	Undefended Frontage	Undefended Frontage	1883.2	26/07/2022	Royal HaskoningDHV	Partly active. Erosion of the toe and land sliding is more widespread. NW extent and SE extent are most active (least vegetation). Good vegetation cover elsewhere. Recently installed timber access steps and outfall down slope face adjacent the old informal ramp access. Timber steps and handrail in good condition.	4	>20	Continue to monitor.	routine

Asset Name	Description	Type	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0703C02	Concrete wall including outfall and two concrete slipways to coastal slope.	Wall	46.8	26/07/2022	Royal HaskoningDHV	Generally fair condition. Minor cracking and spalling remains but appears not to have worsened. Missing coping at top of south access ramp. Security grille open. Security grille securely closed. However, damage to the grille bars reported in 2018 and 2020 remains.	3	>20	Routine: Infill cracks. Replace missing copes. Urgent: repair security grille to prevent child / animal gaining access.	urgent
1221C901C0704C04	Masonry wall in good condition, generally high sand with shingle to east end. Concrete splash wall to rear of promenade below coastal slope.	Sea Wall	415	26/07/2022	Royal HaskoningDHV	High cobble beach covering much of wall. Masonry in good condition along with previous repointing/repairs where visible. Damaged sections of hand railing in 2 locations. Slipways at Lifeguard station generally in fair condition. Damage to slipway coping reported in 2020 has been repaired. Minor mortar loss locally underneath pier structure and no mortar in lower visible section of masonry slipway. Local defects to concrete wall at rear of promenade (cracking and abrasion).	2	>20	Local repairs masonry/concrete walls. consider new rock revetment to east. Repair handrailing.	routine
1221C901C0704C01	661501 Large masonry block revetment protecting carpark, road and coastal slope. Masonry slipway is also present.	Revetment	65.8	26/07/2022	Royal HaskoningDHV	Minor mortar loss locally. High cobble beach levels. Minor local damage to concrete wall at foot of slope. Masonry access ramp at RNLI station open-jointed in lower section (assume covered in beach material when re-pointing undertaken.	2	>20	Local repairs to concrete wall. Local repairs to pedestrian guardrail. Monitor.	routine
1221C901C0704C06	Concrete blockwork seawall protecting pavement, handrail and tarmac road. This section also includes bridging point over river, continuation of sea wall on the southern side.	Sea Wall	147.1	26/07/2022	Royal HaskoningDHV	Towards the north western end of the asset high beach levels protect the toe of wall. Beach levels lower around apex of bend and at south eastern end, particularly to the south east of Skelton Beck. Undercutting of wall visible adjacent crest of rock armour. Generally the wall remains in good to fair condition with minor local abrasion, cracking and vegetation growth throughout. Additionally a localised area of missing coping blocks has exposed the backing footway material, though there does not appear to have been any significant change here since 2016.	3	>20	Replace missing coping blocks. Repoint locally. Monitor beach levels at Skelton. Consider grouting voids beneath wall to the south east of Skelton Beck.	routine
1221C901C0704C02		Carpark.	35.7	26/07/2022	Royal HaskoningDHV	Erosion/ lowering of the beach on the SE flank of watercourse. Further exposure and undercutting of the rear of the rock armour revetment. Low beach levels expose undercutting at the tie in with wall to left of revetment. Local erosion around corners of car park. Vegetation established in front of car park, some minor evidence of erosion.	3	11 - 20	Continue to monitor. Consider reprofiling shingle.	routine

Asset Name	Description	Type	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0704C03	661701 White rendered sea wall set back from the beach, cobbles have collected on the seaward side protecting the toe. Boat handling area, carpark and PH located behind. Slipway is also present giving access to the beach.	Wall	106.8	26/07/2022	Royal HaskoningDHV	Wall appears in fair condition and has recently been repainted. Some cracking and loss of render remains. Paving/ promenade remains in good condition. Concrete slipway in good condition, vertical concrete face remains visible on western side. Joint sealant missing towards seaward end of ramp.	2	11 - 20	Replace flexible joint sealant to access ramp. Local repairs to wall.	routine
1221C901C0704C05	661801 Various concrete and masonry walls to private property with various degrees of concrete apron with typical level of 4.7 mODN.	Wall	118.7	26/07/2022	Royal HaskoningDHV	Beach levels fronting the Ship Inn appeared lower similar to 2020, the undercutting / voiding along the toe of the wall was partly visible, as noted in previous reports. The poured concrete apron at east end of wall is further undercut and outflanked with extensive voids. There is localised cracking to concrete elements. Concrete blockwork is abraded, and several full height vertical cracks were visible. Masonry crest wall in fair condition, with the collapsed section having been recently repaired.	4	1 - 5	Monitor undercutting of toe and voiding beneath grout revetment at eastern end.	urgent
1221D901D0101C01	High cliffs are locally active above beach east of Saltburn. Cliffs much more active (partly active) along Hunt Cliff above shore platform, specifically where railway nears cliff edge. Further east, cliffs are less high and locally active.	Undefended high cliffs.	3551.2	29/07/2022	Royal HaskoningDHV	Generally, similar to 2020. High cliffs are locally active, around Hunt Cliff the activity increases, particularly where railway nears cliff edge. The footpath on the seaward side of the railway is now at significant risk of collapse.	3	>20	Continue to monitor. Localised stabilisation works recommended in areas where erosion threatens footpath and railway.	
1221D901D0201C01	Cliffs to NW partly active, slumping of soft upper slopes, erosion of harder lower cliff, some veg. Cliffs to SE support more veg, small dune system at toe, less active (locally active/inactive).	Undefended high cliffs.	1262.3	29/07/2022	Royal HaskoningDHV	Generally similar to 2020. Some evidence of recent mudslips and activity at the toe of cliffs. Mud lobes protruding onto foreshore are being eroded and undercut. Embryo dunes remain visible.	4	>20	Continue to monitor.	

Asset Name	Description	Type	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221D901D0201C02	Skinningrove Jetty	Breakwater	477	29/07/2022	Royal HaskoningDHV	Repairs to crest wall, jetty deck and rock armour placed along seaward face appear to be working effectively. Inner face of jetty continues to deteriorate with several large cracks, voids, holes, and evidence of scour across the full extent of the face. Elsewhere many defects are visible on original structure (deck slab lifted, poor joint sealant, heavily corroded sheet pile at snout). The new structure is in generally good condition however small defects remain (exposed reinforcement on seaward face). Lighting conduit is severed and severely damaged. Rock armour appears in good condition with generally a good size and interlock. Noted that at the jetty root the rock armour appeared to be of a smaller size and perhaps more vulnerable to movement.	4	11 - 20	Repair inner face of jetty and other remaining defects and continue to monitor the effectiveness of existing repairs particularly rock armour. Urgent repair to lighting conduit on breakwater.	Urgent
1221D901D0202C01	Rock armour defence from jetty to village protects coastal slope and footpath	Armour	305.1	29/07/2022	Royal HaskoningDHV	Re-profiled rock armour is in good condition. Backing slopes remain stable. Footpath along crest continues to erode. There is evidence of washout from the path surface between the rock armour. Geotextile mattress is visible in parts. This may be due to wave overtopping or more likely, surface water runoff from slope to rear of path (E56/1).	3	>20	Monitor effectiveness of re-profiled rock armour and stability of slope. Consider filling holes in revetment with concrete.	routine
1221D901D0202C02	662103 Masonry wall behind rock revetment, severely overtopped prior to breakwater and beck control works.	Wall	182.4	29/07/2022	Royal HaskoningDHV	Similar to 2020, rock armour in fair to good condition. Relatively good interlock, some gaps in coverage.	3	>20	Continue active monitoring.	routine
1221D901D0202C05	662201 Offshore fishtail breakwater protecting frontage and stabilizing beach levels. Concrete slipway also included in defence providing access for fishermen. High ground is natural main land.	Breakwater	450.4	29/07/2022	Royal HaskoningDHV	Similar to 2020, rock armour in fair to good condition. Relatively good interlock, some gaps in coverage.	3	>20	Continue to monitor rock armour and beach levels. Repair outflanking and undercutting of concrete slipway.	routine
1221D901D0202C04	Beach frontage with shingle, cobbles and boulders giving protection to soil embankment and fishing area. Small detached rock berm constructed in 2016 (using rock armour from former fishtail groyne 1221D901D0202C05)	Beach frontage.	77.2	29/07/2022	Royal HaskoningDHV	Beach level and composition appear similar to 2020. Evidence of accumulation of beach material around recently constructed berm.	2	>20	Continue to monitor.	routine

Asset Name	Description	Type	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221D901D0202C03	662301 Concrete wall in moderate condition to end of protection offered by breakwater. Protects road.	Wall	60.5	29/07/2022	Royal HaskoningDHV	Fair condition, evidence of undercutting to the southern seaward face of structure. Minor outflanking and erosion of semi-natural berm crest.	3	>20	Continue to monitor. Consider placing rock armour around southern face of structure.	routine

Appendix D
Cliff Condition Assessments

UNIT	2008	2010	2012	2013 (post-surge)	2014	2016	2018	2020	2022
E52/1	Locally active	Locally Active	Locally Active	Inactive	Inactive	Inactive	Dormant	Dormant	Dormant
E52/2	Inactive	Inactive	Inactive	Inactive	Dormant	Dormant	Dormant	Dormant	Dormant
E52/3a	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive
E52/3b	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive
E52/4	Not Inspected	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Locally Active	Locally Active	Locally Active
E52/5	Not Inspected	Not Inspected	Inactive	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E52/6	Not Inspected	Not Inspected	Inactive	Inactive	Inactive	Inactive	Locally Active	Locally Active	Locally Active
E52/7	Not Inspected	Not Inspected	Dormant	Dormant	Dormant	Dormant	Dormant	Dormant	Dormant
E52/8	Not Inspected	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E52/9	Not Inspected	Not Inspected	Locally Active	Inactive	Inactive	Inactive	Locally Active	Locally Active	Locally Active
E52/10	Not Inspected	Not Inspected	Locally Active	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E52/11	Not Inspected	Not Inspected	Inactive	Dormant	Dormant	Dormant	Inactive	Inactive	Inactive
E53/1	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E53/2	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E53/3	Locally active	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E53/4	Locally active	Locally Active	Locally Active	Partly Active	Partly Active	Locally Active	Locally Active	Locally Active	Locally Active
E53/5	Dormant	Dormant	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E54/1	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Partly Active
E54/2a	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E54/2b	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E54/3a	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E54/3b	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E54/4	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active	Partly Active	Locally Active	Locally Active	Partly Active
E55/1	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E55/2	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E55/3	Locally active	Locally Active	Locally Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E56/1	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Inactive	Inactive	Inactive	Inactive
E56/2a	Inactive	Inactive	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E56/2b	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E57/1	Partly Active	Partly Active	Locally Active	Not Inspected	Partly Active	Locally Active	Locally Active	Locally Active	Locally Active

UNIT	2008	2010	2012	2013 (post-surge)	2014	2016	2018	2020	2022
E57/2	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E57/3	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E57/4	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E57/5	Partly Active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E57/6	Locally active	Locally Active	Locally Active	Not Inspected	Partly Active	Partly Active	Locally Active	Partly Active	Partly Active
E57/7	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E58/1a	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E58/1b	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E58/1c	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E58/6	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E58/2 Lower	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E58/2 Upper	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Partly Active	Locally Active
E58/3 Lower	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E58/3 Upper	Partly Active	Partly Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E58/4 Lower	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E58/4 Upper	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E58/5 Lower	Locally active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E58/5 Upper	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Locally Active	Locally Active	Locally Active
E59/1	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E59/2	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Totally Active	Totally Active	Totally Active
E59/3	Totally Active	Totally Active	Partly Active	Not Inspected	Partly Active	Partly Active	Totally Active	Totally Active	Totally Active
E59/4	Partly Active	Totally Active	Partly Active	Not Inspected	Partly Active	Partly Active	Totally Active	Totally Active	Totally Active

UNIT	2008	2010	2012	2013 (post-surge)	2014	2016	2018	2020	2022
E59/5	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E59/6	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E59/7	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E59/8	Partly Active	Partly Active	Partly Active	Not Inspected	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active
E59/9	Locally active	Locally Active	Locally Active	Not Inspected	Locally Active	Locally Active	Partly Active	Partly Active	Partly Active
E60/1a	Locally active	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active
E60/1b	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active	Totally Active	Totally Active	Totally Active	Totally Active
MU4/1a	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active	Totally Active
MU4/1b	Dormant	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active	Partly Active