



**Walk-over Visual Inspections of Assets  
including Coastal Slopes**



**Scarborough Borough Council  
Final Report**

**October - November 2012**

# Scarborough Borough Council

## Coast Protection Assets and Coastal Slope Condition Analysis

### Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	0	First issue	04/13	
1	1	Minor updates following client comments	17/07/13	A Parsons

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# 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 sediment to varying thicknesses, softer rock cliffs and extensive landslide complexes.

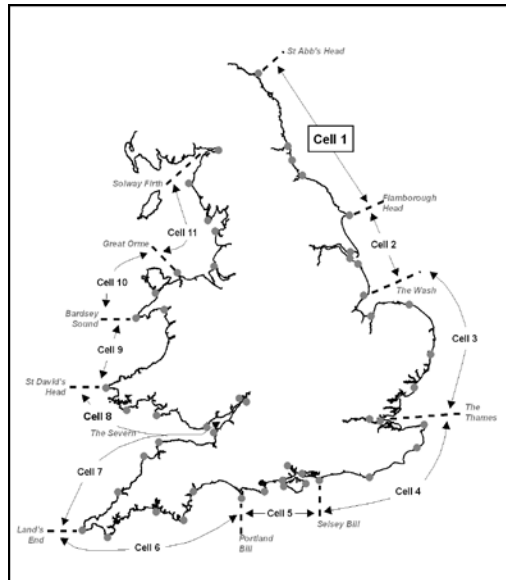


Figure 0-1: Sediment Cells in England and Wales

The work commenced with a three-year monitoring programme in September 2008 that was managed by Scarborough Borough Council on behalf of the North East Coastal Group. This initial phase has been followed by a five-year programme of work, which started in October 2011. The work is funded by the Environment Agency, working in partnership with the following organisations:



The original three year programme of work was undertaken as a partnership between Royal Haskoning, Halcrow and Academy Geomatics. For the current five year programme of work the data

collection associated with beach profiles, topographic surveys and cliff top surveys is being undertaken by Academy Geomatics. The analysis and reporting for the programme is being undertaken by Halcrow.



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 sea bed characterisation surveys
- aerial photography
- walk-over surveys

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 sea bed sediment data collection, and aerial photography.

The present report provides a summary of the main findings of the Coastal Walk-over visual Inspections of assets of Scarborough Borough Council's frontage that were carried out in September to November 2012.

# 1 Introduction

## 1.1 Methodology

This section outlines the approach taken by the slope and asset inspectors, respectively, for the Scarborough Borough Council coastal frontage.

Coastal Walkover Inspections have previously been undertaken every 2 years since 2002 between Scottish Border to River Tyne, and every 2 years since 2008 between River Tyne and Flamborough Head (with an inspection along the Scarborough Borough Council frontage in 2009, but no inspection in 2010). The approach to the inspections is consistent with the previous work. The asset and slope inspectors have included Chartered Engineers (focusing mainly on the built coastal protection structures) and Engineering Geomorphologists (focusing mainly on the natural cliffs and coastal slopes) ensuring suitable skills are applied to each length of frontage.

### 1.1.1 Assessment Methodology

This section presents the approach taken by the slope and asset inspectors respectively for the Scarborough Borough Council coastal frontage.

#### Coastal Slope Condition Assessment

The 2012 Coastal Slope Condition Assessment was undertaken by systematic walk-over inspection of the whole coastline by a team of geomorphologists who are familiar with the site having undertaken previous inspections for SBC. The inspection involved visual assessment of cliff activity and noting specific areas of activity (e.g. landslides and tension cracks). All observations were documented with photographs and field notes. Each unit was identified, photographed and classified according to the five point activity scale as defined in Table 1.1. This classification scheme is the same as that used in previous cliff activity assessments undertaken by Halcrow for Scarborough Borough Council in Cell 1 (Halcrow 2002, Halcrow 2005, Halcrow 2009).

This report provides a summary of the cliff condition as assessed in September-October 2012, and how this differs to assessments from previous years. A fuller discussion of geology and specific mechanisms of cliff failure can be found in previous reports (Halcrow 2002, Halcrow 2005, High Point Rendel 2002). For ease of reference the photos presented in this report have also been bordered with the colours from the key indicated below. Maps showing current activity and change in activity since the last survey are provided in Appendix A.

Rank	Activity Class	Description
1	Dormant	Protected cliffline or landslide complex with no visible evidence of landslide activity.
2	Inactive	Relict cliffs or landslides with vegetated slopes and localised erosion of the toe or failure of the headscarp.
3	Locally Active	Retreating cliffline with localised small landslides or areas of erosion.
4	Partly Active	Retreating cliffline with very common smaller-scale landslides or areas of intense erosion.
5	Totally Active	Retreating cliff line almost entirely affected by large-scale landsliding or intense erosion.

Table 1.1. Cliff activity classes used 2012 assessment

The inspection was primarily conducted from the cliff top, due to access restrictions and health and safety concerns associated with the cliff toe and beaches along this stretch of coast. In the Scarborough Borough Council region, the coastline is followed for the most part by the Cleveland Way cliff top footpath. Where the footpath moved inland the inspection kept



to the cliff edge to ensure the whole coastline was observed and activity recorded. The beach and foreshore were only inspected where access could be safely achieved from the cliff top, as at the coastal towns of Whitby, Scarborough and Filey.

The Coastal Slope Condition Assessment walkover survey for the Scarborough Borough Council frontage was conducted between 10<sup>th</sup> and 28<sup>th</sup> September 2012, working in a north to south direction. The weather during this time was generally mild and dry.

#### *Coast Protection Asset Assessment*

The visual assessment of coast protection assets was carried out by Chartered Engineers in October and November 2012. The inspections were planned to coincide with suitable tidal states and weather conditions. Assets were visually inspected, photographed, graded based on their condition as defined in Table 1.2 and an estimate was made of their residual life and urgency of repair work. The grading assessment followed standard Environment Agency guidelines as presented in the Condition Assessment Manual (EA, 2011). This classification scheme is the same as that used during previous inspections. Inspections were made from both the seaward and landward side of defence where possible. All assets were photographed and all data were stored 'live' using NFCDD inspection forms within SANDS, which was loaded on a ruggedised laptop.

The commentary from the asset inspections in Section 3 provides an overview of findings, summarising each locality and identifying individual assets of poor condition, failing structures and assets that have the potential to fail. It is anticipated that this will help identify areas for investment, including repair work, replacement or the installation of a different asset type. This report will also highlight assets with a certain level of importance or interest.

Grade	Rating	Description
1	Very Good	Cosmetic defects that will have no effect on performance.
2	Good	Minor defects that will not reduce the overall performance of the asset
3	Fair	Defects that could reduce performance of the asset.
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation needed.
5	Very Poor	Severe defects resulting in complete performance failure

Table 1.2 Condition assessment grading used in the 2012 inspections

For ease of reference the photos presented in this report have also been bordered with the colours from the key indicated above. Maps showing current condition and locations of changes since the 2010 inspections are provided in Appendix B.

### 1.1.2 Study Area

This report documents the condition of the coastal cliffs and assets from Cowbar Nab, Staithes in the north, to the Southern part of Filey Bay in the south. An overview of the study area is provided in Figure 1-1 below, which also shows the SMP2 Management Areas. Detailed maps of the cliff units are in Appendix A and the built assets in Appendix B.

The cliff behaviour units (CBUs) previously mapped along this stretch of coast in 2008 were again used in this inspection, with adjustments made where units were found to deviate from the mapping. In

The naming convention for CBUs in this region is as follows: For CBU E59/6 the prefix relates to Future Coast unit E59 and the suffix 6 relates to the specific area as defined in this case by the headland at Redhouse Nab (between Boulby and Cowbar).

The built coastal defence assets are named using the system established within the National Flood and Coastal Defence Database (NFCDD), as used on the previous surveys of this frontage.

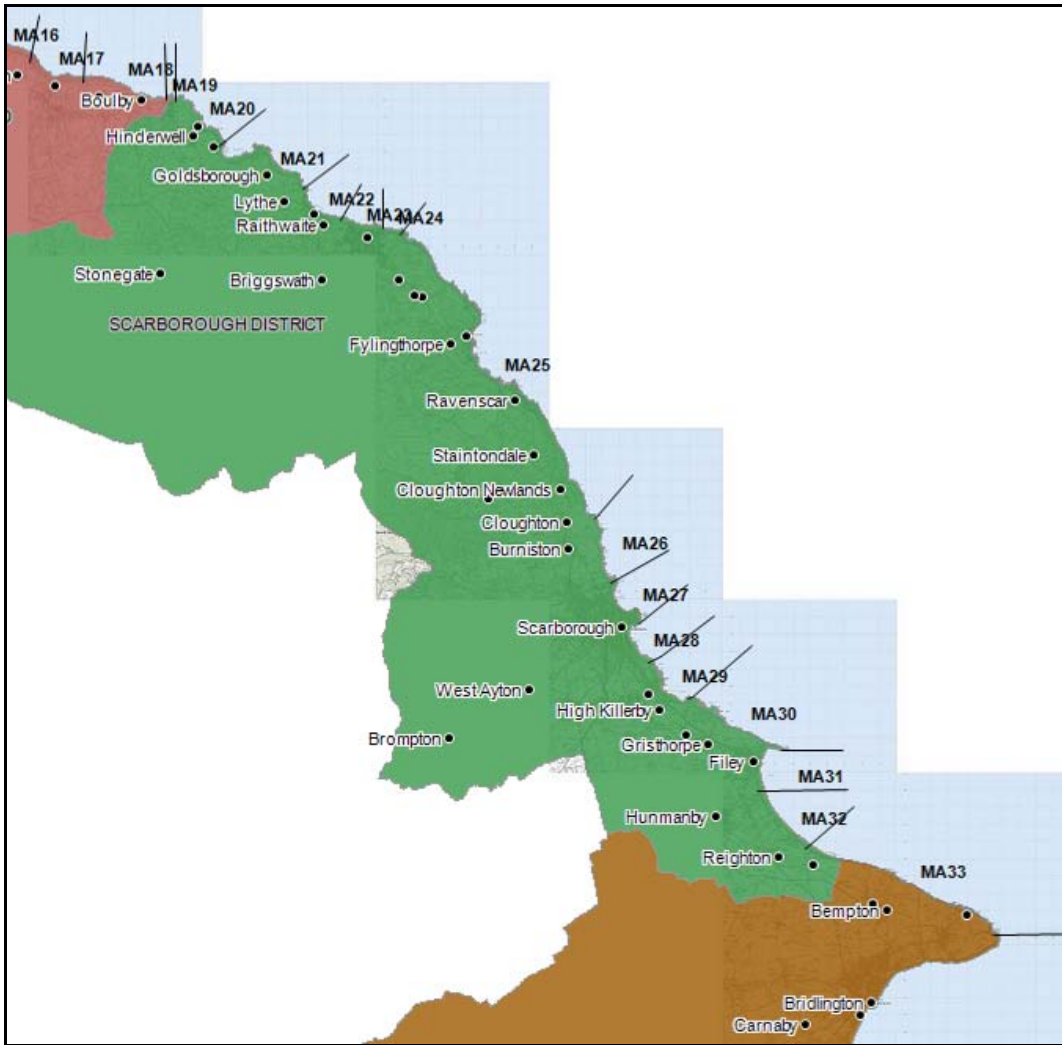


Figure 1-1: Study Area showing SMP2 Management Areas

## 2 Overview

### 2.1 Condition Assessment

#### *Overview of Coastal Slope Condition Assessment*

There is significant variation in the level of cliff activity within the SBC region, reflecting the diverse geology, history of landsliding and the range of cliff protection and stabilisation measures in place to tackle erosion and slope instability issues.

In total 265 cliff behaviour units (CBUs) have been assessed across the region during the 2012 walkover survey, of which Locally Active and Partly Active cliffs are the most common (Figure 1).

The SBC coastal frontage features numerous important assets, ranging from the busy coastal towns of Scarborough, Filey and Whitby to smaller settlements such as Staithes, Robin Hood's Bay and Runswick Bay. The Cleveland Way footpath follows the cliff top along the coastline and in other areas, such as Cayton Bay, strategic roads are routed close to the cliff top.

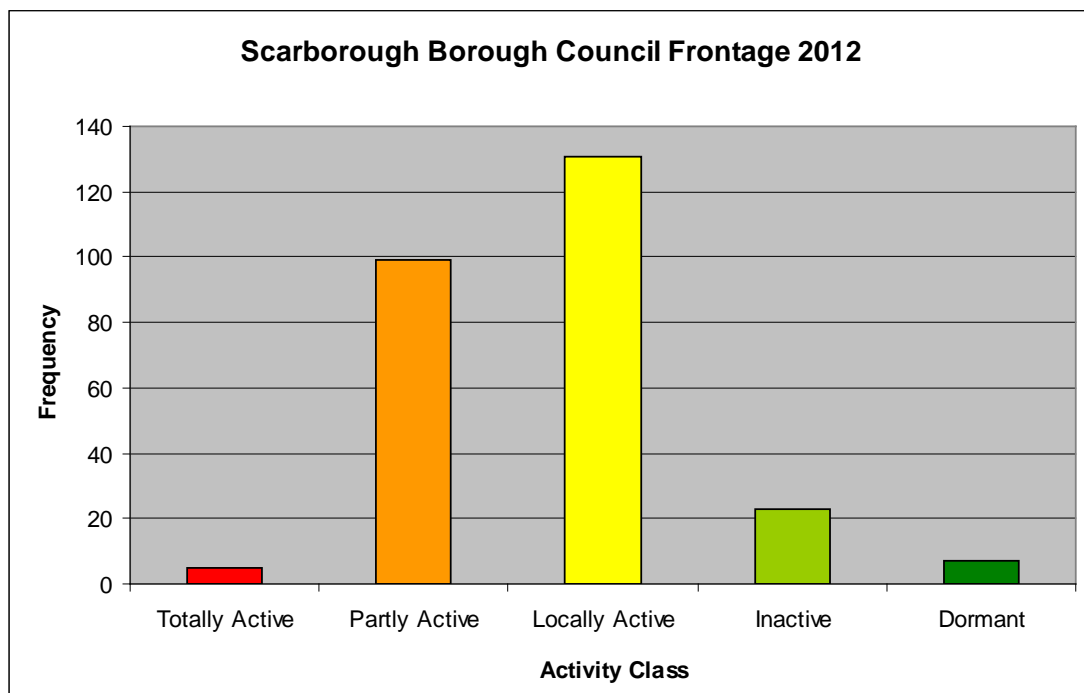


Figure 1. Frequency of cliff activity along the SBC frontage

During the 2008 walkover survey, the following areas were highlighted as having significant cliff activity in the vicinity of key assets:

- **Cayton Bay North:** In early 2008 there was a major reactivation of large scale, deep seated landslide activity at Cayton Cliff. This resulted in the loss of land and demolition of a number of properties. The Cleveland Way footpath also required rerouting. The activity of the landslide slowed during 2009 so the unit was reclassified from Totally to Partly Active. This situation remains in 2012 as localised headscarp recession still occurs periodically, threatening the remaining properties..
- **Filey Town:** Localised cliff instability was evident in 2008 which had led to the closure of some footpaths in Filey. The instability was thought to be related to the significant rainstorm event which affected the town in 2007, which caused widespread damage. The

impacts of this event have been remediated and the cliff was categorised as inactive in 2012.

In addition, the 2009 walkover survey identified the following areas of activity:

- **Filey Brigg:** There is ongoing and intensifying activity around Filey Brigg. While the ongoing erosion will have little direct impact on coastal assets there is a risk to beach and cliff users. This remains an area of localised activity
- **Cornelian Bay:** This bay sits to the north of Knipe Point, Cayton Bay and has been subjected to increased activity and headscarp recession during 2009, leading to closure of the cliff path and threatening some properties at Knipe Point. The activity appears to have reduced during 2012. However, careful observation of this area is important to minimize the risk to nearby land and property.
- **Robin Hood's Bay:** For the most part the units at Robin Hood's Bay are heavily defended at the toe and therefore classified as Dormant. There is a large overhang in the coastal cliff to the north of the defended section and signs of increasing instability to the south.

The 2012 walkover survey identified the following additional area of activity

- **Filey Bay:** The activity of the cliffs above Speeton Sands continues to be high but two of the frontages have been upgraded to Partly Active or Totally Active in the 2012 walkover survey.

Results of the 2012 cliff inspection are mapped in Appendix A.

#### *Overview of Coast Protection Asset Condition Assessment*

There are a large number of built coastal defence assets along this stretch of coastline, generally associated with the coastal towns and villages. Many of these assets are in good or fair condition but there are a large number require minor repair works. The most common works required include blockwork repointing, resealing of joints, reinforcement of undercut zones, repairing cracks, replenishment of rock armour and resurfacing. Several notable areas require some more extensive works.

A brief overview for each of the key locations of coastal defences, highlighting areas of concern is given below.

**Staithe:** the defects observed were similar to observations during the last survey in 2009. The rock armour protecting the main breakwaters is in good condition. There is undercutting to the encasement concrete on the south (inner) face of the north breakwater, and damage to the section of steel sheet piling. The rear harbour wall has a number of large full height cracks and is undercutting in several places. There is loss of mortar between blocks with open joints in the blockwork at many locations, particularly between the Cod and Lobster and the mouth of Staithe Beck. Further investigation of the problems and subsequent remedial works are required. Since the inspections took place significant remedial maintenance works have taken place, costing £140,000.

**Runswick Bay:** The rock armour defence remains in good condition. However, the series of patchwork defences to the north of the RNLI building exhibit a variety of defects. There are several large cracks in the walls and erosion and abrasion of the rocky foreshore is undercutting the foundations in several locations. However, there has been a slight recovery of beach levels with a small build up of coarse grey sand / gravel from the eroding cliff to the north.

**Sandsend:** The toe of the revetment at the car park at the north of the village is exposed and being undercut and there is a large void under the adjacent slipway. The beach levels are low at the failed groyne system fronting the main length of seawall and the timber breastwork retaining the ad hoc toe armour is failing. There is a large void under the toe apron at the south end of the blockwork defence with cantilevered walkway. The sloping concrete

revetment at the south side of Sandsend had a failed section with a large void that needs urgent attention.

**Whitby:** Low beach levels are leading to undercutting of the sections of wall north west of the North beach café that does not have rock armour protection. Whitby main harbour arms show signs of block displacement on each arm, this has led to erosion and cracks to the blockwork as well as voids to parts of the wall. Without repair this may possibly lead to further cracking and potential failure of the harbour walls. There were broken timber fenders at the fuel berth by the fish quay that are in need of urgent attention because they are needed to prevent vessels colliding with the slender piles that support the suspended quay deck. The rock armour placed in 2001 in the outer harbour below the Haggerlythe has been damaged and displaced from the toe of the slope so needs reprofiling and topping up with larger armour.

**Robin Hood's Bay:** The large vertical seawall protecting the main part of the lower village is in poor to very poor condition in places and needs urgent repairs. The masonry walls either side of the slipway have a number of large cracks and voids that need attention.

**Scarborough North Bay:** The defences of most concern are the two sections of wall between the rock armour which stops at Clarence Gardens south and Peasholm Gap. Beach levels were very low here with erosion at the edge of the toe apron. These walls both have a number of structural defects that need attention. It is understood that a capital works improvement scheme is under consideration for this area and that grant aid has been awarded along with an SBC contribution to the sum of £446k to spend within Scarborough North Bay on defence condition improvements from Summer 2013 leading into 2014.

**Scarborough South Bay:** A number of defects were noted in the harbour area including loose stone steps on the inner face of East Pier and a large void under the sheet piles on the SE corner of the breakwater by the lighthouse. At the Spa seawall there are numerous defects including undercutting to the exposed and damaged toe apron, loose blocks in both main wall and crest wall, undermining of the toe, cracking and loss of front face. A capital scheme is understood to be in development to upgrade this section of defence.

**Cayton Bay:** The structure at the public access point just south of the former pumping station is in very poor / failed condition and it is suggested it is demolished and the access ramp improved. The length of defence immediately to the north has also failed and needs removal / making safe.

**Filey:** The most significant issues with the coastal defences at Filey are at the north and south ends end of the defence where the interface with the adjacent undefended sections puts the defences under pressure. The wall at Cobble Landing had major cracks and loose blocks that need attention, along with undercutting of the toe apron. The toe beam is damaged at the bottom of the recurve section on the return section at Martin's Gill. The short section of rock armour at the south end is unstable and should be reprofiled.

#### **Comparison with Previous Assessments and Recommendations**

Few significant changes have been observed in the cliffs since the last inspection survey (2008), although a number of minor changes in activity have occurred. There continues to be activity at Cayton Bay where a large landslide reactivated in early 2008 and properties remain at risk. Cliffs in the southern part of Filey Bay, at Reighton Gap have increased in activity, which may affect the holiday camp. Filey Brigg continues to experience intense erosion and cliffs between the Brigg and Cayton Bay, at the southern part of Robin Hood's Bay village and in Runswick Bay, have all increased in activity. However, no built assets are at risk in these areas. In addition to these changes, landslide activity has been reported by residents in Staithes (eastern part of High Street) and Whitby (along Henrietta Street) where material has fallen from the cliff into back gardens and onto roofs of properties. Both these cliffs are known to be episodically active, particularly associated with intense and sustained rainfall.

In the case of Whitby, the cliff activity has threatened St Mary's church, which has lost a part of its graveyard (during January 2013). This event occurred at a similar time to a landslide in the centre of Whitby on Aelfleda Terrace (28 November 2012). Studies by the council suggest

that this activity relates to failure of local drainage measures in response to sustained and heavy rain. These areas should be closely monitoring, particularly in times of intense rainfall.

Many of the coastal defence assets were found to be in a similar condition to that reported in 2009 and comparative photos have been included in a number of locations in the main report text. However, some assets showed a degree of degradation in condition since the previous survey. These include the defences at north and south of Sandsend, the large seawalls at the south of North Bay, Scarborough, and the defences at the Scarborough Spa, particularly the southern section. Other minor deterioration including cracks, spalling and erosion were seen in coastal defences throughout the study area.

The whole coastline will be subjected to repeat inspections under the Cell 1 Monitoring Programme in 2014, but key areas that should be closely monitored comprise: Staithes, Whitby, South and North Bays Scarborough, the southern part of Cornelian Bay, the northern part of Cayton Bay and Filey Bay.

### 3 Condition Assessment

This section provides an account of observations made on the condition of cliffs and coastal assets within Scarborough Borough Council's coastline, running from north to south.

#### *Coastal Slope Condition Assessment*

Brief descriptions and photographs are presented for each Management Unit. Photographs have been bordered with colours in order to show their activity status, as follows:

	Totally Active
	Partly Active
	Locally Active
	Inactive
	Dormant

Coastal slope condition data, that also show areas of change, are provided in Maps 1-11 in Appendix A.

#### *Coast Protection Asset Condition Assessment*

Brief descriptions and photographs are presented for key assets and those where there are significant defects or the condition has changed significantly since the previous inspection. Photographs have been bordered with colours in order to show their condition as follows:

	5 – Very Poor
	4 – Poor
	3 – Fair
	2 – Good
	1 – Very Good

Coast protection asset data are also provided in Maps 1 to 7 in Appendix B. Full details of all of the of coast protection asset condition inspections has been entered into SANDS.

### 3.1 Management Unit 4 - Staithes

#### *Coastal Slope Condition Assessment*

This Management Unit comprises the high cliffs of Cowbar Nab and those behind and immediately to the east of Staithes (Appendix A Map 1).

The eastward facing end of Cowbar Nab (MU4/1a and E60/1a) features exposed, bedded and jointed rock and has very limited vegetation cover. There is ongoing erosion of softer material at the headscarp and evidence of recent rockfall activity from the blocky lower face is present along the walkway beneath the cliff face. As a result this unit is classified as Totally Active, as it was in 2008.

**Unit MU4/1b** is the south facing side of Cowbar Nab which runs adjacent to Staithes Beck. This unit is sheltered from the wave action because it is upstream of the harbour walls. The cliff does fail occasionally and has been given a classification of Partly Active. Further upstream from MU4/1b a rockfall has occurred on the steep slope adjacent to Staithes Beck.

**Unit MU4/2** sits behind Staithes Harbour and is classified as Partly Active. This cliff is generally well vegetated with small localised patches of erosion. The eastern end of the unit is

more exposed than the rest of the unit because of its position in the bay and is more prone to erosion. Failed material is evident in at the toe of the cliff and recent activity has been reported by residents of the eastern part of High St. The unit has been re classified from Locally Active to Partly Active to reflect this recent phase activity, which was likely to have been triggered by the exceptionally wet weather of 2012.

Further east, beyond the extent of Staithes harbour is unit **MU4/3**. The face of this unit is almost entirely exposed and showing signs of active erosion. Unlike any of the other cliffs within this Management Unit, this section is not protected at the toe and is therefore subject to marine erosion. This unit was classified as Partly Active in the 2009 and 2012 walkover surveys.



**MU4/1a** - Exposed and active end of Cowbar Nab, the southern half (Totally Active).



**E60/1a** - The northern half of Cowbar Nab. The cliff face is showing signs of erosion (Totally Active)



**MU4/1b** - The southwards facing side of Cowbar Nab which runs along Staithes Beck (Partly Active).



**(No unit)** - Further up Staithes Beck a rockfall occurred in the cliffs during February 2012. The site was remediated in September 2012.





**MU4/2** –Vegetated cliff with localised erosion, behind Staithes harbour (Partly Active).

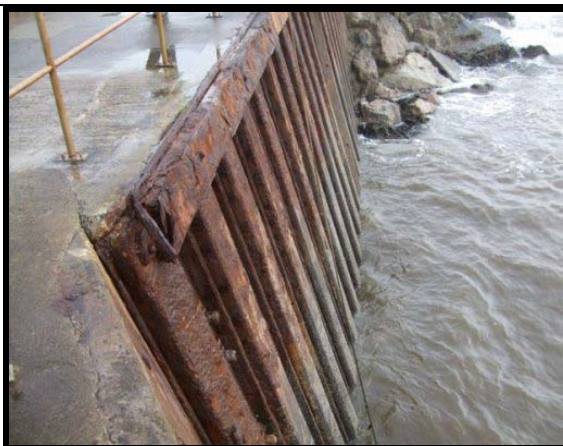


**MU4/2** – There have been a number of recent failures in this management unit, which is now classed as Partly Active.

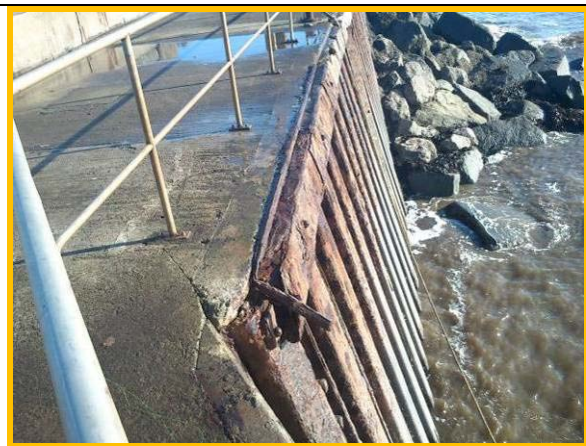
*Coast Protection Asset Condition Assessment*

Asset inspection data are shown in Appendix B, Map 1. A number of the coastal defence assets within the village of Staithes have been renewed or repaired in recent years. It is understood that £140k of maintenance money has been spent in Staithes since the inspection. As noted in previous inspections, the most significant of these are the breakwater arms where 5-8 tonne rock armour was placed on the seaward side in 2002. This acts to provide a greater defended height and to dissipate waves from the breakwater surface. New stainless steel handrails and a new concrete topping, cast over the original outer breakwater added further height to the defence in 2002.

The North Breakwater is in fair condition overall. The rock armour added in 2002 remains tightly packed and in very good condition. However, the sheet piling on the inner face of the east end of the breakwater is heavily corroded and as noted in previous inspections the coping piece (horizontal) on the landward side of the breakwater has corroded and failed. Undercutting is still apparent to the landward (south) side of the north breakwater wall, as well as corrosion to the sheet piling which has caused displacement of a pile. It is recommended that the sheet piling coping is repaired / replaced (Asset Ref. 1221D901D0402C01, element 4).



Corrosion of sheet piling on the landward side of the north breakwater (photo from 2009)



Corrosion of sheet piling on the landward side of the north breakwater (30/10/2012) (Asset Ref. 1221D901D0402C01/4)



Undercutting to landward facing of north breakwater (photo from 2009 inspection) (Asset Ref. 1221D901D0402C01)



Undercutting at landward facing of north breakwater (30/12/2012) (Asset Ref. 1221D901D0402C01)

There is cracking in the promenade deck slab on the north breakwater, see below left, and loss of concrete at the top of the inner face. There is also extensive horizontal cracking of the outer section of the crest wall, below right.



North breakwater promenade and inner face showing cracking in slab and damage to coping. (Asset Ref. 1221D901D0402C01)



North breakwater outer crest wall showing horizontal cracking and rust staining. (Asset Ref. 1221D901D0402C01)

The rock armour defence running south from the north breakwater to the end of Cowbar Lane (Asset Ref. 1221D901D0402C02) was constructed after the 2002 upgrade to the main breakwaters and remains in overall good condition. It appears that some armour stones may have been displaced at the toe. At the north end there is cracking and spalling of the concrete walkway / promenade, possibly related to placement of or movement of the rock armour. At the south end the original promenade at the end of Cowbar Lane has surface erosion and exposed aggregate, and there is cracking and spalling to the blockwork wall, see below right.



Damage to the walkway / promenade, as also noted in 2009 inspection  
(Asset Ref. 1221D901D0402C02)



Rock armour which is in good condition adjacent to stepped wall at end of Cowbar Lane. (Asset Ref. 1221D901D0402C02)

The main Staithes south breakwater (Asset Ref No.1221D901D0403C03), originally had a spur at the northern tip, but the section between main breakwater and the spur is filled with rock armour. The breakwater is in good overall condition. The rock armour is in very good condition. It was noted that there was cracking in concrete crest units in the middle of the breakwater length and exposure to aggregate and concrete joints to the old part of the wall (inner face).



South breakwater promenade and rock armour  
(Asset Ref. 1221D901D0403C03)



Exposure of aggregate and construction joints in south breakwater inner face.  
(Asset Ref. 1221D901D0403C03)

The concrete breakwater / pier (1221D901D0403C04) in the south east of the harbour, with rock armour at the southern end linking to the south breakwater is in good condition. Between this breakwater and the slipway at the harbour office there is a section of undefended cliff which had been subject to a cliff fall prior to the inspection, see photo of MU4/2 above. The slipway (1221D901D0403C05) was largely obscured by sand and small dinghies at the time of the inspection, but appeared to be in good condition.

The southern harbour wall around the Staithes frontage from the slipway at the Harbour office through to the footbridge in Staithes Beck, comprises 4 main assets 1221D901D0403C01, C02, C05, C22 and C04, plus a concrete groyne, C07. The rear wall of the harbour is generally in fair condition, with locally poor sections. Many of the defects reported in the 2009 inspections were still visible. One large crack is visible to the east of the harbour near Leech Bank (Asset Ref. 1221D901D0403C01) extends vertically through the whole wall and is in need of repair and maintenance, although it has not changed since 2009. The concrete groyne (1221D901D0403C07) limiting sediment movement within the harbour is also in fair condition with only a minor cracking to the steps at the landward end in need of repair. Older

sections of the wall, towards the west side of the harbour and into Staithes beck, consist of masonry blockwork and are often exterior walls of private properties, these display visible loss of mortar and missing blocks, see below right. There is also undercutting of the toe in several locations, exposing timber piling. The defects observed were again similar to the previous inspection. Although there is evidence of previous repairs, maintenance needs to be implemented at regular intervals (Asset Ref. 1221D901D0402C22). Should these repairs continue to fail, replacement of the assets should be considered.



Cracks throughout wall and undercutting of toe (Asset Ref. 1221D901D0402C22)



Older sections of harbour wall in need of regular maintenance (Asset Ref. 1221D901D0402C22)



Undercutting at the toe of some parts of the harbour wall (no change since 2009) (Asset Ref. 11221D901D0402C22)



Vertical crack through wall (no change since 2009) (Asset Ref. 1221D901D0403C01)

### 3.2 Management Unit 5 - Jet Wyke

#### *Coastal Slope Condition Assessment*

Jet Wyke forms the embayment between Penny Steel and Old Nab and consists of unit MU5/1 only (Appendix A, Map 1). This unit is classified as Partly Active. The lower slopes of the cliff are very steep, unvegetated and subject to gradual marine erosion. The upper cliff is composed of softer material and supports some vegetation cover.

At the eastern extent of the unit is the western side of Old Nab, a Partly Active headland composed of highly weathered shales. Neither unit has changed activity class between the 2009 and 2012 walkover surveys.



**MU5/1** – The highly weather headland at Old Nab (Partly Active).



**MU5/1** – The more stable, vegetated slope close to Penny Steel (Partly Active).

*Coast Protection Asset Condition Assessment*

There are no coastal defence assets within this Management Unit.

### 3.3 Management Unit 6 - Old Nab to Runswick Bay

This Management Unit consists of 3 Sub-Management Units (Appendix A, Map 1), as follows:

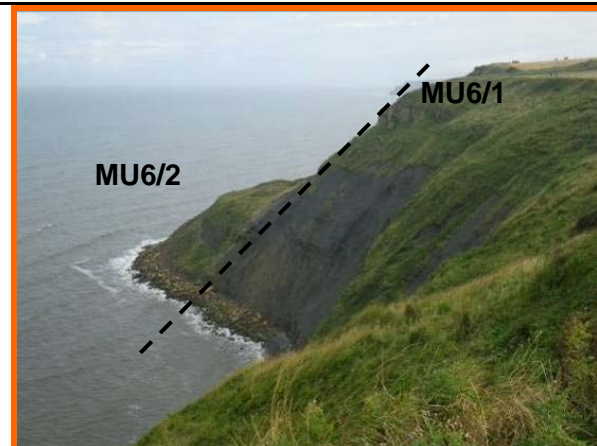
**Mu6A – Brackenberry Wyke**

This sub-management unit consists of unit MU6/1 only. This section of cliff line is classified as Partly Active. Marine erosion is cutting into the hard stratified rock at the base of the cliffs. Some vegetation is supported on the upper slopes with exposed shales lower down showing evidence of on-going erosion. A number of small failures were noted in the centre of the management unit as coastal erosion continues.

This unit has not changed activity class between the 2009 and 2012 walkover surveys.



**MU6/1** – Looking southeast across Brackenberry Wyke from Old Nab (Partly Active)



**MU6/1** – The eroding shales of the east facing side of Old Nab (Partly Active). The stabilised lobe of material in the background is MU6/2.

**Mu6B – Port Mulgrave**

This sub-management unit consists of units MU6/2 to MU6/5.





Unit MU6/2 is located to the north of Port Mulgrave and is undefended. The cliff is well vegetated. There are some signs of recent activity in the form of rockfall from the outcrops of harder, jointed rock on the upper slopes and progressive erosion of the softer material which composes the lower slopes. This unit is classified as Partly Active in 2009 and has been downgraded to Locally Active in 2012.

Unit MU6/3 is located at Port Mulgrave itself and is classified as Locally Active. The cliffs are generally well vegetated, but with patches of erosion. In these places there is intense erosion and weathering with some slumping at the unit toe. Some protection is afforded by the remains of the Port Mulgrave Harbour.

Unit MU6/4 is Rosedale Cliffs, immediately south of Port Mulgrave. The majority of the unit is covered with vegetation and shows little activity. In some places the cliff face has been prone to collapse where the cliff has been eroded and the failure has propagated up the cliff face. As a result, this unit is classified as Locally Active.

Unit MU6/5 is the mostly southerly cliff within this sub-management unit. This unit does not extend as far landward at unit MU6/4 but is otherwise similar. It is characterised by generally well vegetated slopes with local areas of activity on the steeper, lower slopes. Thus, this unit is also classified as Locally Active.

Only MU6/2 has changed activity class between the 2009 and 2012 walkover surveys.

	
<p><b>MU6/2</b> – The lobe of material shows vegetation on the shallower slopes while the steeper slopes are exposed. There were a number of small failures (Locally Active).</p>	<p><b>MU6/3</b> – There are a number of small failures on the cliff above the hard standing at Port Mulgrave (Locally Active).</p>
	
<p><b>MU 6/4</b> - Rosedale Cliffs, south of Port Mulgrave (Locally Active)</p>	<p><b>MU6/5</b> – The upper part of the cliff, which is vegetated (Locally active)</p>

### **MU6C – Lingrow Cliffs**

This sub-management unit consists of units MU6/6 to MU6/8.

Unit MU6/6 forms the northern part of the Lingrow Cliffs. These cliffs are much steeper than those within sub-management unit 6B and do not extend as far inland. The upper slopes are composed of well jointed, hard rock and support some vegetation cover. Lower down, the

slopes consist of softer, grey material which is almost entirely exposed. As a result, the lower slopes are subject to marine erosion. The Management Unit classification has remained Partly Active.

Unit MU6/7 forms the central part of this sub-management unit and consists of a large relict debris run-out lobe. The cliffs are shallower than those in MU6/6 and are less active. The stepped terrain is well vegetated for the most part and shows only small patches of activity at the toe. Thus the unit is classified as Locally Active.

Unit MU6/8 is located just north of Runswick Bay village. The cliff here is formed of two steps, both of which have exposed faces and limited vegetation cover. The exposed slopes are undergoing weathering and rilling. There is also evidence of rockfall activity from the upper slope. This unit is classified as Partly Active.

None of these units have changed activity class between the 2008 and 2009 walkover surveys.



**MU6/6** – The cliffs show signs of vegetation on the upper slopes while the lower slopes are exposed. There were a number of small failures in the face (Partly Active).



**MU6/7** – The cliffs are densely vegetated on the upper slopes while the sea cliff is prone to wave attack (Locally Active).

#### *Coast Protection Asset Condition Assessment*

There are no coastal assets within Sub-Management Units 6A and 6C.

#### **Mu6B (MA20) – Port Mulgrave**

As noted during the 2008 and 2009 inspections, this is a former port and ironstone mine that has been derelict for 70 years and is considered to be redundant (Appendix B, Map 1). Virtually all coastal defences have been lost to the sea. What is left of the southern breakwater is undergoing large scale cracking, deformation, undercutting and outflanking. It is estimated that half of its original length has now been eroded (Asset Ref. 1221D901D0502C01). The northern breakwater appeared to have suffered further damage and lowering of the crest since the 2009 inspection.



Looking at the end of the breakwater with evidence of erosion and failure in 2009 (Asset Ref. 1221D901D0502C01)



View of breakwater 30/10/2012 (Asset Ref. 1221D901D0502C01)



Overview of asset in 2009 (Asset Ref. 1221D901D0502C01)



Overview of asset in 2012 (Asset Ref. 1221D901D0502C01)

### 3.4 Management Unit 7- Runswick Bay

#### Mu7A – Runswick Bay Village

This sub-management unit consists of **units MU7/1 and MU7/2** (Appendix A, Map 1).

**Unit MU7/1** includes Runswick Bay village itself and the adjacent slopes. It is well vegetated and is defended at the toe by a sea wall and rock armour. The outflanking of these defences to the north (within Mu6C) indicates the nature of the erosion which may be occurring here if it were not for the protective influence of these structures. There is some minor evidence of very localised, small scale erosion on the engineered slopes to the south of the village, but this does not appear to be significant.

**Unit MU7/2** is a narrow unit located to the south of Runswick Bay village. The slopes are relatively shallow and well vegetated. The only activity evident is at the unit toe, where the cliffs are subject to marine erosion in the absence of protection measures. This unit is also classified as Inactive.

These units have not changed activity class since the 2009 walkover survey.





**MU7/1** – The slopes of Runswick Bay village  
(Inactive)



**MU7/2** (right of image with rock armour at toe - Inactive) **MU7/3** (left with eroding toe – Locally Active).

### **Mu7B – Runswick Sands**

This sub-management unit consists of units MU7/3 and MU7/4.

**Units MU7/3 and MU7/4** are located behind Runswick Sands. The cliffs here are vegetated and of a shallow gradient, similar to those within unit MU7/2. The units do not have any protection at the toe and therefore are subject to continual marine activity. The toe is generally steep as a result, does not support any vegetation cover, and shows evidence of recent slumping. As a result, both units are classified as Locally Active.



**MU7/4** – Toe erosion at the base of the cliff  
(Locally Active)

These units have not changed activity class since 2009.

### *Coast Protection Asset Condition Assessment*

This Management Unit is divided into 2 Sub-Management Units:

#### **Mu7A – Runswick Bay Village** (Map 1, Appendix B)

In recent years new coastal defences have been constructed in Runswick Bay, associated with the building of a new pumping station (adjacent to the lifeboat station) and associated with the remediation of the landslip that damaged the defence near the end of the road. The other defences fronting the properties at the north of the bay are of variable age and condition.

The rock armour defences (Asset ref: 1221D901D0602C01) remain in very good condition, with the rocks tightly packed with good coverage and no evidence of significant deformation. The associated slipway towards the south from the end of the road and boat park is also in good condition. Beach levels appeared relatively high at the time of the inspection, so the toe was not visible. There is ongoing erosion of the undefended cliff at the southern end of the defence and some of the locally sourced smaller rock used at the tie in has been scattered, see below right, however this is not a cause for concern at present.

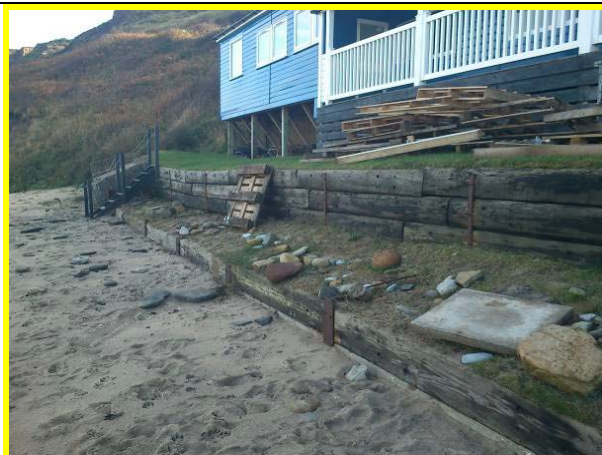


Runswick Bay village rock armour defences (Asset Ref. 1221D901D0602C01)



Southern end of Runswick bay rock armour defences (Asset Ref. 1221D901D0602C01)

The Sailing Club, located in the bay some 600m south of the village, where the beach is wider has been constructed on timber struts and features a mix of coastal defences (Asset Ref. 1221D901D0602C05), below left and right. The informally placed relic tank trap blocks at the south end show extensive cracking. The timber defences across the front of the main building are showing signs of rot and will need replacement in future.



Runswick Bay sailing club timber defences at south end. (Asset Ref. 1221D901D0602C05)



Northern end of defences at Runswick Bay sailing club (Asset Ref. 1221D901D0602C05)

At the northern end of the rock armour, the slipway adjacent to the RNLI building remains in good overall condition, although the timber strips to support the small boats are rotting in many places and will need replacing and joints between slabs need resealing, below left. The seawall around the pumping station to the north of the RNLI building is in very good condition, below right, although the standards for all of the handrails are showing corrosion and need cleaning and repainting.



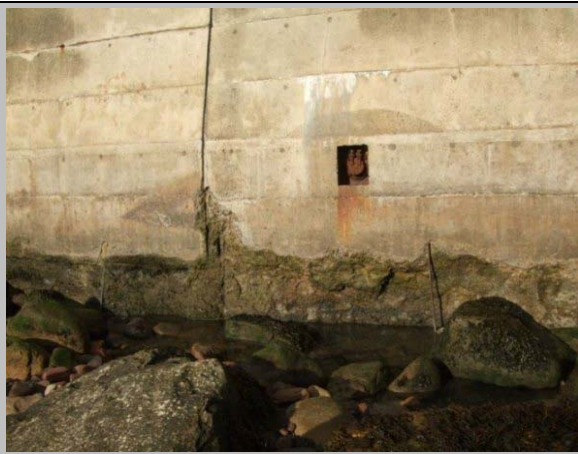
Northern slipway adjacent to the RNLI  
(Asset Ref. 1221D901D0601C04)



Seawall around the pumping station (Asset Ref. 1221D901D0601C07)

The sea wall defences to the north of the new pumping station show a variety of defects ranging from minor to more significant issues.

The most northern coastal sea wall (Asset Ref. 1221D901D0601C01) is suffering from surface cracking and erosion. Erosion of the underlying rocky foreshore continues to cause undercutting of the sea wall. Further investigation is required to determine the rate of undercutting. Further defects include washed out sealant joints, flap valves on weep holes which have seized shut, wash out of the joints under the capping beam, vertical cracks through the wall, missing joints and filler in the seawall face and promenade surface with vegetation growth, and outflanking at tie in to eroding cliff at northern end, see photo lower right below. Although changes are limited since the 2009 inspection it is recommended that these issues are addressed.



Undercutting of the northern coastal sea wall  
(Photo taken from 2009 report)



Foreshore scour at toe of seawall, photo from 30/10/2012 (Asset Ref. 1221D901D0601C01)



Promenade on top of northern seawall,  
30/10/2012 (Asset Ref. 1221D901D0601C01)



Erosion of cliff adjacent to north end of seawall,  
30/10/2012 (Asset Ref. 1221D901D0601C01)

Moving south, the protruding section of wall (1221D901D0601C06) protecting the individual property is in fair condition. There are signs of repairs to the large vertical cracks in the wall and toe apron. However there are cracks in the top of the concrete bagwork part of the wall.



Repaired vertical cracks to toe of wall, and  
horizontal cracks holding  
(Asset Ref. 1221D901D0601C06)



View of northern end of wall with cracked concrete  
bagwork.  
(Asset Ref. 1221D901D0601C06)

The main length of wall below the properties, Asset Ref. 1221D901D0601C03 is in variable condition. Although there are signs of repair work there are significant cracks in the wall and undercutting of the toe in several locations, see photos below. The beach level has recovered here since the 2009 inspection with a small accumulation of coarse grey shale sand from the eroding landslip to the north of the village.



Diagonal cracks in wall (Asset Ref. 1221D901D0601C03)



Gaps at joints and missing blocks (Asset Ref. 1221D901D0601C03)



Overview of wall (Asset Ref. 1221D901D0601C03)



Undercutting of toe adjacent to steps (Asset Ref. 1221D901D0601C03)

The concrete breakwater or groyne (Asset Ref. 1221D901D0601C02) to the north of the pumping station and lifeboat slip was noted to be in need of repair during the 2009 survey, with large horizontal and vertical cracks on both sides propagating through the defence. The condition at the time of the 2012 inspections seems to be similar or worse. It is recommended that forthcoming strategy study should consider the need for this asset in terms of sheltering to the RNLI Slip and pumping station seawall, and the retention of sand and gravel beaches in the area.



Large horizontal crack to breakwater (Asset Ref. 1221D901D0601C02)



(Asset Ref. 1221D901D0601C02)

### 3.5 Management Unit 8 - Runswick Bay to Sandsend

Coastal Slope Condition Assessment

This Management Unit is divided into 2 Sub-Management Units (Appendix A, Map 1):

#### Mu8A – Runswick Sands to Kettle Ness

This sub-management unit consists of units MU8/1 to MU8/4.

**Unit MU8/1** is located behind Runswick Sands and is classified as Partly Active. The toe is steep with little or no vegetation cover and evidence of recent falls and slides. The mid and upper slopes are more densely vegetated with localised patches of erosion. This unit has increased in activity from 2009 when it was Locally Active.

**Unit MU8/2** is a relict debris run out lobe situated adjacent to Runswick Sands. The slopes are generally shallower than those of neighbouring units and are mostly well vegetated. There is localised erosion at the toe with some protection afforded by rockfall deposits and the shore platform. Minor erosion is evident in places along the headscarp. This unit has remained classified as Locally Active.

**MU8/3** is located behind Kettleness Sand and is classified as Locally Active, having been downgraded from Partly Active. The slopes are steep and free from vegetation down much of their length. There is intense weathering occurring along much of the unit, especially at the toe which is subject to marine action.

**MU8/4** is small unit, just west of Kettle Ness. . Regular, marine erosion is indicated by the absence of vegetation and the unit remains classified as Partly Active.



**MU8/1** The cliffs behind Runswick Sands (Partly Active)



**MU8/2** Relict debris run out lobe adjacent to Runswick Sands (Locally Active)



**MU8/3** The vegetated upper cliffs and eroding sea cliffs above Kettleness Sands (Locally Active)



**MU8/4** Material from previous failures have stabilised and become vegetated above the level of wave attack (Partly Active)

### Mu8B – Kettle Ness to Sandsend

This sub-management unit consists of units **MU8/5 to MU8/15** (Appendix A, Maps 1 and 2).

**Unit MU8/5** forms the headland promontory of Kettle Ness. This area was extensively quarried for alum in the past and as a result is now subject to ongoing and intense erosion. It remains classified as classified as Partly Active.

**Unit MU8/6** is located to the east of the Kettle Ness headland and is classified as Partly Active. Along most of its length this unit is steep with little vegetation cover. There is evidence of recent rockfall activity from the headscarp and ongoing weathering of the lower grey materials.

**Units MU8/7 and MU8/8** comprise the relict debris run out lobes of Seaveybog Hill and Ovalgate Cliff. They are generally well-vegetated. There is some evidence of localised activity at the toe and headscarp and the units are classified as Locally Active.

**Unit MU8/9** is located at Loop Wyke and is classified as Partly Active. The upper slopes of this unit support some vegetation cover. Lower down the slopes are very steep, support no vegetation cover and have failed recently. The base of the cliff is subject to ongoing marine erosion.

**Unit MU8/10** forms a relict debris slide lobe with a steep back face and shallow toe. The unit is quite well vegetated with some localised erosion evident at the headscarp and at the toe. Some protection of the toe is afforded by past rockfall deposits. This unit is classified as Locally Active.

**Unit MU8/11** is located at Keldhowe Steel and is classified as Partly Active. There has been a minor increase in activity within this unit since the 2008 walkover survey. This is indicated by increased weathering of the lower slopes and a reduced vegetation cover. The upper slopes still support some vegetation, with localised patches of erosion at the headscarp.

**Unit MU8/12** is immediately south of Keldhowe Steel. The lower slopes are steep and subject to on-going marine erosion. The backscarp also has localised erosion and the unit is classified as Partly Active.

**Units MU8/13, MU8/14 and MU8/15** form the headland of Sandsend Ness and the adjacent cliffs. All units remain classified as Partly Active. The toes of these cliffs are subject to on-going marine erosion and there is evidence for erosion on the upper slopes. The disintegration of abandoned sea defences within Unit MU8/15 are resulting in exposure and erosion of the lower cliff face.



**MU8/5** The ongoing erosion of the Kettle Ness headland (Partly Active)



**MU8/6** (mid-distance) Steep, exposed slopes (Partly Active) (approx. extent shown).



**MU8/7 and MU8/8** The well vegetated relict debris flow lobe at Seaveybog Hill (Locally Active)



**MU8/9** has recently failed in the lower two-thirds of the cliff slope. As a result the unit is classified Partly Active.



**MU8/10** The lobe of material at Tellgreen Hill is being eroded by coastal processes but appears to be stable overall (Locally Active).



**MU8/11** Some of the slopes are stable enough to support vegetation but a greater proportion of the cliff face is exposed rock (Partly Active).

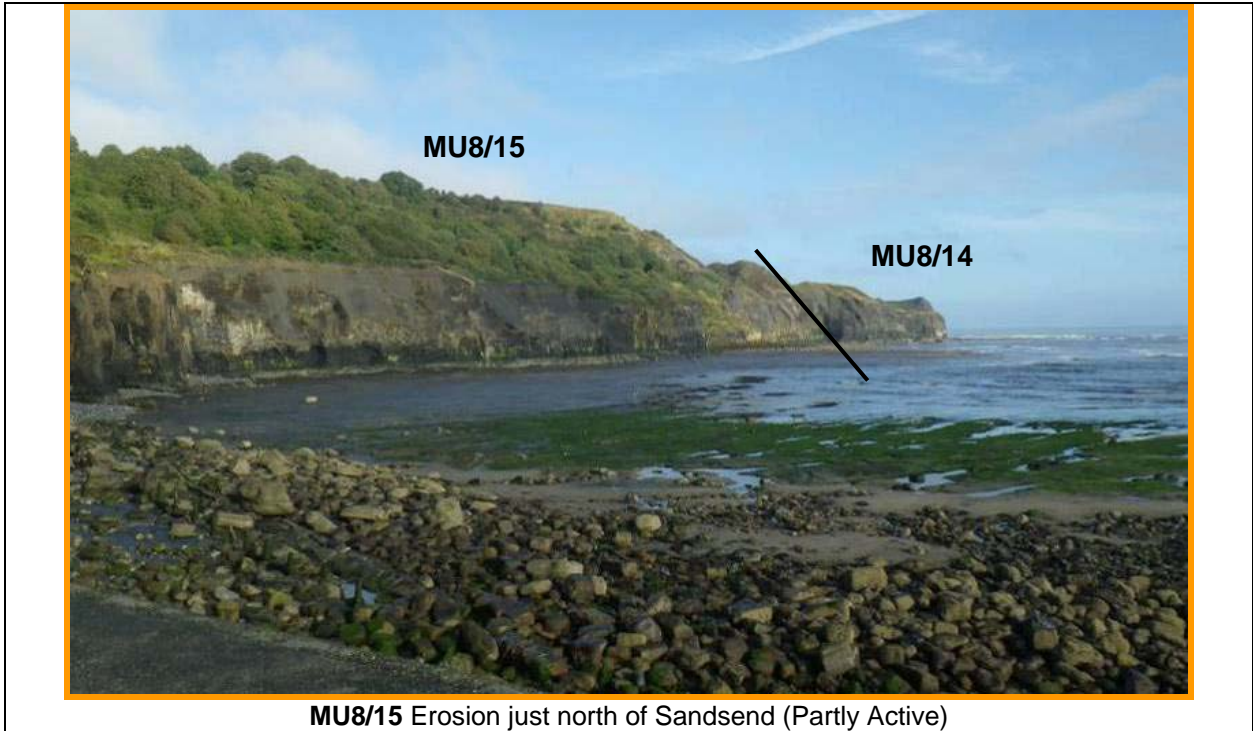


**MU8/12** the cliff is showing signs of regular erosion in the lower two-thirds of the face (Partly Active).



**MU8/13 and MU8/14** Erosion at the toe of the units causes instability to propagate up the face of the cliff (Partly Active) (approx. extents shown).





**MU8/15** Erosion just north of Sandsend (Partly Active)

*Coast Protection Asset Condition Assessment*

Two short lengths of retaining walls believed to have been originally intended to protect and support the disused railway line were identified along this section of coast in the previous inspection report. These are a brickwork wall at Deepgrove Wyke and a masonry wall south of The Scar that was noted to have failed. However, these two walls were not classed as coastal defences and were reported to be redundant in 2010, so have not been included in this inspection report.

### 3.6 Management Unit 9 – Sandsend

*Coastal Slope Condition Assessment*

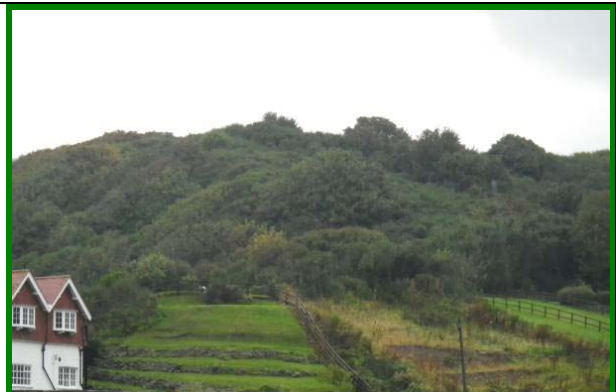
This Management Unit is divided into three Sub-Management Units, as follows (Appendix A, Map 2):

**Mu9A and Mu9B – Sandsend Village**

These management units comprise units MU9/1 and MU9/2. Both units are defended at the toe by the Sandsend sea wall, groynes and some rock armour. As a result there was no evidence of activity during the 2012 surveys and the units are both again classified as Dormant.



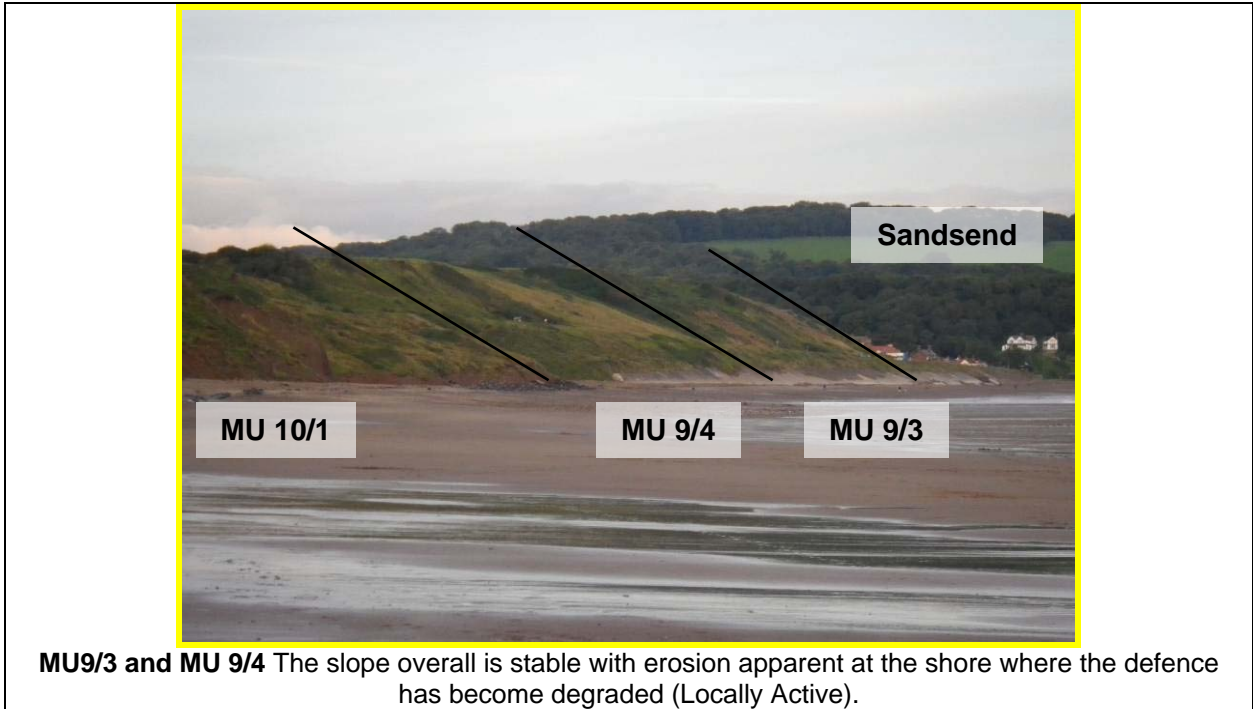
**MU9/1** is located close to Sandsend (Dormant)



**MU9/2** is the slope above the village of Sandsend (Dormant)

### Mu9C – East Sandsend

This sub-management unit consists of unit MU9/3 only. This unit is located above the concrete sea defences immediately to the east of Sandsend. There has been some effort to stabilise the slopes within this unit, which acted to reduce the level of activity. However the presence of erosive features in the exposed materials provides evidence of ongoing instability. This unit is was formerly classified Partly Active in 2008, but the presence of defences mean it is now classified as Locally Active.



**MU9/3 and MU 9/4** The slope overall is stable with erosion apparent at the shore where the defence has become degraded (Locally Active).

#### *Coast Protection Asset Condition Assessment*

#### **Mu9A and Mu9B – Sandsend Village** (Map 2, Appendix B)

Coastal defences at Sandsend vary from fair to poor condition.

The most northerly defence at Sandsend car park area, is a sloping concrete revetment with recurve crest wall and rock armour toe protection (Asset Ref No.1221D901D0701C02). The concrete wall is in fair condition with minimal damage to the surface. There is some minor cracking and surface erosion which is typical of concrete defences such as this. The north end of the revetment has lost thickness of concrete at the base through abrasion, with exposure of reinforcement bars, although the worst area noted in the 2009 inspection was not visible as it was covered with cobbles and may have been repaired. Encasement of this reinforcement is advised from a structural perspective, as well as preventing any H&S accidents occurring due to sharp edges of the exposed bars. The toe of the revetment is exposed and undercut in many places, with abrasion of the soft rock on which the wall is founded ongoing, see below left. The toe armour is displaced and not fully protecting the toe; this could be ameliorated by re-profiling and topping up the rock armour protection. There is a large void under the south side of slipway adjacent to Sandsend Beck, see below right. There is also missing filler in the slipway joints and in the crest wall joints.



Displaced toe armour, undercutting to concrete revetment and abrasion damage to revetment (Asset Ref No.1221D901D0701C02)



Void under slipway at the north of Sandsend (Asset Ref No.1221D901D0701C02)

Similarly to the 2009 inspection, the beach was low in front of the main concrete seawall in front of Sandsend village (Asset Ref. 1221D901D0702C01). The groyne field is derelict and the remains have no significant impact on sand movement. The toe of the seawall was showing evidence of significant damage and movement in 2009 and the defence appears to have worsened over the last three years, with the timber breastwork deteriorating and allowing the ad hoc toe protection units to move. There are cracks in the wall and significant abrasion at the steps.



Timber toe of sea wall in a poor state - photo from 2009 (Asset Ref. 1221D901D0702C01)

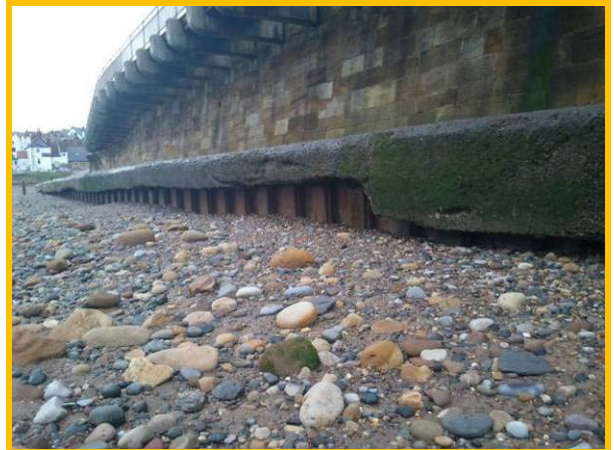


Failed timber groynes and timber breastwork at toe of wall in front of Sandsend (Asset Ref. 1221D901D0702C01)

The newer short section of masonry blockwork sea wall (Asset Ref. 1221D901D0702C04) that supports a cantilevered promenade just north of East Row Beck was noted in the 2008 inspection to suffer from undercutting of the toe of the structure with steel sheet piling in need of repair. Although the main wall is in fair condition the defence has an overall rating of poor. The steel toe piling was visible in several locations during the 2012 inspection and is corroded and abraded. There are holes through the piles and voids behind under the apron. There is a particularly large void under the southern end of the apron, see below left.



Masonry blockwork sea wall with cantilevered footway, showing large void under toe apron and failed groynes. (Asset Ref. 1221D901D0702C04)



Exposure of toe piling below masonry wall. (Asset Ref. 1221D901D0702C04)

The low masonry wall (Asset Ref. 1221D901D0702C03), below left and right, that returns into both sides of East Row Beck adjacent to the road bridge is in overall good condition, although there is minor abrasion damage to some blocks and locally missing sections of mortar.



Low masonry wall at east Row Beck, south bank. (Asset Ref. 1221D901D0702C03)



Low masonry wall at east Row Beck, north bank. (Asset Ref. 1221D901D0702C03)

### Mu9C – East Sandsend

Southeast of Sandsend, a large sloping concrete revetment covering light weight rock armour / rubble runs parallel to the coastal road (Asset Ref. 1221D901D0702C02). This 800m long defence features many significant defects throughout. There was a large void > 1.5m across where the revetment had failed and the underlying rubble was being actively eroded, see photo below top left. There is frequent surface cracking and localised spalling and undercutting and erosion of the toe. There was evidence of several significant repairs since the previous inspection at the east end of the revetment (below top right) and several other areas. The whole asset is in poor condition and it is understood that a capital improvement scheme planned to be undertaken in the near future.



Large void in revetment adjacent to recent patch repair (Asset Ref. 1221D901D0702C02)



Repair at east end of the concrete revetment since 2009 inspection (Asset Ref. 1221D901D0702C02)



Cracks and voids in surface of concrete revetment (Asset Ref. 1221D901D0702C02)



Gabions protecting café at NW end of revetment (Asset Ref. 1221D901D0702C02)

### 3.7 Management Unit 10 – Upgang Beach

#### *Coastal Slope Condition Assessment*

This Management Unit comprises units **MU9/4**, **MU10/1** and **MU10/2** (Appendix A, Map 2).

**Unit MU9/4** is comprised of well vegetated slopes which are protected in part by the concrete toe defences. There is still some minor localised erosion at the unit toe so that this unit is classified as Locally Active.

Further east, **unit MU10/1** is a small unit classified as Inactive. The relict cliffs are vegetated down most of their length, with some small patches of erosion evident at the unit toe.

**Unit MU10/2** comprises the till cliffs behind Upgang Beach. These cliffs are prone to episodic failure in the form of mudsliding and block failure onto the beach. Vegetation cover is patchy along the cliff face and is likely to be related to the landslide cycles. This unit is classified as Partly Active.

None of these units have changed activity class between the 2009 and 2012 walkover surveys.

#### *Coast Protection Asset Condition Assessment*

There are no coast protection assets within this Management Unit.



### 3.8 Management Unit 11 – Whitby West

#### *Coastal Slope Condition Assessment*

This Management Unit is divided into 2 Sub-Management Units (Appendix A, Map 2):

#### **Mu11A – Whitby Sands West**

This Sub-Management Unit consists of **units MU11/1 and MU11/2**.

These units are comprised of re-graded slopes which are largely protected by the sea wall and promenade. As a result there is very little evidence of activity. Unit MU11/1 is classified Inactive.

Within unit **MU11/2**, there has previously been evidence for slope wash and footpath erosion causing localised damage and the unit was classified as Locally Active in 2009. However, during the current inspection, no evidence for erosion was seen and the unit has now been classified as Inactive.



**MU11/1** Regraded, stabilised slopes (Inactive)



**MU11/1** The upper sections of the slopes are in good condition (Inactive)

### **Mu11B – Whitby Sands East**

This Management Sub-Unit consists of units **MU11/13** and **MU11/14**.

These units are generally protected by a variety of coastal structures. The coastal slope at **unit MU11/13** shows very few signs of activity and therefore is classified as Inactive. Exposed rock faces are showing minor erosion in the absence of defences in places within **unit MU11/14**. As a result, this unit is classified as Locally Active.

These units have not changed activity status since the 2009 walkover survey.



**MU11/3** Defended slopes with little evidence of recent activity (Inactive)



**MU11/4** Localised erosion above Whitby Sands (Locally Active)

### *Coast Protection Asset Condition Assessment*

#### **Mu11A – Whitby Sands West and Mu11B – Whitby Sands East** (Map 2 Appendix B)

This Management Unit encompasses the sea walls to the west of Whitby West pier. Most of the assets are in Fair condition. Although defects are localised, it is recommended that repairs and repointing is undertaken to prevent areas of weakness being exploited further. Sections of the sea wall east of the North Beach Café that are not protected by rock armour revetment are particularly susceptible to wave impact loading and abrasion causing increased levels of surface erosion, exploitation of joints between concrete sections and potential undermining (Asset Ref. 1221D901D0802C01, C03 and C13).

The most westerly defence at Whitby is a rock armour defence fronting the promenade (Asset Ref. 1221D901D0801C01). As in the 2009 inspection the armour is in good condition with only minor movement visible. The asset is in overall good condition although the promenade

is rated as fair as some slabs appear to be sinking with cracks and standing water, which may be a sign of loss of fill and voids beneath - further investigation and monitoring is needed.



Promenade looking south east showing cracks in slabs and standing water (Asset Ref. 1221D901D0801C01)



Rock armour in good condition (Asset Ref. 1221D901D0801C01)

The sections of seawall along the frontage west of the North Beach Café with no protective rock armour, Asset Ref. 1221D901D0802C01, and 1221D901D0802C03 have in many places lost the concrete surface over whole lower half of wall due to abrasion. The toe is exposed and there is undercutting, below left and right. There is also local damage to the wall capping beam and promenade slabs in a number of locations from wave overtopping damage where there is no rock revetment. The large concrete wall structure (Asset Ref. 1221D901D0802C03) is similar to the wall to the north west, but has no rock armour. The toe is exposed and eroded along its length, leading to significant undercutting, although the beach was higher at the time of inspection than during the previous, 2009 inspection. This defence is currently in a poor condition. Repairs to toe are required to prevent future instability of wall and it is recommended that consideration is given to extending the rock armour to this section. Adjacent sections of wall show similar defects although toe is often less visible here



Undermining of toe in section with no rock armour (Asset Ref. 1221D901D0802C01)



Undermining of toe in section with no rock armour (Asset Ref. 1221D901D0802C03)





Washout of joints in slabs from wave overtopping (Asset Ref. 1221D901D0802C03)



Undermining of wall adjacent to steps - (Asset Ref. 1221D901D0802C03)



Photos of exposed and damaged toe (Asset Ref. 1221D901D0802C03) – **From 2009 inspections**

East of the north beach café the steps and ramps show signs of repairs, but are generally in poor overall condition with defects such as undercutting, erosion, cracking, exposure of aggregate and rounding of step edges. Repair work is needed to some structures to prevent future failure. Undercutting and erosion is occurring to the side walls of the stairs along the West Cliff and are in need of repair (Asset Ref. 1221D901D0802C04001).



Erosion and cracking to stair side wall - image from 2009 (Asset Ref. 1221D901D0802C04001)



No change from 2009 - image from 31/10/2012 inspection (Asset Ref. 1221D901D0802C04001)



Loss of wall facing and damage to encasement repair (Asset ref. 1221D901D0802C14)



Abrasion damage to wall (Asset ref. 1221D901D0802C14)

The wall adjacent to Argyle Road is in fair condition, and is intact with no toe exposed at the time of the site visit. However, the front face shows extensive abrasion and erosion and there are significant cracks both through the capping and directly beneath it. Although in some places patch repairs are visible, these defects should be monitored and repaired when possible to prevent further degradation in the future.



Overview of asset, looking south. Patchwork repairs to capping visible – photo from 2009. (Asset Ref. 1221D901D0802C04)



No significant change to asset from 2009 (Asset Ref. 1221D901D0802C04)



Patchwork repairs to capping holding  
(Asset Ref. 1221D901D0802C04)



Promenade ramp above seawall  
(Asset Ref. 1221D901D0802C04)

Between Argyle Road and the Royal Crescent, two sections of blockwork separated by a ramp show further defects. There appear to have been some repairs to the blockwork since 2009 and both Assets Ref. 1221D901D0802C07 and 1221D901D0802C06 are in fair condition, but here are cracks through blocks, washout along joints and the capping shows damage. Both assets lengths have pipes exiting through front face, seepage from which has attracted vegetation growth.



Cracking, mortar loss and vegetation growth due to leaking pipe  
(Asset Ref. 1221D901D0802C06)



Cracking, mortar loss, damage to capping and localised repairs  
(Asset Ref. 1221D901D0802C07)



Visible joint washout and seepage  
(Asset Ref. 1221D901D0802C06)



Cracking, mortar loss and damaged blocks (Asset Ref. 1221D901D0802C06)

The area below the theatre consists of a variety of defences, which are formed in several vertical stages or layers, with concrete/stone on the beach and with cliff toe protection walls formed of timber breastwork, rock armour and vertical walls. These make up Assets Ref. 1221D901D0802C15 and C05. Most elements require non-urgent repair works and are in fair condition. Typical defects here include cracking and washout at joints.

It was noted in the 2009 inspection that there may be some movement in the vertical wall directly beneath the north corner of the theatre building/walkway, and a recommendation given that further investigations and monitoring are undertaken here, installation of tell tales and the setting up of a deformation survey may be appropriate.



Cracking in concrete revetment toe.  
(Asset Ref. 1221D901D0802C15)



Mortar loss and vegetation growth on upper wall  
(Asset Ref. 1221D901D0802C15)



Defence toe suffering abrasion and weathering  
(Asset Refs. 1221D901D0802C05)



Mortar loss and surface erosion to middle and upper wall  
(Asset Ref. 1221D901D0802C05)

To the east of the theatre the natural cliff is intermittently defended with a series of blockwork and brickwork sections. These vary in construction and are generally in good condition, but there are areas of undercutting and erosion at the interface between the blocks and the natural cliff, which require repair and lowers the condition to a 'fair' grading.



Cliff protected with block/brickwork undercutting at interface with cliff requires repair (Asset Refs. 1221D901D0802C09)



Cliff protected with blockwork, (Asset Refs. 1221D901D0802C09)

The Battery Wall just west of West Pier is formed of large sandstone blocks (Asset Ref. 1221D901D0802C12), similarly to the pier itself. There are signs of movement, from numerous cracked blocks to large gaps at joints. There appears to have been little if any change since 2009; although repairs to some gaps are evident, further repairs are deemed necessary.

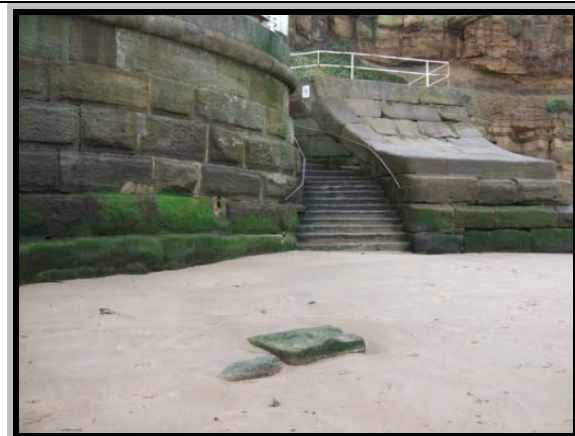


Photo from 2009 showing repairs visible, voids and gaps (Asset Ref. 1221D901D0802C12)



Evidence of recent movement of central block (Asset Ref. 1221D901D0802C12)

### 3.9 Management Unit 12 – Whitby

#### *Coastal Slope Condition Assessment*

This Management Unit consists of **unit MU12/1**, which is situated beneath Whitby Abbey and St Mary's church on the town's East Cliff (Appendix A, Map 2). The slopes are well vegetated with toe protection afforded by the harbour walls meaning much of their face is covered by a debris apron. Localised activity occurs at the headscarp and in the debris apron. This unit is classified as Locally Active, which has not changed status since 2009.

Following the inspection, a significant but localised failure of the headscarp occurred on 29 November 2012, which led to loss of part of the graveyard of St Mary's church and deposition of debris on properties along Henrietta Street. It is thought that the failure was associated with damaged drainage pipes and the very wet conditions of 2012.



**MU12/1** Below Whitby Abbey the slopes are vegetated, but with localised signs of erosion (Locally Active). Cliffs behind Henrietta St (row of white cottages extending along cliff face below St Mary's church) are subject to periodic failure.

*Coast Protection Asset Condition Assessment*

This Management Unit encompasses the sea walls and the East and West Piers (or 'harbour arms') of Whitby's harbour (Map 2 Appendix B). Coastal defences at Whitby are generally in fair condition, but several exhibit major defects.

The west and east harbour arms and outer breakwaters (Asset Refs. 1221D901D0803C01 / 02 / 03 / 04) were not inspected thoroughly due to limited access even at low tide. However, these structures were previously inspected under the strategy study, including a dive survey. The main eastern and western harbour arms (Asset Refs. 1221D901D0803C02 / C03) have loose blocks and possible vertical movement in at least one location on each arm. It is recommended that the fixity of the loose blocks is investigated urgently, and that any voids are filled with grout. It is possible that loose blocks could displace during a storm and that there may be a significant quantity of wash-out material behind it, leading to the consequent weakening and collapse of the structure. It is understood that a major capital scheme to improve the piers is under consideration. Longer term detailed monitoring recommendations should be developed as part of the scheme maintenance plan.



Missing blocks at LW line NE corner of West Breakwater (Asset Ref. 1221D901D0803C02)



General view of West breakwater (Asset Ref. 1221D901D0803C04)



Displacement of block work on west side of West Breakwater - left image from 2009, right from 31/10/12  
(Asset Ref. 1221D901D0803C02)

There is a new access bridge, opened in July 2012 between the main and outer western breakwaters. The timber deck of the western outer breakwater (C01) was in a fair condition, with evidence of rot to some ends of some planks, below left, and it is slippery when wet so may present a possible H&S issue. The supporting timber structure was not inspected due to limited access.



Evidence of rot in ends of timber desk on West Pier extension (Asset Ref. 1221D901D0803C01)



General view of west outer breakwater (Asset Ref. 1221D901D0803C01)

An urgent works scheme was undertaken recently to repair the southern end of the outer east breakwater where a large void had formed in the structure behind the sheet pile toe which had failed following corrosion and abrasion. Despite the repair the asset remains in overall poor condition due to corroded toe piling and rotting timber deck structure. This asset was only inspected from the main east breakwater as there is no access on foot even at low water.

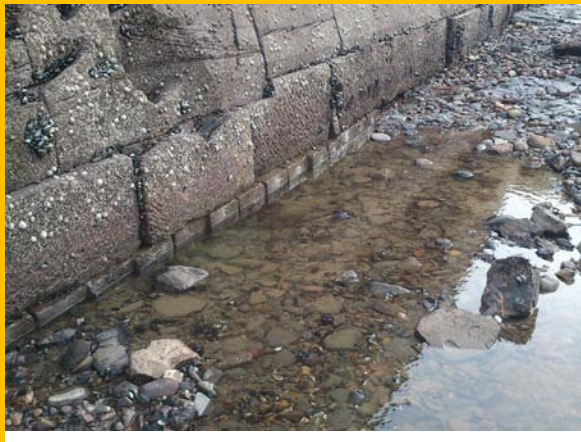


General view of outer east breakwater extension arm, (Asset Ref. 1221D901D0803C04)



South end of outer east breakwater extension arm, where failed toe piling has been replaced with precast concrete panels. (Asset Ref. 1221D901D0803C04)

The main east breakwater 1221D901D0803C03 is in poor overall condition. There are large cracks to promenade and settlement of poured concrete slabs and erosion to capping beams. Furthermore there is displacement to the sandstone block work, with large cracks at several locations and voids in the blockwork near the NE bend. There are also loose blocks at south end by the rock armour, see below right. The low beach levels on the harbour side of the breakwater is exposing a timber foundation below the stone blockwork, see photo below left which may accelerate decay of the timber and destabilise the blockwork.



Exposed timber foundation under inner face of east breakwater Pier (Asset Ref. 1221D901D0803C03)



Loose blocks at south outer end of east breakwater (Asset Ref. 1221D901D0803C03)





Area of displaced blocks on outer face of east pier (Asset Ref. 1221D901D0803C03)



Open gaps between sandstone slabs in deck of east pier (Asset Ref. 1221D901D0803C03).

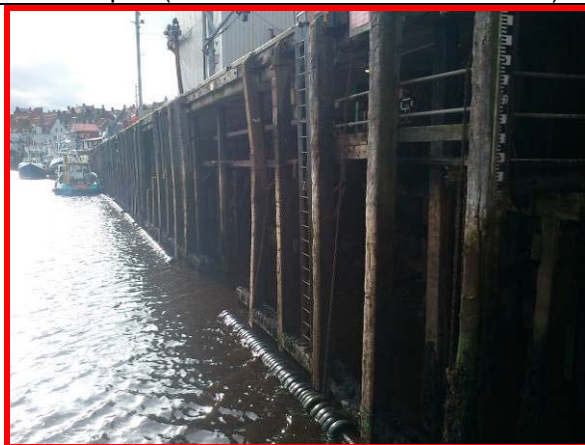
The west harbour pier at the fish quay consists of a concrete slab suspended over the original quay wall with concrete filled vertical and raking steel pile supports, see photos below. There is corrosion to the steel piles, which look rather slender and susceptible to damage. It was not possible to inspect the underside properly as this would require a boat even at low tide. There is a broken outfall under the pier at the south end, see below right. There were broken vertical timber fender piles at the fuel berth that need repairing urgently as they provide protection to the main pier support piles.



Broken outfall between promenade supports under pier (Asset Ref. 1221D901D0803C06)



Corrosion to deck support columns (Asset Ref. 1221D901D0803C06)



Broken and missing timber fender piles at fuel berth need replacing  
Asset Ref. 1221D901D0803C06)



View of original quay wall and deck support piles near north end of Asset Ref. 1221D901D0803C06

The inner section of the west harbour quay wall (Asset Ref. 1221D901D0803C07), near the swing bridge was largely obscured by seaweed on the lower wall and vegetation growth to the upper wall, see below left. The promenade is in good condition. There is wash out of joints at the set of stairs at middle of wall length.



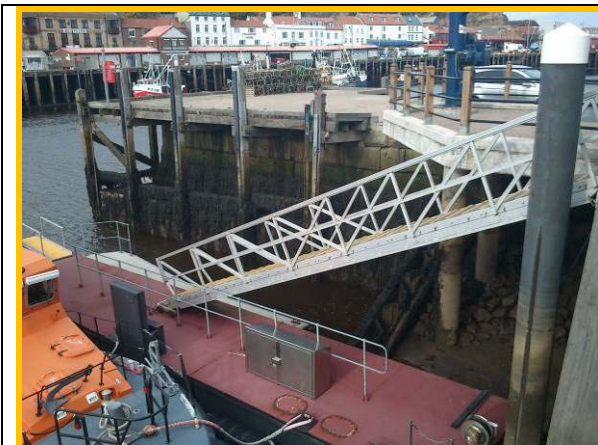
Inner west quay wall near swing bridge, (Asset Ref. 1221D901D0803C07)



Repairs underway to swing bridge fendering

The inner wall on the east side, between the swing bridge and the RNLI berth consists of a variety of riparian property walls, which are protected by concrete apron and a sheet pile toe, below top right (Asset Ref. 1221D901D0803C10). Access is difficult so inspection was from the RNLI berth and swing bridge.

Asset 1221D901D0803C08 includes the pier immediately north of the RNLI pontoon and the larger Tate Hill Pier that projects into the harbour together with the harbour rear wall between them. The asset is in poor overall condition. The south pier is masonry with a timber surround, see below top right. The timber has some splits and rotting wood. There was evidence of repairs to the south pier, including replacement capping blocks. The masonry wall between the two piers has missing mortar and blocks in places, see below lower right, and is in poor condition. The longer masonry pier opposite the fish quay, known as Tate Hill Pier has very weathered blocks on south side see below lower left. There also appears to be a void under the NE toe of Tate Hill pier and displacement of facing/crack to deck slab at the end.



Timber piling and deck supports adjacent to RNLI pier platform (Asset Ref. 1221D901D0803C08)



Sheet piling and toe apron protecting property walls (Asset Ref. 1221D901D0803C10)



Heavily weather blocks on south side of Tate Hill pier (Asset Ref. 1221D901D0803C08)



Wall at east side of harbour south of Tate Hill pier (Asset Ref. 1221D901D0803C08)

North of Tate Hill pier, the harbour wall is fronted by a sand beach, with a variety of riparian walls at the back, Asset ref. 1221D901D0803C09, below left. Between here and the main harbour East Pier there is a rock revetment protecting the toe of the slope at the Haggerlythe, 1221D901D0803C05. This was constructed in 2001, but is in poor condition. The same asset reference continues outside the East Pier below the abbey for about 200m, and here larger rock was used in the 2001 scheme. Within the harbour the revetment is showing signs of significant damage, with displacement of the armour and exposure of the geotextile netting stabilising the slope above, see photo below right. This armour needs re-profiling and topping up with larger armour.



Riparian walls backing sandy beach in east side of harbour, (Asset Ref. 1221D901D0803C09)



Displaced rock armour and damaged revetment at the Haggerlythe inside harbour adjacent to east pier (Asset Ref. 1221D901D0803C05)

The rock revetment Asset Ref No.1221D901D0803C05 continues east outside the harbour, to protect the toe of Abbey Cliff. This section, again built in 2001 it is constructed of larger rock and is in fair condition (see images in next section).

### 3.10 Management Unit 13 – Whitby East

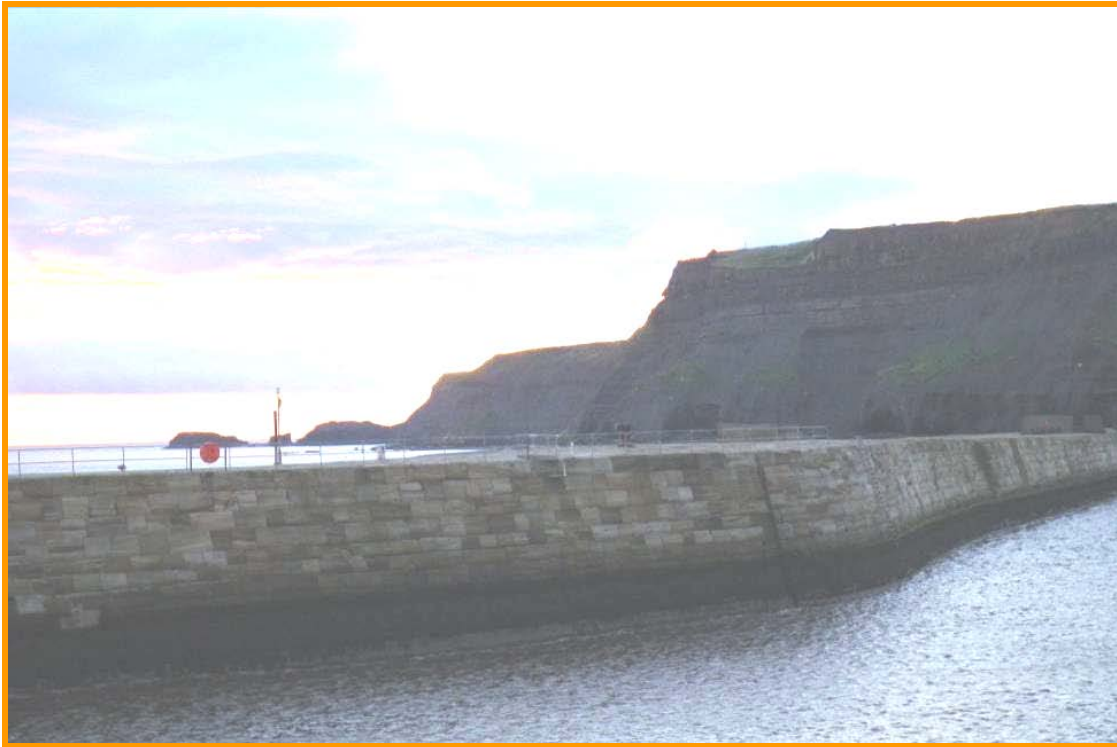
#### *Coastal Slope Condition Assessment*

This Management Unit is divided into 2 Sub-Management Units:

#### **Mu13A – Cliffs east of Whitby Harbour**

This Sub-Management Unit consists of **unit MU12/2** only (Appendix A, Map 2). The high cliffs which comprise this unit are classified as Partly Active. There is evidence of a large recent rockfall from the upper part of the cliff and ongoing erosion at the headscarp. Almost the

entire cliff face is exposed with very little vegetation cover. There is no change in activity level since 2008.



**MU12/2** The cliff face does not support vegetation and there is evidence of recent rockfalls at a number of points along the unit (Partly Active).

#### **Mu13B – Whitby East to Widdy Head**

This Sub-Management Unit consists of **units MU13/1 to MU13/6** and part of unit MU14/1 (which will be discussed under Management Unit 14) (Appendix A, Maps 2 and 3)

**Unit MU13/1** is located immediately east of Whitby and is classified as Partly Active. The lower slopes are almost entirely exposed and are subject to marine erosion. The upper slopes are actively retreating through periodic rockfalls.

**Unit MU13/2** comprises the eroded headland of Saltwick Nab. This unit is continuing to actively erode and supports little vegetation cover. Rilling and gullying is evident on the exposed faces. As a result this unit is classified as Partly Active.

The cliffs within **unit MU13/3** are located within Saltwick Bay. The cliffs of this embayment are protected to some extent from marine action by the high stable beach. As a result, the unit is less active and well vegetated. It is classified as Locally Active.

**Unit MU13/4** is located just east of Saltwick Bay and is fronted by a narrower beach than adjacent unit MU13/3. Consequently it is subject to more regular wave attack at the toe and much of the slopes are active and exposed. There is evidence of small slumps of debris and rockfall activity and there is ongoing localised and minor recession of the headscarp. This unit was classified as is classified as Partly Active in 2009, but is now considered to be Locally Active.

**Unit MU13/5** is formed by the shallow, relict debris flow lobe at Black Nab. The slopes of this unit are well vegetated, with localised activity evident at the toe and headscarp. This unit was classified as Locally Active in 2009 but the activity noted at the headscarp and toe means it is classified as Partly Active in 2012.

**Unit MU13/6** is a long, steep-faced unit near the Whitby Fog Signal and the former lighthouse. There is some intermittent vegetation cover, but the slopes are largely exposed with evidence of rockfalls from the upper strata. There are also signs of ongoing weathering and marine erosion of the lower layers. This unit is classified as Partly Active.



**MU13/1** Cliffs east of Whitby (Partly Active).



**MU13/2** The highly weathered headland of Saltwick Nab (Partly Active).



**MU13/3** Saltwick Bay cliffs and beach (Locally Active).



**MU13/4** Exposed, eroding cliff subject to marine erosion (Partly Active).



**MU13/5** The cliff is showing signs of erosion in the lower half of the face (Partly Active).



**MU13/6** Steep faces close to the Whitby Fog Signal (Partly Active).

*Coast Protection Asset Condition Assessment*  
(Map 28 Whitby to Saltwick Bay and Map 29 Saltwick Bay to Raw Pasture Bank)

Mu13A – Cliffs east of Whitby Harbour

There is a section of rock armour protecting the eastern side of the harbour and toe of Abbey cliff directly to the east of Whitby harbour East Pier. The rock armour varies in size from 1-4

tonnes to 5-8 tonnes. (Asset Ref No.1221D901D0803C05) and is in fair condition, below left and right, although there are areas that would benefit from topping up with additional armour stone.



Rock armour protection to toe of Abbey Cliff (Asset Ref. 1221D901D0803C05)



Rock armour at interface between east pier and Abbey cliff (Asset Ref. 1221D901D0803C05)

#### **Mu13B – Whitby East to Widdy Head**

There are no coastal assets within this Sub-Management Unit.

### **3.11 Management Unit 14 – Widdy Head to Pursglove Styre Batts**

#### *Coastal Slope Condition Assessment*

The only unit within this Management Unit is **MU14/1** (Appendix A, Map 3). The cliffs within this unit are classified as Locally Active. The slopes are generally well vegetated, with small local patches of erosion evident. Parts of the lower cliff are mantled by vegetated debris and the cliff toe is characterised by extensive boulder lobes. This unit has not changed activity status since 2009.



**MU14/1** stable cliffs with largely-vegetated debris aprons and boulder lobes (Locally Active)

There are no coastal assets within this Management Unit.

### 3.12 Management Unit 15 – Pursglove Styne Batts to Robin Hood's Bay

#### Coastal Slope Condition Assessment

This Management Unit consists of units **MU15/1 to MU15/4** (Appendix A, Maps 3 and 4).

**Unit MU15/1** is a long, generally well vegetated unit classified as Locally Active. There are localised areas of more intense erosion in places.

**Unit MU15/2** is located at Far Jetticks. This cliff has widespread activity, with ongoing marine erosion evident at the toe and localised activity on the cliff face. In 2009 the cliff was classified as Totally Active but the development of vegetation on the cliff face in recent years means the cliff is currently classified as Partly Active.

**Unit MU15/3** is largely comprised of the headland of Bay Ness, north of Robin Hood's Bay. The upper slopes support some continuous vegetation cover however the lower slopes are largely exposed. As a result they are subject to ongoing toe erosion and occasion small scale rockfalls. This unit is classified as Partly Active.

Just north of Robin Hood's Bay Village is **unit MU15/4**. The cliffs have a general absence of vegetation cover and are eroding down much of their length. There is evidence of slumping and rilling on the cliff face, with active recession of the headscarp. The toe is mantled by a narrow boulder strip which is insufficient to protect against marine action. This unit is classified as Partly Active.

Only MU 15/2 has been changed since 2009 (from Totally Active to Partly Active) the rest of the units have remained in the same activity class.



**MU15/1** Well vegetated slopes (Locally Active)



**MU15/2** An area of intense erosion (Partly Active)



**MU15/3** The cliff face supports patchy vegetation  
(Partly Active)



**MU15/3** Ongoing activity near the top of the cliff  
(Partly Active)



**MU15/4** Exposed cliffs with boulders at the toe (Partly Active)

*Coast Protection Asset Condition Assessment*

There are no coastal assets within this Management Unit.

### **3.13 Management Unit 16 – Robin Hood’s Bay**

*Coastal Slope Condition Assessment*

This Management Unit is divided into 3 Sub-Management Units:

**Mu16A – Robin Hood’s Bay Village**

This Sub-Management Unit is composed of units **MU16/1**, **MU16/2** and **MU16/3** (Appendix A, Map 4)

**Unit MU16/1** is the cliff fronting the upper part of Robin Hood’s Bay Village and is classified as Partly Active. The upper slopes are composed of soft material and support some vegetation cover with evidence of slumping and localised recession of the headscarp. The lower slopes are near vertical with no vegetation cover. The lower cliff has been undercut by marine erosion.

**Units MU16/2 and MU16/3** are stabilised landslides that form the lower parts of Robin Hood’s Bay Village and are both classified as Dormant. The units are protected by sea defences and show no evidence of recent activity.



None of these units has changed activity status since 2009.



**MU16/1** Cliffs below the upper part of Robin Hood's Bay Village (Partly Active)



**MU16/1** the base of the cliff continues to erode. The undercutting of the cliff is evident in the left side of the photograph (Partly Active)



**MU16/2** The cliffs have been stabilised at the toe but show some signs of erosion on their face (Dormant).



**MU16/3** The cliff at this location has been stabilised and is not visible through much of the unit (Dormant).

#### **Mu16B – South of Robin Hood's Bay Village**

This Sub-Management Unit consists of **unit MU17/1** only. This unit is defended at the toe by a sea wall and rock armour. The slopes are densely vegetated with trees and shrubs and show little evidence of recent activity. As a result this unit is classified as Inactive, as it was in 2008.



**MU17/1** The defended toe and heavily vegetated slopes show that the unit has been stable (Inactive)

## Mu16C – Cowling Scar

This Sub-Management Unit consists of **unit MU17/2** and part of **unit MU17/3**.

**Unit MU17/2** is protected in part by rock armour at the toe. The slopes are generally well vegetated with some exposed areas at the head and mid-slope where evidence of sliding and gullies are present. A tension crack has opened at the back of the cliff so the instability is continuing and propagating landward. This unit classified as Locally Active 2009, but is now considered to be Partly Active, due to the evidence of instability throughout the unit.

Further south, within **unit MU17/3**, defences are absent and the cliffs are more active. There is significant slumping and sliding activity at beach level as well as at the cliff head and mid-slopes. This unit is classified as Partly Active.



**MU17/2** The land drains from the adjacent fields are draining on to the cliff and causing instability (Partly Active).



**MU17/2** The slope is showing evidence of ground movement (Partly Active).



**MU17/3** Looking south across Robin Hood's Bay (Partly Active) (approx. unit extents shown)

### *Coast Protection Asset Condition Assessment*

Robin Hood's Bay village is defended by an extensive system of coast protection defences which was upgraded and extended in 2001 (Appendix B, Map 3). Most of the defences at Robin Hoods Bay are in a fair to good condition, but the older original structures are showing

evidence of damage and defects. The recent strategy study has proposed a capital scheme for the large vertical seawall (Asset Ref. 1221D901D1003C02) that protects the main part of the lower village. Maintenance recommendations elsewhere include re-pointing and repairing cracks and keeping localised areas of vegetation growth under control to avoid damage.

The most northern defence at Robin Hoods Bay is a section of rock armour protecting the cliff toe to the north of the northern slipway, Asset Ref. 1221D901D1002C02. This rock armour constructed as part of the 2001 scheme is in good condition, see photo below, top left.

The large sea wall (Asset Ref. 1221D901D1003C01) that was built in 2001 is fronted by rock armour and incorporates a slipway / ramp to its northern end. The wall is in very good condition. Joints and sealant show no signs of damage or minor defects. The rock armour at the toe is also very good, apart from one area near the centre where there are several gaps indicating displaced armour units. The timber fence adjacent to the ramp, see photo below top left, has some rotten / broken rails that need replacing. The northern slipway has some abrasion damage near the toe and missing joint filler, but is overall in good condition



Rock armour at north end of defence system (Asset Ref. 1221D901D1003C02)



Section of rock armour with gaps / displaced units in front of 2001 seawall. (Asset Ref. 1221D901D1003C01)



Sea wall with rock armour toe constructed in 2001 (Asset Ref. 1221D901D1003C01)



Rock armour extension at the interface between defended and undefended section. (Asset Ref. 1221D901D1003C01)

Between the 2001 seawall and the large vertical defence wall built in 1975 further south there is a short 25m length of undefended shale cliff, Asset Ref. 1221D901D1003C03, which is slowly eroding, see photo below right and threatens to undermine the north end of the vertical wall.



Large vertical wall at Robin Hood's Bay  
(Asset Ref. 1221D901D1003C02)



Short section of undefended cliff  
(Asset Ref. 1221D901D1003C03)

The large vertical concrete wall that was constructed in 1975 (Asset Ref. 1221D901D1003C02) is in poor condition, showing evidence of surface cracking, rust marks indicating corrosion of the reinforcement steel, mineral encrustation, seepage, and extensive cracking and repair work to the crest of the wall. Previous inspections have also noted some evidence of undercutting at the toe, but this was not visible at the time of inspection due to the beach levels. The recently developed strategy has proposed a capital scheme to repair and refurbish this wall.



Large vertical wall at Robin Hood's Bay in poor condition  
(Asset Ref. 1221D901D1003C02)



Crest wall in locally very poor condition  
(Asset Ref. 1221D901D1003C02)

The short section of defence between the central slipway and the vertical wall (Asset Ref. 1221D901D1003C04) has an exposed toe at the north and evidence of large cracks at its southern end. There are large voids in the masonry wall, >0.5m deep as evidenced by water pouring out as the tide receded. Above the wall there is loose spalling blockwork style render to upper property wall that could fall on pedestrians. There is some evidence of repair work and re-pointing to the joints but further repairs are needed, including grouting the deep voids.

The adjacent central slipway (Asset Ref. 1221D901D1003C05) is in an overall good condition, with signs of wear, minimal cracking and limited loss of cobble stones, see photos below, lower left and right. This structure needs regular inspections and minor repairs to keep it in good order.



Loose render on property wall to north side of slipway (Asset Ref. 1221D901D1003C04)



Open joints and voids visible in several places (Asset Ref. 1221D901D1003C04)



Central Slipway in overall good condition (Asset Ref. 1221D901D1003C05). (Masonry wall forming property foundations to rear in fair condition -1221D901D1003C06).



Missing cobbles and mortar in slipway, with evidence of previous repair work with contrasting colour mortar. (Asset Ref. 1221D901D1003C05)

The mixed construction defence (Asset Ref. 1221D901D1003C06) on the south side of the slipway has mass concrete toe at the base with a variety of stone and blockwork above. The defence has a patchwork of previous repairs and repointing throughout but further work is needed. There is a large crack visible in south end of the concrete toe and some undermining of the toe was apparent. There were some missing stone blocks in return end at south.



Cracks and missing stonework in upper wall (Asset Ref. 1221D901D1003C06)



Wide cracks to toe of wall and undermining (Asset Ref. 1221D901D1003C06)

At the south of the village is the concrete sea wall at the Quarter Deck (Asset Refs. 1221D901D1003C10). This was given rock armour toe protection as part of the 2001 scheme. The rock armour is tightly packed and is providing good protection to the toe of the sea wall behind. The upper sections of the sea wall itself show some evidence of seepage through the blockwork joints, and cracking and erosion to the capping beam and spalling, although there is evidence of repairs since the 2009 inspection. The promenade above the sea wall is in a good condition, with only minor defects present. The timber access stairs down onto the Quarter Deck are worn and show signs of previous repairs and will need replacing in future.



Quarter Deck sea wall with cracked capping beam with previous repairs (Asset Ref. 1221D901D1003C10)



Failing previous repairs at south end of Quarter Deck (Asset Ref. 1221D901D1003C10)

At the south of the Quarter Deck there is a length of rock armour defence with a slipway / ramp, both of which were constructed in 2001, see photo below left. The rock armour is in very good condition, is tightly packed and performing well, although there are two armour units that have been displaced near the centre (Asset Ref. 1221D901D1003C09). The barrier gate on the ramp is rusted and needs repainting. There was evidence of fire / barbeque damage to the plastic geotextile mesh in the concrete deck north of the barrier.

To the south of the southern ramp is a short section of rock armour built in 2001 to stabilise the cliff and prevent outflanking of the Quarter Deck wall, Asset Ref 1221D901D1003C07. At the south end the eroding adjacent cliff is starting to cause some unravelling and it is suggested that in future after further erosion the rock armour should be reprofiled to form a double sided defence, in a similar way to the transition at the south end of the northern section of rock armour (Asset 1221D901D1003C03).



Rock armour and ramp south of Quarter Deck (Asset Ref. 1221D901D1003C09)



Promenade above rock armour. (Asset Ref. 1221D901D1003C09)



Apparently displaced rock armour units (Asset Ref. 1221D901D1003C07)



Tightly packed rock armour (Asset Ref. 1221D901D1003C07)



Southern extent of rock armour - photo from 2009 inspection (Asset Ref. 1221D901D1003C07)



Erosion adjacent to south end of rock armour. November 2012 (Asset Ref. 1221D901D1003C07)

### 3.14 Management Unit 17 – Cowling Scar to Peak Steel

#### *Coastal Slope Condition Assessment*

This Management Unit is divided into 2 Sub-Management Units (Appendix A, Map 1):

#### **Mu17A – Boggle Hole**

This Sub-Management Unit consists of part of **unit MU17/3** only. This unit is described under Management Unit 16.

#### **Mu17B – Boggle Hole to Peak Steel**

This Sub-Management Unit consists of **units MU17/4 to MU17/9**.

**Units MU17/4 and MU17/5** are located south of Boggle Hole and are classified as Partly Active. The cliff toe is near vertical and vegetation-free due to on-going erosion. The body of the cliff is a shallower gradient and composed of soft glacial sediments with localised evidence for activity associated with incision of streams.

Further south, units **MU17/6 and MU17/7** are classified as Locally Active. The upper slopes of these units are more stable with more continuous, dense vegetation cover than those units to the north. Some localised activity at the headscarp and toe is evident.

**Units MU17/8 and MU17/9** are located immediately west of Peak Steel. **Unit MU17/8** has a steep lower slope which is actively eroding and a shallower upper slope which supports some

vegetation cover. Headscarp recession is evident in places. **Unit MU179** is steep with little vegetation. These units are classified as Partly Active.

None of these units has experienced a change in activity level since the 2009 inspection.



**MU175** has been subject to marine erosion at the toe of the cliff (Partly Active)



**MU175** Looking northwards (Partly Active)

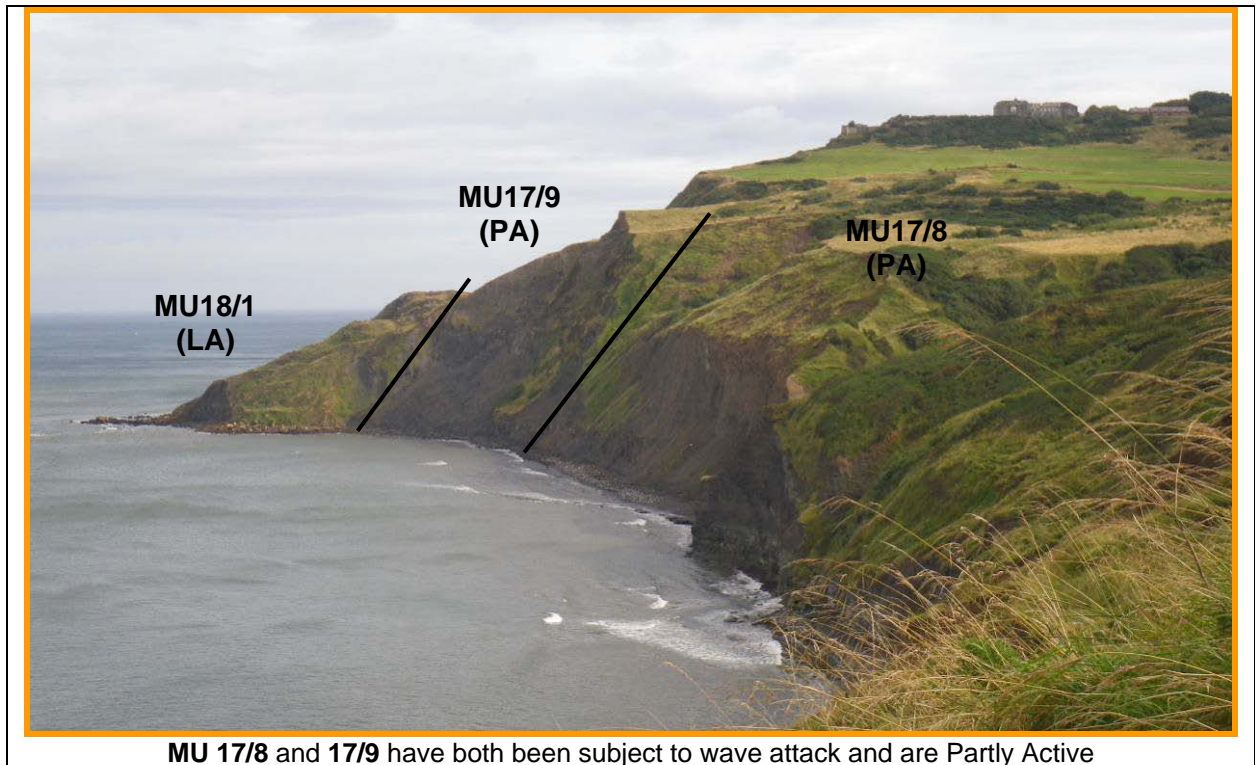


**MU176** Locally Active the slopes in the foreground are well vegetated with some signs of movement on the face (Locally Active).



**MU177** west of Peak Steel (Locally Active).





*Coast Protection Asset Condition Assessment*

Mu17A and Mu17B– Boggle Hole to Peak Steel

There are no coastal defences present here, but fluvial assets include a stone slipway integrated with a concrete revetment, a fuel bund and the outfall of Mill Beck. Boggle Hole Youth Hostel and footbridge is located 50m upstream of the mouth of the beck. Not inspected in 2012. Access is provided to the beach via a concrete slipway.

A short section of rock armour revetment and concrete and timber piling are providing protection to the mouth of the Stoupe Beck just to the south of Boggle Hole. However these are fluvial rather than coastal sea defences and not included in the coastal defence asset inspection.

### **3.15 Management Unit 18 – Peak Steel to southern end of Beast Cliff**

*Coastal Slope Condition Assessment*

This Management Unit is divided into 2 Sub-Management Units, as follows (Appendix A, Maps 4 and 5):

**Mu18A – Peak Steel to Blea Wyke Steel**

This Sub-Management Unit consists of **units MU18/1 and MU18/2.**

**Unit MU18/1** is located at Peak Steel, below Ravenscar. The cliffs in this region have a distinct two-tiered form. Much of the upper headscarp is densely vegetated with little evidence of recent activity. The lower headscarp, exposed to the sea, is more active episodic slides and falls evident. This unit is classified as Locally Active.

**Unit MU18/2** is a well vegetated, relict system with no signs of activity. As a result it is classified as Inactive.

Neither of these units has changed activity status since 2009.



**MU18/1** Peak Steel (Locally Active)



**MU18/2** Distinct two-tiered cliffs (Inactive)

### **Mu18B – Common Cliff and Beast Cliff**

This Sub-Management Unit consists of **units MU18/3 and MU18/4**, both of which are classified as Locally Active. The cliffs have a distinct ‘undercliff’, formed by seepage erosion and landsliding conditioned by variations in the geology. The slopes are well vegetated with only localised patches of activity evident at the slope toe. These units have not changed activity status since 2009.



**MU18/3** Densely vegetated relict cliffs (Locally Active)



**MU18/4** Vegetated overall but with localised erosion (Locally Active)

#### *Coast Protection Asset Condition Assessment*

There are no coastal assets within this Management Unit.

## **3.16 Management Unit 19 – Beast Cliff to Scalby Ness**

#### *Coastal Slope Condition Assessment*

This Management Unit is divided into 5 Sub-Management Units (Appendix A, Maps 5 and 6):

#### **Mu19A – Beast Cliff to Herbert Hole**

This Sub-Management Unit consists of **unit MU19/1** only. Within this unit the cliffs are generally well vegetated, with minor localised patches of erosion at the unit toe. There is some evidence of marine erosion and small scale rockfall. This unit is classified as Locally Active, and has not changed since 2009.



**MU19/1** the well vegetated cliff face (Locally Active)

**Mu19B – Herbert Hole to Tindall Point**

This Sub-Management Unit consists of **unit MU19/2** and **part of units MU19/1** (described previously) **and MU19/3**.

**Unit MU19/2** is located on the north side of Hayburn Wyke and is classified as Locally Active. There is minor activity at the headscarp and some evidence of past rockfalls at the toe. The slopes around the footpath on the northern side of Hayburn Wyke have been susceptible to instability in the past, but recent stabilisation works have been effective.

**Unit MU19/3** is located around and to the south of Hayburn Wyke. These cliffs are well vegetated in most places, with only minor localised erosion evident at the toe and headscarp.

Neither of these units has shown a change in the level of activity between the 2009 and 2012 walkover surveys.



**MU19/2** Looking north across Hayburn Wyke at the vegetated cliffs (Locally Active).



**MU19/3** Looking south across Hayburn Wyke (Locally Active)

**Mu19C – Tindall Point to North of Cloughton Wyke**

This Sub-Management Unit comprises parts of **units MU19/3** (described above) and **MU19/4**.

**Unit MU19/4** is located immediately to the north of Cloughton Wyke. The unit is characterised by high, steep cliffs which are more active than those cliffs further north. There is some recession of the headscarp. This unit continues to be classified as Partly Active.



**Mu19/4** The upper slopes are vegetated but the lower slopes are (Partly Active)

#### **Mu19D – Cloughton Wyke**

This Sub-Management Unit consists of **units MU19/5 and MU19/6**.

**Unit MU19/5** is located on the northern side of Cloughton Wyke and is classified as Locally Active. The near vertical cliffs are composed of hard rock which have failed through a series of small rockfalls. The cliffs support some vegetation cover and are subject to ongoing marine erosion at the toe.

**Unit MU19/6** forms the southern part of Cloughton Wyke and extends southwards to Long Nab. The lower cliff is near vertical with a general absence of vegetation cover. There is evidence of rockfall from this layer onto the shoreline below. The upper part of the cliff is shallower, composed of softer material and is fairly well vegetated. This unit is classified as Locally Active.

Neither of these units has changed activity status since the 2009 walkover survey.



**MU19/5** Northern side of Cloughton Wyke (Locally Active).



**MU19/6** Southern side of Cloughton Wyke (Locally Active).

#### **Mu19E – Hundale Point to Scalby Ness**

This Sub-Management Unit consists of **unit MU19/6** (described previously) and **units MU19/7 to MU19/11**.

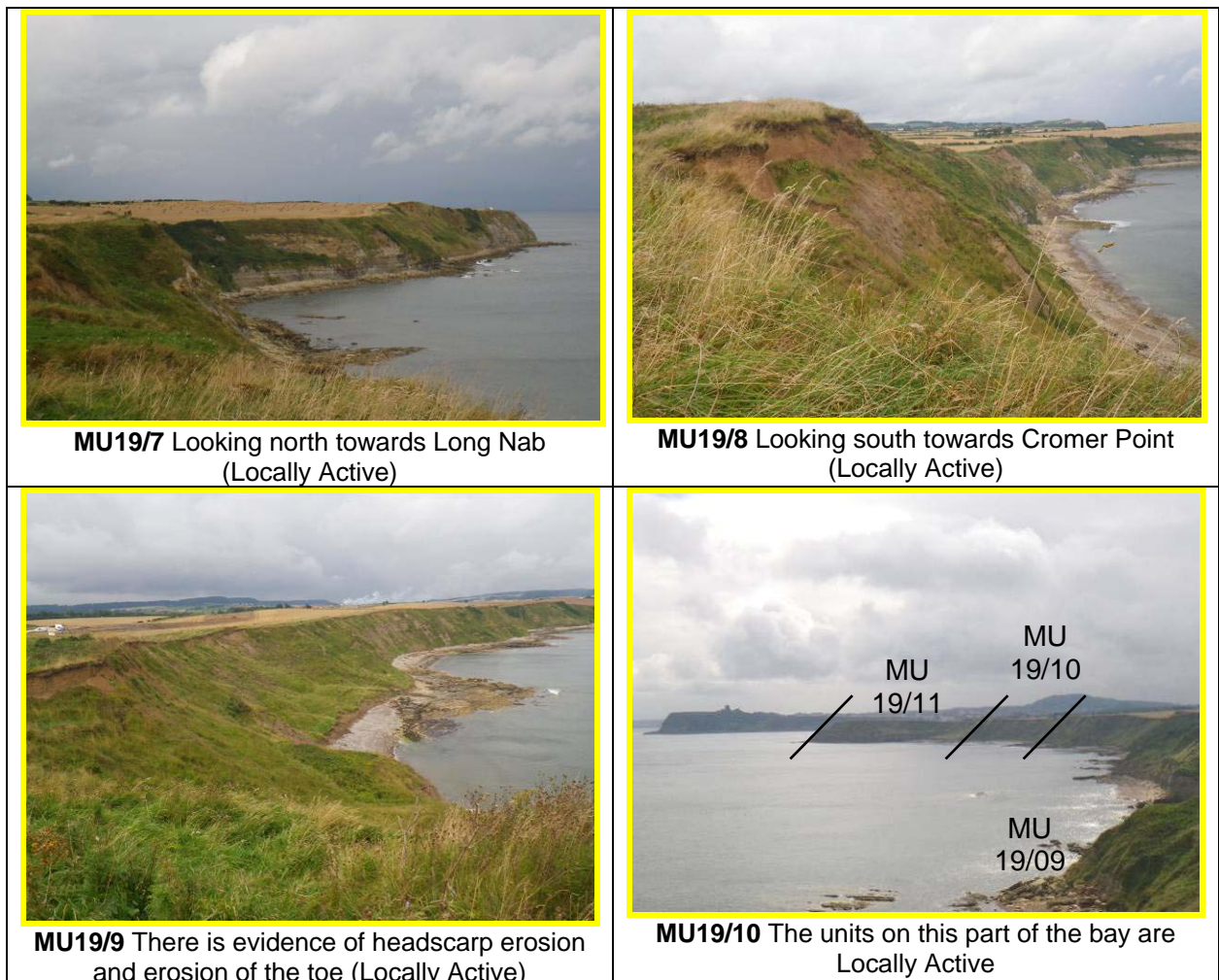
**Units MU19/7 and MU19/8** extend from Long Nab in the north to Cromer Point in the south. They are both classified as Locally Active. The cliffs are generally well vegetated, with boulder

lobe deposits at the base of the cliff. Minor activity is evident at the toe as a result of marine action and there is localisation recession of the headscarp.

**Units MU19/9 and MU19/10** are located between Cromer Point and Scalby Ness and are classified as Locally Active. The toe of these units is subject to marine action and is slumped in places. The headscarp is steep, exposed and actively receding over much of the unit lengths. Despite the vegetation cover, mid-slope there are tension cracks, slumping, sliding and gliding blocks indicating ongoing activity. These units were classified as Partly Active in the 2009 walk over survey but have been reclassified to Locally Active.

The Scalby Ness headland comprises **unit MU19/11**. This area is well vegetated with only localised activity evident at the toe and some recession at the headscarp. This unit is classified as Locally Active.

Only units MU19/9 and 19/10 have changed activity status since the 2009 walkover survey, having reduced in activity.





**MU19/11** Long Nab is eroding at the toe but the cliff face is well-vegetated and stable (Locally Active)

*Coast Protection Asset Condition Assessment*

**Mu19 – Beast Cliff to Scalby Ness**

There are no formal sea defences within MU 19. However there is an outfall pipe which has been laid across the mouth of Scalby Beck and continues north across the foreshore in front of Long Nab. This acts as a weir controlling the flow of the beck at low tide and was discussed in the 2009 report, but as it is not a SBC coastal defence asset it was not included in the 2012 inspections.

**3.17 Management Unit 20 – Scarborough North Bay**

*Coastal Slope Condition Assessment*

This Management Unit is divided into 2 Sub-Management Units (Appendix A, Map 6):

**Mu20A – Northern North Bay**

This Sub-Management Unit consists of **units MU20/1 and MU20/2**.

Both of these units are defended at the toe by the sea wall which runs the entire length of North Bay. The slopes are well vegetated and show no obvious evidence of recent activity, thus they are both classified as Dormant, as they were in 2009.



**MU20/1** Dormant



**MU20/2** Behind the sea wall (Dormant)

**Mu20B – Southern North Bay**

This Sub-Management Unit comprises **units MU20/3, MU20/4a and MU20/4b**.

**Unit MU20/3** is well vegetated and shows no obvious evidence of recent instabilities. It is classified as Dormant, with no change since 2009.

**Unit MU20/4a** is located to the rear of North Sands and is classified as Inactive. The relict slopes are well vegetated with only minor and localised evidence of erosion at the headscarp, it remains classified as inactive.

**Unit MU20/4b** covers the area of Clarence Gardens and has previously been slightly more active than the adjacent unit MU20/4a. However, recent remediation works have repaired cracks and the slopes are now well vegetated with exposed rock at the headscarp. This unit classified as Locally Active in 2009 but has now been downgraded to Inactive.



**MU20/3** Well vegetated slopes (Inactive)



**MU20/4a** Relict slopes with localised activity (Inactive)



**MU20/4b** Exposed rock headscarp (Inactive)

#### *Coast Protection Asset Condition Assessment*

The coast defence system protecting the Town of Scarborough stretches for approximately 6.5km and includes a wide variety of defence types which are in varying condition (Appendix B, Map 4). The inspections were undertaken on 7<sup>th</sup> and 8<sup>th</sup> November 2012. For ease of reference the defence inspection has been subdivided in accordance with the Scarborough Coastal Defence Strategy units.

#### **Scarborough North Bay**

There are formal defences throughout the whole length of the North Bay, many of which are currently stable but most of the concrete and blockwork structures show some evidence of damage such as; cracking, loss of mortar, loss of expanding sealant and surface erosion and abrasion damage to front face. There are also a number of structural cracks in the back wall behind the promenade where this acts as a retaining wall to the road. It is understood that grant aid has been awarded along with an SBC contribution to the sum of £446k to spend on defence condition improvements within Scarborough North Bay in summer 2013 leading into 2014

**Mu20A – Northern North Bay  
Sealife Centre 20A/1**

The most northerly defence in the system, Asset Ref. 1221D901D1201C01, starts adjacent to the footbridge at Scalby Mills and is in fair condition, see below left. There are small cracks throughout and some holes and damage near the bridge where it ties into the river bank.

Moving south the wall, Asset Ref. 1221D901D1201C02, around the promontory on which the Sea Life centre is built is in less good, but still overall fair condition, see below top right and bottom left. There is evidence of toe scour and abrasion damage to the face of the wall. At the southern end of this defence there is a beach access ramp / slipway that is unusable due to the low beach levels leaving a large drop and boulders at the bottom. The Promenade in this area is in good condition, below lower right, although in places there is evidence of wave overtopping damage to the vegetation in the Sea Life centre gardens behind.



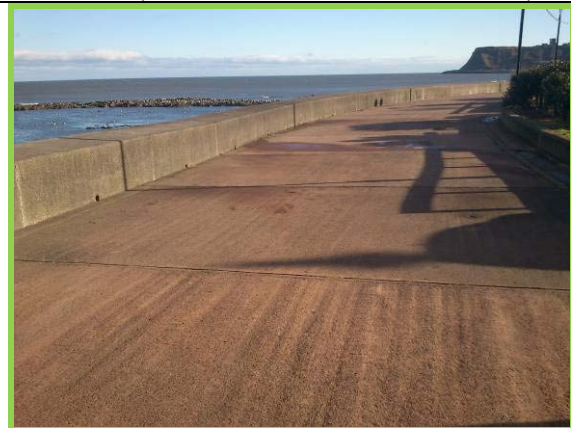
Wall on south side of Scalby Beck in fair condition (Asset Ref. 1221D901D1201C01)



Damage to face of blocks on wall at Sea Life Centre (Asset Ref. 1221D901D1201C02)



Exposed toe at Sea Life Centre. Note missing infill apron behind end of sheet pile toe. (Asset Ref. 1221D901D1201C02)



Promenade at Sea Life Centre in good condition (Asset Ref. 1221D901D1201C02)

**North Bay Cliffs – 20A/2 to 20A/7**

Sea walls (Asset Refs. 1221D901D1201C03, C24, C25, and C04, lie between the Sea Life Centre and the small promontory at the south of the mini golf course. These are formed of blockwork with a concrete crest wall with a promenade beyond, backed by a grouted stone revetment, see below lower right. There is considerable abrasion damage to the front face, and spalling of the capping beam along this length, see below top left. The beach was very low at the north, as on previous surveys, and in places the sheet pile toe (Asset Ref. 1221D901D1201C02) or concrete toe (Asset Ref. 1221D901D1201C24) has been exposed



and is corroded or eroded. The promenade shows signs of heavy wave overtopping damage with loss of filler from joints. The steps mid way along are abraded with rounded steps near the toe. The wall around the promontory, Asset ref 1221D901D1201C04, which is more exposed has had relatively recent repairs to both the front face and the low crest wall at this section, below, bottom left and right. It is recommended that repairs are considered to reface the northern part of the wall to the in future.



Erosion and spalling of front face of wall and exposed toe. Asset Ref. 1221D901D1201C03



Grouted revetment behind prom has missing infill and voids in several locations Asset Refs. 1221D901D1201C25 & C04



Recent repairs to areas of front face of wall. Asset Ref. 1221D901D1201C04



Recent repairs to low crest wall at promontory. Asset Ref. 1221D901D1201C04

Between the promontory at Asset Ref. 1221D901D1201C04 and Peasholm Gap, in front of the beach huts the beach levels are higher. This section has been split into asset lengths between each set of access steps and consists of defences Asset Ref. 1221D901D1201C10, C26, C11, C12, C13, C14, C15, C16, C05, C17, C18 and C06, running from north to south. The beach was relatively high along this length, so only the upper wall and steps were visible, see sample photos below. South of the beach management centre there were voids and missing stones in a number of locations in the rear grouted stone revetment below the beach huts. At a number of locations the wall capping beams have been repaired, but further work is required in several further locations. At the south of this section a new rear wall was being constructed, see photo below, lower right. Just to the north of this, in front of the beach huts there had been damage to several of the capping beach on the low wall at the back of the promenade, and in one case a 1m length was missing.

The wall to the north of the ramp at Peasholm Gap has several vertical cracks, see below bottom right. The beach is higher at this location, but there is occasional wave action and this has caused loss of expansion joint filler in the new rear wall protecting the new development behind the wall.



High beach levels, repairs to capping beam holding. (Asset Ref. 1221D901D1201C12)



High beach in front of new rear wall at beach management centre, (Asset Ref. 1221D901D1201C15)



Damage to rear wall and grouted revetment (Asset Ref. 1221D901D1201C05)



New rear property boundary wall under construction at south end of Asset Ref. 1221D901D1201C05



Missing filler in construction joint in new wall north of Peasholm Gap (Asset Ref. 1221D901D1201C06)



Full height cracks in wall north of Peasholm Gap ramp (Asset Ref. 1221D901D1201C06)

### Southern North Bay Peasholm Gap and Clarence Gardens - 20B/1 to 20B/3

The wall at Peasholm Gap, Asset ref. 1221D901D1201C19 has missing mortar at joints, damage to the front face of many blocks and spalling to the splash beam between the lower and upper sections, see below upper left photo. There was evidence of localised repairs, but much more significant work is required. The promenade and slipway / ramp appeared in fair to good condition.



Abraded / eroded blocks and splash beam at Peasholm Gap.  
(Asset Ref. 1221D901D1201C19)



Slipway and sloping wall with splash beam  
(Asset ref. 1221D901D1201C20)

South of Peasholm Gap the beach levels drop and Royal Albert Drive is protected by an increasingly high curve profiled blockwork wall that runs south to the slight promontory at the ramp opposite the recently redeveloped Oasis Café. Repairs were evident in places on the wall and the promenade along this section was being re-laid at the time of the inspection (7th Nov 2013). South of the central steps the beach was very low causing undercutting at the toe of the wall, Asset 1221D901D1201C21. There are a number of vertical cracks that have been previously repaired unsuccessfully and the capping beam is cracked and breaking up, with cracks and holes between capping and promenade. There were several missing blocks at toe of the wall and a missing section of handrail near the bottom of ramp. There was evidence of repair work to structural vertical cracks near the slipway noted in the 2009 inspections.



Recently replaced promenade slabs  
(Asset Ref. 1221D901D1201C07)



Erosion and undermining at steps at south end of  
Asset Ref. 1221D901D1201C07



Low beach levels exposing toe apron  
(Asset Ref. 1221D901D1201C07)



Low beach levels exposing toe apron  
(Asset Ref. 1221D901D1201C21)



Exposed toe – with missing blocks  
(Asset Ref. 1221D901D1201C21)



Exposed toe – photo from 2009  
(Asset Ref. 1221D901D1201C21)

To the southern end of the North Bay, opposite Clarence Gardens to the north of the rock armour there is a large stepped concrete blockwork sea wall structure (Asset Ref. 1221D901D1201C08 – just north of Albert Road) constructed with eight large buttresses/bastions which protrude from the wall out onto the beach. The buttresses/bastions vary in height and length. As noted in the 2009 inspections the toe of the wall is severely eroded and there is severe cracking to out-built sections particularly at north end. There is a concrete berm above the buttresses, which is in good condition. Above this are the sea wall and promenade, and a second wall at the back of the promenade as the road, Albert Drive, is at higher level here. Both the promenade and the second wall show cracking. There are localised signs of repair to eroded faces of blockwork and to buttresses, however, additional repairs are now required. It is understood that a capital works scheme is under consideration to repair this section of wall.



Looking north from south end  
(Asset Ref. 1221D901D1201C08)



Looking north, showing eroded undermined toe  
(Asset Ref. 1221D901D1201C08)



Cracking outbuilt section at north of defence –  
photo from 2009.  
(Asset Ref. 1221D901D1201C08)



Cracking at outbuilt section at north of defence –  
photo from 07/11/2012.  
(Asset Ref. 1221D901D1201C08)

There is a short section of stepped blockwork wall (Asset Ref. 1221D901D1202C23) between this wall and the rock armour section. This short wall two large vertical cracks with one crack extending through the capping beam. There is another crack extending half way up the wall. There is missing blockwork in localised areas and the lower part of wall is eroded with exposed aggregate. The secondary wall beyond the promenade and the promenade itself are also cracked. These issues were identified in the 2009 inspections but had changed very little when inspected in 2012, see photos below.



Example of cracking Photo from 2009  
(Asset Ref. 1221D901D1202C23)



Little change is same crack- Photo from 07/11/12  
(Asset Ref. 1221D901D1202C23)

The southern-most section of defence in this unit is the first section of the rock armour at Clarence gardens (south) that was constructed in 2004/5. This is in good condition, protecting the original wall behind, Asset ref 1221D901D1202C01.



### 3.18 Management Unit 21 – Castle Cliff, Scarborough

#### *Coastal Slope Condition Assessment*

This Management Unit is divided into 2 Sub-Management Units (Appendix A, Map 7):

#### **Mu21A – Castle Cliff**

This Sub-Management Unit consists of **units MU21/1 and MU21/2.**

**Unit MU21/1** is located at The Holms and continues to be classified as Inactive. In this unit the rock is prone to rockfalls and there are patches of rock on the face where small cliffs are exposed. There was no evidence of recent rockfalls and the majority of the unit is well vegetated.

**Unit MU21/2** forms the Castle Cliff promontory and continues to be classified as Locally Active. The cliffs are steep with variable vegetation cover and extensive toe protection measures. Locally, bedrock is exposed where it is subject to ongoing weathering and erosion from rainfall



**MU21/1** Well jointed hard rock has a thick cover of vegetation (Inactive).



**MU21/2** Well jointed hard rock (Locally Active)



**MU21/2** Steep, exposed cliff (Locally Active)

### **Mu21B – The Harbour**

There are no natural cliff units within this Sub-Management Unit.

#### *Coast Protection Asset Condition Assessment*

#### **Mu21A/1 – The Holms and Castle Headland 21A/2**

Asset condition data are shown in Appendix B Maps 4 and 5. The rock armour and Accropodes “East Pier to the Holms” coast protection scheme constructed between 2003 and 2005 protects the area at the south end of North Bay with a rock armour revetment, Asset ref 1221D901D1202C03. This continues through the Holms as rock armour with concrete toe piles to reduce the footprint of the defence limiting encroachment into the SSSI, Asset Ref. 1221D901D1202C04. The section continuing around the Castle Headland to the harbour is an Accropode revetment with concrete toe piles and rock crest, Asset ref.1221D901D1202C02. There is a continuous wave return wall along the crest of these defences, which were built between 2003 and 2005.

On the whole, these defences remain in good condition. There is some evidence of cracking and erosion along the Accropode arm edges and several of the units are broken, although there were known to be a number of broken units shortly after construction was completed. The inspection was limited to views from the crest wall and it was not possible to inspect the toe as it was below water in all tide conditions. There are a number of cracks in the crest wall but, these are currently of no concern, but monitoring may be useful to detect further

deterioration. There has been some deterioration of through wear and tear to parts of the promenade and some expansion joints in both promenade slabs and wave wall need resealing.

At the time of the visit Yorkshire Water had works underway near their pumping station and storm outfall just north of the harbour and as part of their traffic control they had erected additional traffic signs through the promenade slab. It should be ensured that the promenade and road slab is made good when the works are complete.



Overview of rock armour with raised crest wall  
(Asset Refs. 1221D901D1202C03)



Overview of rock armour with concrete piles at toe visible (Asset Refs. 1221D901D1202C04)



Example of crack through centre of wave wall –  
(Asset Ref. 1221D901D1202C03)



View of Accropode armour with concrete piles at toe and rock crest visible  
(Asset Ref. 1221D901D1202C02)





Joints in promenade slab needing re-sealing  
(Asset Ref. 1221D901D1202C02)

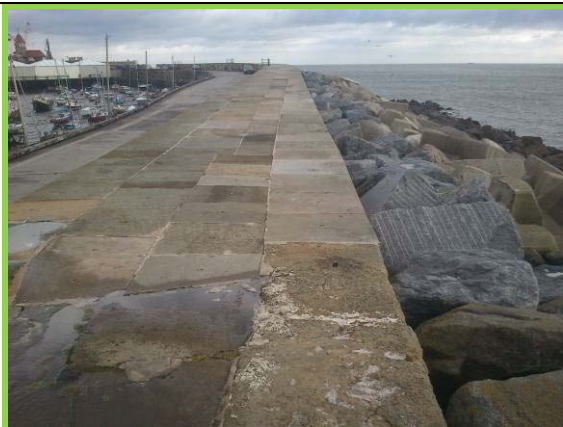


Expansion joint in crest wall needs repair  
(Asset Ref. 1221D901D1202C02)

### Mu21B/1 and 21B/2 – The Harbour

Scarborough Harbour is located at the southern side of the Castle Headland at the old part of the town. There are continuous formal defences throughout the whole extent. These range from the 2005 rock armour and Accropode sections to very old stone quay walls. Around the commercial side of the harbour many of the defences are aged, and are constructed using sheet metal piles back-filled with mass concrete. The inspection of this area took place on a very low tide on 16<sup>th</sup> October 2012.

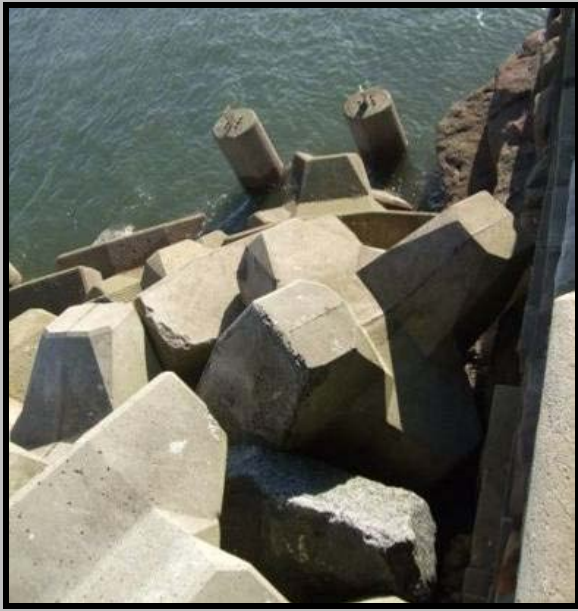
The East Pier outer wall armour (Asset Ref. 1221D901D1301C01) remains in very good overall condition, with only minor cracking to the crest wall and individual Accropodes. The raised section of stone blocks that was rebuilt along almost the entire length remains in good condition with minor erosion and cracks present. At the seaward end of the harbour arm the rock armour is less tightly packed than it is along the rest of the pier, but there has been little if any change since the 2009 inspection.



View of East Pier with rock armour, Accropodes and raised wall section  
(Asset Ref. 1221D901D1301C01)



Tightly packed rock armour, Accropodes rock toe blanket and concrete toe piles seaward of East Pier harbour wall  
(Asset Ref. 1221D901D1301C01)



South end of harbour arm showing potential lack of armour fill photo from 2009 (Asset Ref. 1221D901D1301C01)



South end of harbour arm showing potential lack of armour fill Photo taken 16/10/2012 (Asset Ref. 1221D901D1301C01)

The faces of many blocks are missing or cracked at the seaward end of the original East Pier wall. The inner face of East Pier, Asset ref 1221D901D1301C16 was refurbished as part of the 2005 scheme, with missing blocks replaced and joints filled. Minor missing joints and cracks appear throughout the harbour masonry walls with recent maintenance work visible to the landward part of the harbour arms. The inner wall was inspected on a very low tide and it was noted that there are open joints and voids at the toe, see photos below left and right.

The stone stairs set into this defence are loose and in need of repair, see lower photos below. The washout of the joints at this set of steps was noted in the 2009 report and this has deteriorated, threatening collapse of the stone treads.



Erosion at toe, south end of East Pier. (Asset Ref. 1221D901D1301C16)



Open joints between blocks in inner face of east Pier below repaired section. (Asset Ref. 1221D901D1301C16)



Washout behind steps – photo from 2009  
(Asset Ref. 1221D901D1301C16)



Washout behind steps – 16/10/2012  
(Asset Ref. 1221D901D1301C16)

A number of defences in the harbour area show corrosion to the steel piling of varying degrees (Asset Ref. 1221D901D1301C13 and 1221D901D1301C17), as would be expected in an environment such as this. Locals report the piles to be up to 50 years old. Significant corrosion is evident in the photo below located on the harbour arm near the lighthouse, and there is a large void in the SE corner visible on very low tides (Asset Ref. 1221D901D1301C17).



Void under SE corner of breakwater by lighthouse  
(Asset Ref. 1221D901D1301C17)



Corroded sheet piles, but overall fair condition  
(Asset Ref. 1221D901D1301C17)

The original quay wall on Sandside (Asset Ref. 1221D901D1301C06) shows signs of deformation; missing joints and movement of blockwork. The newer concrete jetty which has been constructed above also shows signs of movement although still structurally sound. There are also cracks forming on the columns and beams to the underside of the extended jetty with exposed reinforcement bar in places. The section of steel sheet piling adjacent to the east is heavily corroded. At the east end of Sandside the promenade is supported by several arches built in front of the original quay. These appear in fair condition but there is damage to the concrete capping, see below right and the ladders are rusted.



The original quay wall beneath the newer concrete jetty (Asset Ref. 1221D901D1301C06)



Spalling concrete capping to arched suspended quay at east end of Sandside (Asset Ref. 1221D901D1301C05)

The west pier appears to be in fair condition, the steel sheet piling on the inner side of the harbour wall and at the seaward end is corroded, although intact (Asset Ref. 1221D901D1301C13 and C18). The outer side (Asset Refs. 1221D901D1301C07 and Asset Ref. 1221D901D1301C19) shows several significant defects including large full height cracks and exposure of aggregates. During the inspection at low tide the toe, which has a variety of constructions was exposed. This shows potential undercutting in a number of places with low beach levels. Erosion to the wall and minor cracks to the promenade were also noted during the inspection (Asset Ref. 1221D901D1301C19). These cracks require repair and monitoring to ensure that the structural integrity of the defence is maintained.



Corroded sheet piling and damaged timber fenders at end of West Pier (Asset Ref. 1221D901D1301C18)



Cracks to concrete facing and exposed toe to steps on West Pier (Asset Ref. 1221D901D1301C18)

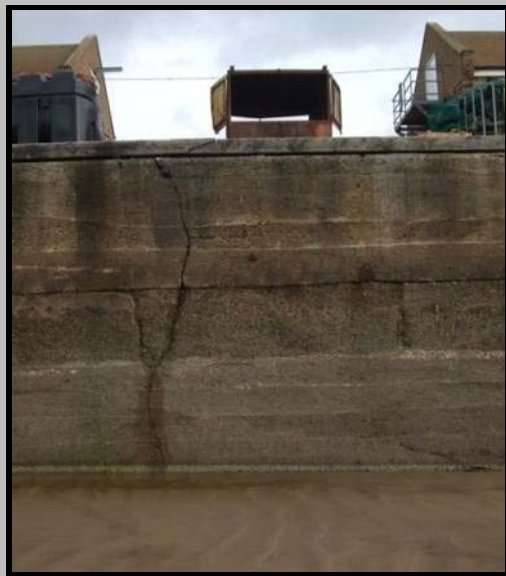
The beach level at the west side of west pier (Asset Ref. 1221D901D1301C19 and C07, see photos below) was lower than during the 2009 inspections, see photos below, exposing the timber toe piles. If the lower levels persist the toe piles may become further undercut so additional toe protection should be considered.



Undermining of toe of concrete encased section at bend where West Pier narrows (Asset Ref. 1221D901D1301C07)



Cracks and repairs in concrete encasement section at narrowing of West Pier (Asset Ref. 1221D901D1301C07)



Large vertical crack extending through the wall photo from 2009 (Asset Ref. 1221D901D1301C19)



No change to vertical crack extending through the wall photo from 16/10/12, but lower beach exposing timber toe piles. (Asset Ref. 1221D901D1301C19)

### 3.19 Management Unit 22 – Scarborough South Bay

#### *Coastal Slope Condition Assessment*

This Management Unit is divided into two smaller Sub-Management Units (Appendix A, Map 7):

#### **Mu22A – St Nicholas Cliff**

There are no natural cliff units within this Sub-Management Unit.

#### **Mu22B – South Cliff and Holbeck Gardens**

This Sub-Management Unit consists of **units MU22/1 to MU22/8**, all of which are protected at the toe by the sea wall, promenade and in places, rock armour.

**Unit MU22/1** is the most northerly unit located in Scarborough's South Bay and is classified as Inactive. It is well vegetated with only minor, localised activity evident as footpath cracks.

**Unit MU22/2** comprises the area around and to the north of the Spa complex. This unit was classified as Locally Active in 2009 as a result of ongoing shallow instability and damage to footpaths. Following remedial work the unit is now classified as Inactive.

**Unit MU22/3** is located just south of the Spa Complex in the vicinity of the cliff lift. The steep slopes of this unit are well vegetated with little evidence of instability apart from cracking to footpaths. Therefore, this unit is classified as Inactive.

**Units MU22/4 and MU22/5** comprise the northern part of the South Cliff Gardens and are both classified as Inactive. These units are generally well vegetated and appear to be largely stable. Locally, there are some minor cracks within footpaths and some exposed rock faces near the cliff toe.

**Unit MU22/6** is located behind the former bathing pool and is classified as Inactive. The slopes of this unit are well vegetated although there are some signs of very localised rockfall near the unit toe. The unit was classified as Locally Active in 2009 due to more widespread activity.

**Unit MU22/7** is located at Holbeck Gardens (just north of the run-out lobe) and is classified as Inactive. A number of footpaths in this area remain closed due to cracking and ongoing instability. However this does not represent an increase in activity since 2008. Otherwise, the slopes are well vegetated.

**Unit MU22/8** comprises the stabilised Holbeck Hall landslide run-out lobe and is protected at the toe by boulder armour. The slopes here are hummocky and are well-vegetated. However, localised sections near the headscarp are exposed and tension cracks are visible in the debris lobe. This unit is classified as Locally Active.

Only MU22/2 and 22/6 have changed activity status since the 2009 walkover survey.



**MU22/1 to MU 22/6** Well vegetated slopes with large coastal defences at the toe (Inactive)



**MU22/6** Well-vegetated slopes behind the former bathing pool (Inactive).



**MU22/7** The cliff face shows stability overall (Inactive).



**MU22/8** Localised activity at the headscarp of the Holbeck Hall landslide run-out (Locally Active)

*Coast Protection Asset Condition Assessment*  
**Scarborough South Bay**

Within South Bay are a wide range of coastal defence assets. Throughout the defences there are vertical cracks and areas of heavily eroded blockwork. Although there are numerous defects to the sea walls, they are generally structurally sound but repair work is needed to improve the condition of the assets and capital schemes have been recommended in the strategy at several locations. Common defects visible throughout include mortar loss and surface cracking.

**Foreshore Road and St Nicholas Cliff MU 22A1/ and 22A/2**

The South Bay defences start at the RNLI station, adjacent to West Pier. As in the 2009 inspection the sea wall protecting the Lifeboat Station is in fair to good condition with minor mortar loss of joints and erosion (Asset Ref No.1221D901D1301C08).



View of blockwork wall beneath life boat station  
 Photo from 2009 (Asset Ref. 1221D901D1301C08)



Minimal change to wall since 2009  
 (Asset Ref. 1221D901D1301C08)

The low defence wall along the east side of Foreshore Road, is split into different NFCDD assets at each of the sets of access steps. These are running from north to south Asset Refs. 1221D901D1301C15, C21, C23, C24 and C25. Due to high beach levels only the top two courses of stone blocks were visible along most of this length. However, where



visible, the sea wall is in good condition with only occasional minor missing joints and erosion evident and occasional defects to the hand railing needing repair.



Damaged handrail above wall (Asset Ref. 1221D901D1301C22)



High beach level along sea wall running in front of Foreshore Road, South Bay (Asset Ref. 1221D901D1301C15)

The two stage wall at the end of Valley Road / Aquarium Top has a vertical crack in the wall at the back of the promenade (Asset Ref. 1221D901D1301C09). This was observed in 2009, but does not appear to have deteriorated. Repair work to the vertical cracks is advised to prevent further cracking to the wall.



Vertical crack to second wall protecting road. Photo from 2009 (Asset Ref. 1221D901D1301C09)



Second stage wall, with crack, 16/10/12 (Asset Ref. 1221D901D1301C09)

### Spa Chalet 22/A3

The recurved sea wall between Valley Road and the promontory at the Spa (Asset Ref. 1221D901D1301C26) shows occasional defects throughout, such as washout of joints and erosion to the blockwork surface and some cracked blocks although they appear stable. It is recommended that repointing is undertaken to prevent future washout and further damage. The crest wall, photo below right, has weathering / abrasion damage to some stone blocks that requires attention and missing mortar or cracks in joints.



General view of defence at Spa Chalet  
(Asset Ref. 1221D901D1301C26)



Erosion and weathering to limestone blocks in  
crest wall  
(Asset Ref. 1221D901D1301C26)

**The Spa – 22A/4 to 22B/2**

The beach was relatively high for the inspection of the stone blockwork sea wall at “The Spa”, possibly due to beach management operations moving sand to this area from the Foreshore Road beach earlier in the year. However, the toe apron, which is in locally poor condition was still exposed. A capital improvement works scheme is under development for this frontage, although further deterioration should be closely monitored and action taken if necessary until the scheme can be implemented.



Loose blocks and open joints with failed previous  
repairs blockwork wall  
(Asset Ref. 1221D901D1301C27)



Exposed and abraded toe apron at the Spa  
(Asset Ref. 1221D901D1301C27)



Loose blocks and cracking in crest wall previous  
repairs (Asset Ref. 1221D901D1301C27)



Loose blocks set back in void at toe of wall  
(Asset Ref. 1221D901D1301C27)

The curved plan section of wall, (Asset Ref. 1221D901D1301C28) is in a similar state to the main blockwork wall to the north. There are open joints and cracked blocks throughout especially in south, although there had been repairs to the cracked splash beam since the previous inspection.



Undercutting to the sea wall – photo from 2009 (Asset Ref. 1221D901D1301C28)



Repaired splash beam, but cracks in blockwork below (Asset Ref. 1221D901D1301C28)

The wall at Spa Colonnade, Asset ref 1221D901D1301C29, while in fair overall condition has major spalling and loss of concrete to lower splash beam below infilled openings, see below left. There is also a small void at the toe near to South end.

The low wall with low level promenade shelter, Asset Ref. 1221D901D1302C01 adjacent to the cliff railway is in poor condition and in need of capital improvement works. There are open joints in lower wall and two large areas of missing facing blocks. The concrete rendering to the columns and beams supporting the upper level promenade is cracked with corrosion staining from the reinforcement or steel beams, particularly near the stairs to the upper level. The rear splash wall at the back of the upper level has lost mortar jointing between the stone blocks, see below right.



Abraded and spalling concrete capping to original wall below infilled openings (Asset Ref. 1221D901D1301C29)



Weathering and loss of joints in stone wall at back of high level prom by cliff railway (Asset Ref. 1221D901D1302C01)



Loss of stone facing and undermining of the toe on lower level wall  
(Asset Ref. 1221D901D1302C01)

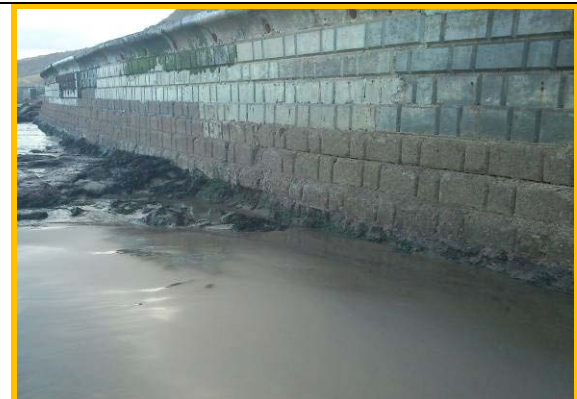


Cracking and corrosion to beams supporting upper level prom.  
(Asset Ref. 1221D901D1302C01)

The low wall at South Cliff Gardens, Asset Ref. 1221D901D1302C02, appears to have had a considerable number of repairs over the last few years, with rebuild of sections of the capping beam and front face apparent, significantly improving condition locally. However this wall is very exposed to storm action, due to its low level, with the crest overtopped on many tides each year, so regular ongoing repairs and continuing to rebuild further failing sections is recommended. The wave overtopping has dislodged the joint sealant between some of the promenade slabs, some of which appear to have settled. There is evidence of undercutting due to the erosion of the relatively soft rock on which the wall is founded in a number of places.



Missing joint sealant in gaps promenade slabs  
(Asset Ref. 1221D901D1303C02)



Repaired upper section of wall, but lower level suffering from abrasion and undercutting  
(Asset Ref. 1221D901D1302C02)

### South Bay Pool MU 22B/5

The lower section of the concrete block wall which has offset, slightly stepped blocks, and that capping beam is showing evidence of significant surface erosion exposing aggregate throughout the defence. It was only possible to inspect parts of the lower wall due to the low tide level, but there were deep voids/ missing joints in the blockwork that need attention. The lower promenade, which is subject to regular heavy wave overtopping, is missing filler between slabs in places. It was apparent that some new slabs had been placed during recent significant repairs, but others are eroded. There was also loss of facing to set back second wall and cracks/spalling to splash beam, although it is noted that a section of the middle level wall had been rebuilt recently. Ongoing repairs and maintenance will be necessary in future due to the age and overall condition of this asset.



Undermining of wall, with voids at South Bay Pool (Asset Ref. 1221D901D1303C02)



Repaired upper section of upper wall adjacent to re-constructed concrete ramp. (Asset Ref. 1221D901D1303C02)

### Holbeck Gardens MU 22B/6

The beach at the Holbeck Gardens defence, was high covering the lower promenade in the centre. This is probably due to its relatively enclosed location between South Bay Pool and the Holbeck cliff landslide lobe. The bastion groyne at the north has cracks throughout the concrete, although there were repairs evident at head of bastion. There are missing / damaged parts of the capping beam to the lower wall. The handrail to the upper promenade is very corroded with missing sections.



Corroded handrail with missing section on upper level prom (Asset Ref. 1221D901D1304C02)



High beach covering lower wall at Holbeck Gardens (Asset Ref. 1221D901D1304C02)

### Holbeck Cliff MU 22B/7

The relatively new rock armour revetment (Asset Ref. 1221D901D1304C01) defending the relict debris flow lobe at the site of the Holbeck Hall landslide remains in good condition, with the armour tightly packed and good coverage. The rock toe was not all inspected due to tide cover. At the southern end of the defence there has been erosion leaving the beach access ramp with a vertical drop to rocks at the end and a crack in the bottom slab.



Vertical drop off ramp at south end of Holbeck revetment (Asset Ref. 1221D901D1304C01)



Rock armour revetment at Holbeck landslide (Asset Ref. 1221D901D1304C01)

### 3.20 Management Unit 23 – Holbeck to Knipe Point

#### *Coastal Slope Condition Assessment*

This Management Unit consists of a large number of units, from MU23/A in the north to MU24/A7 at Knipe Point in the south (Appendix A, Map 7).

**Unit MU23/A** is located immediately south of the Holbeck Hall landslide run-out lobe and is classified as Partly Active. This unit has well-vegetated upper slopes, but the cliff experiences on-going marine action and rockfalls.

**Units MU23/B** is also classified as Partly Active, having been upgraded from Locally Active in 2009. A failure had recently occurred in this unit, with mudslide debris cascading from the top of the cliff to the beach. The cliffs tend to be steep and in some cases undercut by marine erosion.

**Unit MU23/C** remains classified as Locally Active. The unit is well-vegetated with only localised patches of erosion. The cliff toe is steep and eroding.

**Units MU23/D1, MU23/D2 and MU23/D3** are located at Wheatcroft Cliff above Black Rocks. These units are active down much of their length, with on-going recession of the headscarp, slumping in the mid-slope and erosion of the toe. All three units were classified as Partly Active in 2009. **MU23/D2 and 23/D3** have been downgraded to Locally Active in 2012 as activity is more localised than previously seen.



**MU23/A** Erosion of the toe (Partly Active)



**MU23/B** Recent failure of the cliff (Partly Active)



**MU23/C** Ongoing marine driven erosion is evident on this unit (Locally Active)



**MU23/D1** failed blocks at the toe of the cliff (Partly Active)



**MU23/D2** The failed material is evident on the shore (Partly Active)



**MU23/D3** Joint bound blocks in the cliff face (Locally Active)

**Unit MU23/E** is located at White Nab and remains classified as Locally Active. The slopes of this unit support some vegetation cover with intermittent areas of more intense erosion mid-slope and at the unit toe.

**Unit MU23/F** is a narrow, thin unit which follows a small valley occupied by a outflow channel for a pipeline and pumping station. The slopes are well vegetated and show very little evidence of recent activity. As a result, this unit is classified as Inactive.



**MU23/E** Vegetation and localised erosion (Locally Active)



**MU23/F** Engineered channel with little evidence of activity (Inactive) (photo from 2009)

**Units MU23/G1 and MU23/G2** form the northern part of Frank Cliff and are both classified as Partly Active. The upper slopes of these units support some vegetative cover. The unit toes are highly active with evidence of rockfalls, slumping and sliding onto the beach below. This classification represents an increase in activity observed within unit MU23/G1 between the 2008 and 2009 walkover surveys.

**Unit MU23/H** forms the headscarp and upper zone of a large mudslide embayment at Frank Cliff. It is largely well vegetated with local areas of erosion and is therefore classified as Locally Active. **Unit MU23/H2** formed the main body of the mudslide. It has a greater level of activity, with less vegetation cover and is classified as Partly Active. The mudslide toe is formed of a series of smaller mudslides forming **units MU23/H1, MU23/H2a, MU23/H2b and MU23/H3** all of which were classified as Totally Active in 2009. Units **MU23/H1, MU23/H2a, MU23/H2b** have been reclassified to Partly Active for H1 and H2a and Locally Active for H2b to reflect the reduction in activity observed in 2012.



**Unit MU23/I** comprises the main body of of the Cornelian cliff mudslide and is classified as Partly Active. Although the majority of this unit is densely vegetated, there is evidence for



recent activity at the headscarp, which has experienced localised slumps. **Units MU23/I1, MU23/I2 and Mu23/I3** form smaller mudslides at the toe of unit 23/I. MU23/I1 is Partly Active while MU23/I2 and I3 are Locally Active.

**Unit MU23/I4** situated on the north side of the Knipe Point headland and is composed of soft glacial material. The unit was classified as Totally Active in 2009, when the retreating cliffs of this unit were almost entirely affected by intense erosion, with little vegetative cover. The unit is more stable in 2012 and has been reclassified as Locally Active.



**MU23/I1** Densely vegetated upper part of Cornelian cliff (Partly Active)



**MU23/I2 and I3** Less active toe unit within Cornelian Bay (Locally Active)



**MU23/I4** Recent headscarp activity between Cayton and Cornelian Bays (Locally Active)

**Unit MU23/J** is also located on the north side of Knipe Point. This unit is composed of hard, well jointed rock and is classified as Locally Active. There has been a small recent fall, which is shown in the photograph.

**Units MU24/A8 and MU24/A7** are situated on the east and south facing sides of Knipe Point respectively and are both classed as Partly Active. The unit frontages are almost entirely exposed and experiencing intense erosion. There is some evidence of past rockfall activity.

The units within this Sub-Management Unit have not experienced a change in activity between the 2009 and 2012 walkover surveys.



**MU23/J** Rock face of the north side of Knipe Point (Locally Active)



**MU24/A7 and A8** Exposed slopes (Partly Active)

*Coast Protection Asset Condition Assessment*

There are no coastal defence assets within this Management Unit.

### **3.21 Management Unit 24 – Cayton Bay**

*Coastal Slope Condition Assessment*

This Management Unit is divided into 2 Sub-Management Units (Appendix A, Map 1):

**Mu24A – Cayton Bay North**

This Sub-Management Unit consists of **units MU24/A and A2, MU24/B and MU24/B1 to B10.**

**Unit MU24/A** comprises the main body of the Cayton Cliff landslide complex that reactivated during 2008-2009. Significant recession of the headscarp was occurred in this event, resulting in the loss of land and properties at Knipe Point Drive. During 2009, headscarp recession and activity within the body of the landslide had reduced resulting in a classification of Partly Active. Activity has reduced more by 2012, with only localised activity noted at the toe and headscarp, and no evidence for movement noted in the body of the landslide. The unit is therefore considered to be Locally Active.

**Unit MU24/B** forms the main part of the Tenants' Cliff landslide and is classified as Inactive. The toe of Tenants' Cliff is comprised of a number of smaller landslide units **MU24/B1 to B10**, which are all classified as Locally Active. There is variable vegetation cover within these units and evidence of localised erosion and occasional rockfall. None of these units have changed activity status since the 2009 walkover survey.



**MU24/A** The toe of Cayton Cliff is Partly Active



**MU24/B and B1 to 10** Tenants' Cliff upper slopes are inactive. Units at the toe are Locally Active.

### **Mu24B – Cayton Bay South**

This Sub-Management Unit consists of **units MU24/C to MU24/T**.

**Units MU24/C, MU24/D and MU24/E** are located just southeast of the Pumping Station in Cayton Bay and are cut into the soft till cliffs. All units show active recession of the headscarp and slumping and cracking mid-slope. At the unit toes there is evidence of slumping and erosion. These units have had their classification changed from Partly Active to Locally Active.

The small embayments of **units MU24/F and MU24/G** are well vegetated with localised erosion at the toe and the headscarp. They are both classified as Locally Active.

**Unit MU24/H** comprises the access route to the beach at Cayton Bay. The slopes of this unit are engineered and well vegetated, with no obvious signs of recent activity. Therefore this unit is classified as Inactive.

**Units MU24/I, MU24/J, MU24/K and MU24/L** are located above Cayton Sands and classified as Locally Active. Within these units there is localised recession at the headscarp and erosion mid-slope. Vegetation cover is variable.

Between **units MU24/M1 and MU25/T**, all units are classified as Partly Active. **Units M1, M2, N, O, P and Q** are cut within the soft glacial sediments and as a result are characterised by a retreating cliffline, slumping and sliding down most of the unit lengths and an eroding toe. At **unit MU24/R**, the cliff becomes much higher, steeper and is composed of a more resistant geology. The mechanism of erosion changes accordingly, so that within units **MU24/R, S and T** the dominant processes are now rockfall and weathering. The classification of **MU24/R** as Partly Active represents an increase in activity level for this unit. Only MU24/O has changed activity class from Totally Active in 2009 to Partly Active in 2012.

The activity status most of the cliff units is unchanged since 2009.



**MU24/C** A slump of material which is becoming more vegetated and stable (Locally Active)



**MU24/D** Toe slumping which is more stable than during the last inspection (Locally Active)



**MU24/E** Looking south (Partly Active)



**MU24/F and G** Well vegetated slopes (Locally Active)



**MU24/H** Access route to Cayton Sands (Inactive)



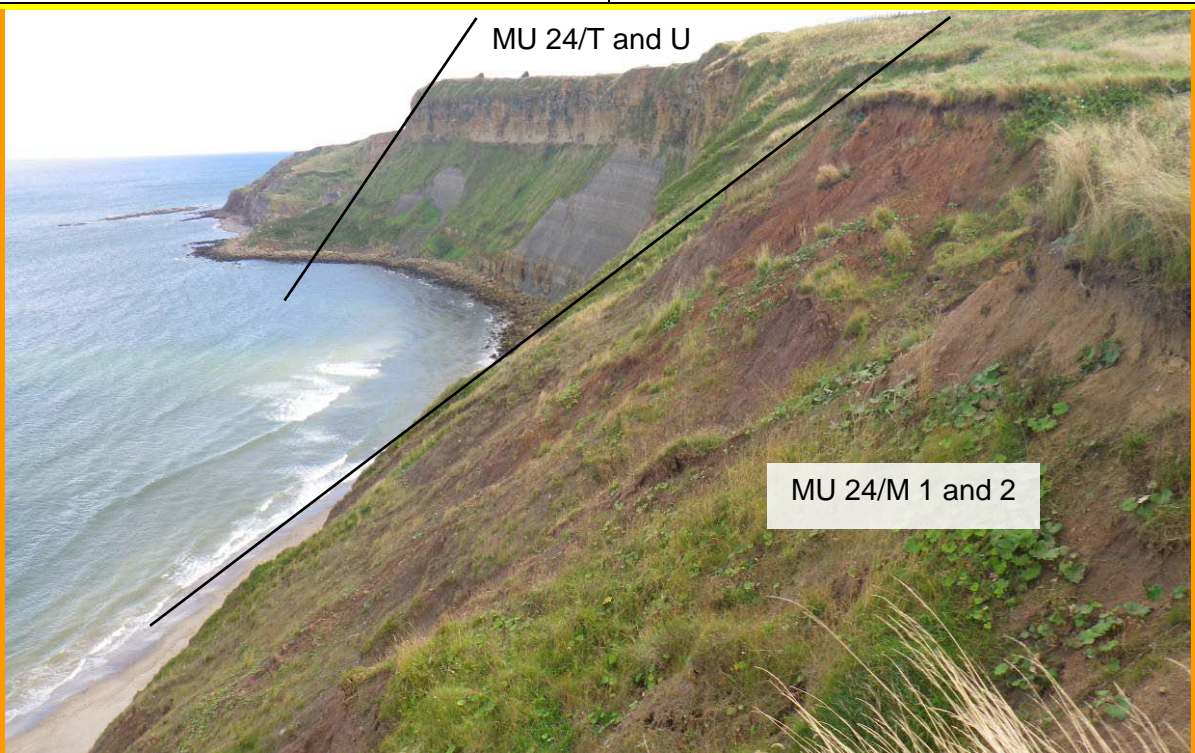
**MU24/J** Localised headscarp recession (Locally Active)



**MU24/K** The slope has patchy vegetation (Locally Active)



**MU24/L** Localised headscarp recession (Locally Active)



**MU24/M1 and 2 to MU U** The slope has patchy vegetation with localised areas of erosion and bare rock. The majority of the units are Partly Active with the exception of MU U, which is Locally Active.

*Coast Protection Asset Condition Assessment*

**Mu24A – Cayton Bay North**

There are no coastal defence assets within this Sub-Management Unit.

**Mu24B – Cayton Bay South**

Cayton Bay is predominantly a natural bay mostly free from coastal defences. However, there are a series of defences at Cayton pumping station, which extend to the beach access ramp to the south (Appendix B, Map 6).

To the north of the pumping station (which is now converted to a private residence) is a private blockwork defence with concrete toe slab, Asset Ref. 1221D901D1402C02, which ties into the eroding cliffs to the north with a mixture of brick, stone blocks and concrete, see below left. This wall is in fair condition and appears newer than the wall to the south, although the toe apron is undermined with voids beneath that need attention.

There are a complex series of private blockwork and concrete sea walls (Asset Ref. 1221D901D1402C05) protecting the main pumping station building. The condition of the defences varies from good to very poor and relates to the height from the high water mark. The higher, red brick walls appear sound. The lower, concrete and sandstone blockwork is in fair condition with evidence of quite recent repairs to joints. A patchwork of repair work is visible to the blockwork (see photo below right). The lower apron has had recent cosmetic repairs with poured concrete that appears to have been tipped from above. However, the toe appears undercut in places. There appear to have been many repairs since the last inspection but due to the age, exposure and patchwork nature of the defence there will be a need for ongoing maintenance repairs to prevent defects expanding and destabilising the overall wall.



Tie in of Pumping station defences at north end  
(Asset Ref. 1221D901D1402C02)



Walls protecting former pumping station  
(Asset Ref. 1221D901D1402C05)

Between the southern end of the pumping station defences and the beach access point there is a derelict length of defence, Asset Ref. 1221D901D1402C04, which exhibits major undercutting, blockwork washout, parts of upper wall missing and significant damage. It is advised that the failed southern part of this defence should be made safe or removed in accordance with the SMP policy.



Large voids to makeshift defences to the south of the pumping station (Asset Ref. 1221D901D1402C04)



South end defence of the pumping station (Asset Ref. 1221D901D1402C04)

The last defence to the south is the concrete structure at the public beach access point. This is in a failed condition with large cracks and voids throughout (Asset Ref. 1221D901D1402C06). Repair work consisting of a concrete skim over the voids on the deck is apparent, although the structure remains unsafe. It is recommended that this structure is demolished and removed and replaced with a simple safe public access ramp set further back.



Difficult public access at failing beach defence (Asset Ref. 1221D901D1402C06)



Voids beneath and failing front face at defence at beach access south of the pumping station (Asset Ref. 1221D901D1402C06)

Around 300m south there is a beach access point for the path from the public car park at the surf shop. There are a set of beach access steps that were previously protected by gabion baskets, which distorted and split under wave action and / or cliff movement, see below left and right. This is not a formal coastal defence, so has no asset number.



(Failed gabion baskets at south beach access)



(Failed gabion baskets at south beach access)

### 3.22 Management Unit 25 – Lebberston Cliff and Gristhorpe Cliff

#### *Coastal Slope Condition Assessment*

This Management Unit consists of units **MU25/U** at Lebberston Cliff to **MU25/AE** at the eastern end of Gristhorpe Cliff (Appendix A, Maps 7 and 8) .

**Unit MU25/U** is located above Red Cliff Hole and is classified as Locally Active. The steep cliffs are characterised by localised areas of erosion, but are otherwise fairly well vegetated. This classification has remained the same since the 2009 walkover survey.

**Unit MU25/V** is located at Lebberston Cliff and comprises a large, periodically active mudslide system. The unit appears to be prone to regular change and recession, although it appears to have stabilised somewhat since the 2009 walkover. This unit was Totally Active in the 2009 walkover but it has now been downgraded to Partly Active.

**Unit MU25/W** is situated at Red Cliff Point and is classified as Locally Active again in 2012. The slopes of this unit are well vegetated with localised cracks and freshly slumped material.



**MU25/U** Steep, exposed rock cliffs (Locally Active)



**MU25/V** Upper part of active mudslide system (Partly Active)





**MU25/W** Headscarp recession and patchy vegetation (Partly Active)

**Unit MU25/X** is classified as Partly Active, as it was in 2009. Despite being well vegetated, the slopes of this unit appear to be subject to ongoing instability, with evidence of mudsliding and recession at the headscarp.

**Units MU25/Y and MU25/Z** are located at the northwest end of Gristhorpe Cliff and are classified as Partly Active. These units are characterised by localised areas of activity, with headscarp recession, slumps in the mid-slope and on-going erosion of the toe. Both units were previously classified Locally Active in the 2009 walkover survey.

**Unit MU25/AA** was previously an area of mudslide activity and headscarp recession and was classified as Totally Active in 2009. In 2012 the activity has less marked and the unit is now classed as Partly Active. The soft till cliff is being eroded at the headscarp with slumping and sliding mid-slope. Marine erosion is apparent at the cliff toe.



**MU25/X** Toe erosion and shallow slumping (Partly Active)



**MU25/Y** Headscarp recession and mid-slope activity (Locally Active)



**MU25/Z** Mudslide head formed on the cliff top following heavy rainfall (Partly Active)



**MU25/AA** Mudsliding and patchy vegetation cover (Partly Active)

**Units MU25/AB and MU25/AC** form the main part of Gristhorpe Cliff and are adjacent to a caravan park. The upper cliff slopes are composed of soft glacial sediments and experience localised slumping, with headscarp recession. The face of the cliff is steeper with active erosion and formation of debris aprons. Unit MU25/AB is Partly Active, while MU25/AC is Locally Active, having been downgraded in 2012 from Partly Active.

**Units MU25/AD and MU25/AE** are similar in form to adjacent units MU25/AB and AC. However, the lower slopes of these units appear more stable than those of the adjacent units, and support more continuous vegetation cover. There is some erosion of the headscarp and localised areas of more intense erosion on the lower slopes. These units are classified as Locally Active, with no change since 2009.



**MU25/AB** Upper vegetated slopes (Partly Active)



**MU25/AC** Steep, exposed lower cliffs (Partly Active)



**MU25/AD** Erosion affecting the top of the cliff (Locally Active).



**MU25/AE** A vegetated cliff with only localised signs of erosion (Locally Active).

*Coast Protection Asset Condition Assessment*

There are no coastal assets within this Management Unit.

### 3.23 Management Unit 26 – Newbiggin Cliff and North Cliff

*Coastal Slope Condition Assessment*

This Management Unit comprises **unit MU26/AF** in the northwest to **unit MU26/AX** just to the west of Filey Brigg (Appendix A, Map 8).

**Units MU26/AF, MU26/AG and MU26/AH** are located at The Wyke, to the west of Newbiggin Cliff and are all classified as Locally Active, as they were in 2009. These units are characterised by a soft till overlying resistant rock cliff that is fronted by a debris apron. There is minor, localised activity within the till capping including recession of the headscarp in places. The rock cliff is largely stable, but the debris apron shows evidence for recent rock falls and is subjected to marine erosion.

**Units MU26/AI and MU26/AJ**, form the western part of Newbiggin Cliff and are both classified as Partly Active, as they were in 2009. These units are of a similar form to the adjacent Locally Active units, described above. However, they are characterised by a greater level of activity within both the upper and lower cliff layers and less continuous vegetation cover.

**MU26/AK and MU26/AL** have both been downgraded from Partly Active in 2009 to Locally Active in 2012. Both units are heavily vegetated and stable.



**MU26/AG** Rockfall evidence at the unit toe (Locally Active)



**MU26/AH** The soft upper layer of this unit (Locally Active)



**MU26/AI and AJ** large vegetated debris aprons dominate these units. There is activity in these aprons and the overlying cliffs. Localised toe erosion is also seen (Partly Active)



**MU26/AK** The vegetated upper cliff (Locally Active)



**MU26/AL** The vegetation on the top and mid-cliff (Locally Active)

**Units MU26/AM, MU26/AN and MU26/AO** form the main part of Newbiggin Cliff and are classified as Locally Active. These cliffs are again characterised by a soft upper layer, a hard rock middle layer and series of debris cones at the unit base. There is localised activity within these units, especially within the soft upper layer.

**Unit MU26/AP** is classified as Partly Active, as it was in 2009. These units feature localised erosion of the soft upper till layer and a largely exposed, vertical lower layer. This lower layer is devoid of vegetation cover and is subject to marine erosion at the toe.

**Unit MU26/AQ** is classified as Locally Active, having been downgraded from Partly Active in 2009. There is vegetation on the upper and the talus slopes but the cliff face is exposed and eroding.

**Units MU26/AR to MU26/AX** form the main part of North Cliff with all units assigned the Locally Active status during the 2009 and 2012 walkovers. Only MU26/S has changed classification by being upgraded to Partly Active, to reflect the observed headscarp recession. The upper part of the cliffs, comprised of soft glacial sediment is exhibiting localised erosion in the form of headscarp recession and mud sliding. There is localised marine erosion of the toe.

Except where stated, none of the units within this Management Unit have changed activity status since 2009.



**MU26/AM to MU26/AN** Locally Active.



**MU26/AO** Locally Active, with vegetated upper slopes



**MU26/AP** Partly Active, with vegetated upper slopes



**MU26/AQ** Exposed, vertical lower cliff (Locally Active)



**MU26/AR** Three-tiered stratigraphy (Locally Active)



**MU26/AX** Localised erosion of upper soft till layer (Locally Active)

*Coast Protection Asset Condition Assessment*  
There are no coastal assets within this Management Unit.

### 3.24 Management Unit 27 – Filey Brigg

#### *Coastal Slope Condition Assessment*

This Management Unit comprises units **MU27/AY to MU27/O** on the northern and southern sides Filey Brigg (Appendix A, Map 8).

**Unit MU27/AY** has a similar form to those units described in Management Unit 26, with till overlying rock cliffs and is classified as Locally Active. The upper slopes are well vegetated with intermittent zones of activity in the form of headscarp recession and rilling of exposed sediment. The classification is the same as in the 2009 walkover survey.

**Unit MU27/AZ** is very similar to unit MU27/AY but has the higher classification of Partly Active. This is because the upper slopes of this unit show more widespread activity and less continuous vegetation cover.

**Unit MU27/BA** was classified as Totally Active in 2009 as the headscarp was affected by recent recession and mud sliding, but has changed to Partly Active in the current survey.

**Units MU27/BB to MU27/BD** are located on the northern side of Filey Brigg and are all Partly Active. The upper slopes of these units support some discontinuous vegetation cover. Headscarp recession, localised mudslides and rilling are common in the upper till unit. None of these units have changed classification since 2009.

**Unit MU27/BE and 27/BF** are located on the northern side of Filey Brigg but are less active than adjacent units. The upper slopes are generally well vegetated with only localised areas of erosion. Therefore, these units are classified as Locally Active. MU27/BE has been downgraded from Partly Active while 27/BF was Locally Active in 2009.

**Units MU27/A and MU27/B** are located at the tip of Filey Brigg, both are all classified as Partly Active. These units are composed entirely of the soft glacial material which particularly susceptible to erosion. Despite some vegetation cover, there is frequent mud sliding within these units. These units were also classified as Partly Active in the 2009 walkover survey.

**Units MU27/C to MU27/I** are located on the south side of Filey Brigg, which has a thicker cover of till than the north side, due to the southerly dip of the bedrock. All units are classified as Locally Active. These units support much more continuous vegetation cover than those units on the north of the Brigg. There is localised activity mid-slope and erosion of the unit toes which is likely to result from marine action. All of these units were classified as Locally Active in 2009 with the exception of 27C and 27D, which were Partly Active in 2009.

**Units MU27/J and MU27/K** are also located on the south side of the Brigg. These units are undergoing quite intense erosion down much of their length and are therefore classified as Partly Active, as they were in 2009.

The southwest corner of Filey Brigg comprises units **MU27/L to MU27/N**, all of which were classified as Totally Active in 2009 and 2012. These units are almost entirely affected by intense erosion and mudsliding.



**MU27/AY and AZ** Well vegetated upper slopes  
(Locally Active and Partly Active)



**MU27/BA** The failure which had been observed in 2009 is now beginning to stabilise (Partly Active).



**MU27/BB** Mass failure of upper layer  
(Partly Active)



**MU27/BC** Slumping, sliding and rilling  
(Partly Active)



**MU27/BD** Erosion of the sea cliffs with a (Partly Active)



**MU27/BE** The vegetated slopes are showing signs of slippage and ongoing coastal erosion (Locally Active)



**MU27/BF** Well vegetated upper slopes (Locally Active)



**MU27/A** Cracking and slumping activity (Partly Active)



**MU27/B** The toe is protected to some extent but the cliff slope continues to erode (Partly Active)





**MU27/C to I** Vegetated upper slopes on the south side of Filey Brigg (Locally Active)



**MU27/J to MU27/N** Continuing denudation of Filey Brigg, with gullies and mudslides evident in the thick glacial sediments (Partly Active and Totally Active)

#### *Coast Protection Asset Condition Assessment*

There are no formal coast protection structures in this unit. However, at the East end of Filey Brigg a cabin structure and wall exists tucked away against the cliffs. The structure comprises of a blockwork wall, poured concrete apron and blockwork cabin build onto the cliff strata. The previous inspection noted that undercutting is occurring to the apron as well as washout of the joints to the wall, the cabin is in structurally sound condition. Access is restricted due to the eroded path leading to the asset and as it is not a formal coast protection asset it was not inspected as such in the 2012 asset inspections. There is a photo of the structure from the cliff inspection on the previous page at MU27/B.

### **3.25 Management Unit 28 – Filey Bay North**

#### *Coastal Slope Condition Assessment*

This Management Unit is divided into 2 Sub-Management Units (Appendix A, Map 8):

#### **Mu28A – North of Filey Town**

This Sub-Management Unit consists of **units MU27/O to MU27/X**, located to the north of Filey town.

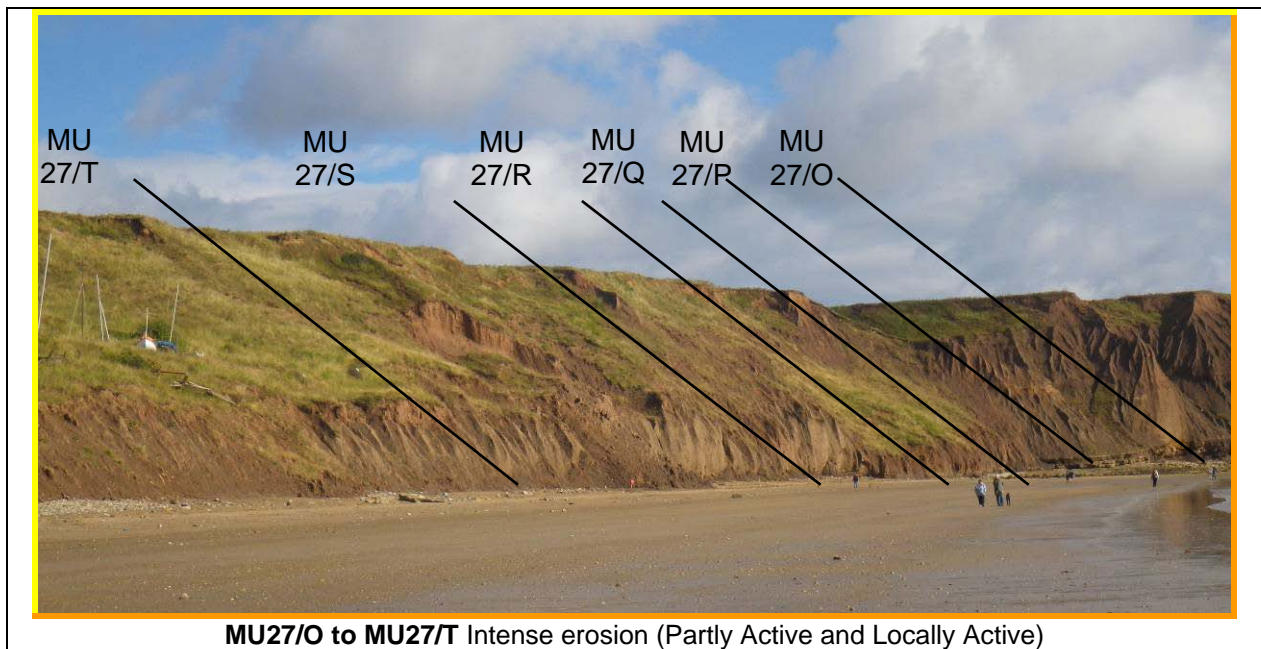
**Units MU27/O to MU27/S** are situated below the North Cliff Country Park and are classified as Partly Active, with the exception of **MU27/R**. These cliffs are composed of glacial sediment

and are undergoing erosion down much of their length. This erosion is particularly intense at the steep unit toe area where the cliffs are subject to marine action. Up slope, there is greater vegetation cover with areas of sliding, cracking and recession at the unit heads. Unit **MU 27/O** was classified as Totally Active in 2009, this has been downgraded to Partly Active in 2012. Unit MU27/R was Partly Active in 2009 and has been reclassified as Locally Active in 2012. The remainder of the above units retained their activity classification. A failure occurred in the lower half of unit 27/S during 2012, resulting a debris lobe being deposited on the beach.

**Units MU27/T and MU27/U** are located in the vicinity of Filey sailing club and are classified as Locally Active. These units are better vegetated than those Partly Active units to the north, yet feature localised common areas of erosion. There is minor activity at the unit head scarps and toes, with some slumping and sliding mid-slope. Both units were Locally Active in 2009 and again in 2012.

**Unit MU27/V**, is located just south of the sailing club. The unit was classified as Partly Active again in 2012. This unit is lacking in vegetation cover, has an eroding headscarp and is heavily rilled and gullied.

**Units MU27/W and MU27/X** lie immediately north of Filey town. Vegetation cover of these units is variable, with localised areas of activity throughout. There is ongoing recession at the headscarp and erosion of the toe by marine activity. These units are classified as Locally Active in 2009 and 2012.



**MU27/O to MU27/T** Intense erosion (Partly Active and Locally Active)



**MU27/U** entry to the sailing club (Locally Active)



**MU27/V** Slopes around Filey sailing club (Partly Active)



**MU27/W** entry to the sailing club (Locally Active)



**MU27/X** entry to the sailing club (Locally Active)

*Mu28B – Filey Town Frontage*

This Sub-Management Unit consists of **units MU28/Y and MU28/Z** at Filey town.

Much of the town frontage lies within **unit MU28/Y**. There are no signs of activity on the coastal slopes and this unit continues to be classified as Inactive.

**Unit MU28/Z** is located at the southern end of Filey and is also classified as Inactive. Recently, significant slope stabilisation works have been undertaken within the ravine. This unit was downgraded from Locally Active, its classification in 2009.



**MU28/Y and Z** The Filey frontage does not show any signs of slope failure (Inactive).

*Coast Protection Asset Condition Assessment*

**Mu28A – North of Filey Town**

To the north of the town, Filey Sailing Club is located at the back of the beach and is protected by some coastal defences. The section of cliff below the boat park (which is located on a terrace part way up the cliff) north of the club building is undefended, but the eroding face is littered with geotextile debris from previous slope stabilisation works that have failed, see below left.

Immediately north of the Sailing Club piled defences there was formerly a defence structure (Asset Ref. 1221D901D1601C02) that consisted of timber breastwork retaining rock armour. This defence has failed and is now totally ineffective with debris scattered on the beach, see photo below right.



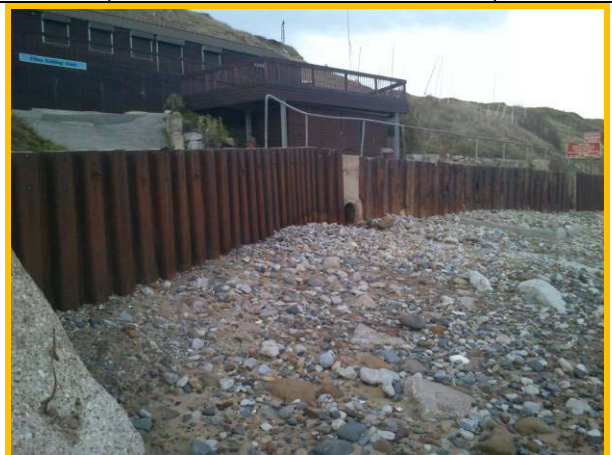
Debris from former slope stabilisation works being eroded at Filey sailing club boat park  
(Asset Ref. 1221D901D1601C01)



Debris from failed defence and former slope stabilisation at Sailing Club.  
(Asset Ref. 1221D901D1601C02)



Centre section of sheet piling below Sailing Club house in failed condition.  
(Asset Ref. 1221D901D1601C03)



Newer section of sheet piling at Sailing Club ramp on left of photo.  
(Asset Ref. 1221D901D1601C03)

The piles at the northern end of the Sailing Club (Asset Ref. 1221D901D1601C03) show surface corrosion but are generally in a sound condition. However the central section of piles are badly corroded with large holes and in need of repair. Since the 2009 inspections the piles at the side of the concrete slipway giving access to the beach to the south have been replaced. The new piles show surface corrosion but are generally sound. The natural accumulation of pebbles in front of the structures will inevitably lead to abrasion damage so this must be an ongoing problem. Minor repair work is needed to the slipway where there are cracks between construction slabs.

#### **Mu28B – Filey Town Frontage**

The Filey Town frontage is protected by a sea wall just over 1km in length between Cobble Landing in the north and Martin's Gill at the south and is split into 9 asset lengths. The sea wall is generally in fair condition although it shows evidence of minor, localised defects including cracks and chipping within the capping beam, surface erosion and mortar loss. The description of the inspection runs from north to south.

The most northerly asset in the defence system consists of the rear wall and slipway at Cobble landing (Asset Ref. 1221D901D1602C01). There are some areas missing or eroded joints in slipway blockwork. In the rear wall below the chalets there is a long horizontal crack in wall and a large void in centre of wall near the ramp at the north end of chalets.



Rear wall set back behind slipway at Cobble Landing (Asset Ref. 1221D901D1602C01)



Missing grout in sections of cobbles in slipway (Asset Ref. 1221D901D1602C01)

Between the northern slipway at Cobble Landing and the slipway at the end of Ravine Road the seawall is split into two assets. The northern asset, 1221D901D1602C09, is essentially a breakwater or wing wall protecting the slipway. This section of wall is in need of repair as it has a major crack and section of loose blocks, see photo below right. The toe apron is also exposed and appears to be undercut, below top left, although the foundation details are not know.



Photo from 2009 inspection of crack at Cobble Landing – (Asset Ref. 1221D901D1602C09)



Cracks in wall and loose blocks adjacent to slipway 08/11/12. (Asset Ref. 1221D901D1602C01)



Exposed and undercut toe apron at Cobble Landing  
(Asset Ref. 1221D901D1602C09)

The main part of the wall to the south, Asset ref. 1221D901D1602C06 is in good overall condition, although here are areas of damage that have been previously repaired, see photos below lower right and left.



Damaged blocks at ramp with evidence of previous repairs. (Asset ref. 1221D901D1602C06)



Small vertical crack in wall that has been repaired previously. (Asset ref. 1221D901D1602C06)

The section of wall between Ravine Road and the access point east of Cargate Hill Road is Asset ref. 1221D901D1602C08. This section is in fair overall condition, although some blocks have abrasion damage to the front face, particularly near beach level. Several of the coping blocks are cracked, and drainage flap valves are partly covered with sand due to the beach level. At both slipway access points there are open joints in the slipway blocks that need re-pointing.



General view of wall showing repaired coping wave return blocks and abrasion damage to blocks near beach level. (Asset Ref. 1221D901D1602C08)



Pedestrian bridge at access slipway from Cargate Hill. Corrosion to bridge and open joints in slipway blocks need attention. (Asset Ref. 1221D901D1602C08)

From the promenade pedestrian bridge at Cargate Hill to the next access point at Crescent Hill the wall (Asset Ref. 1221D901D1602C03) is in fair condition. There are several new or repaired coping splash beam blocks, but more are cracked. The lower handrail is loose where it joins the footbridge and needs re-fixing. The upper coping near the handrail up-stands is chipped and damaged in many locations. There is abrasion damage to the front face of many blocks and several of the drainage outlets are blocked due to beach levels



General view of wall looking north. (Asset Ref. 1221D901D1602C03)



Damaged coping and splash beam (Asset Ref. 1221D901D1602C03)

The next defence asset to the south is the wall around the promontory, Royal Parade, Asset ref. 1221D901D1602C04. This section of wall is again in fair overall condition, although it is slightly more exposed to wave action than the wall to the north. There was noted to be missing mortar at some of the joints in the coping blocks and between some of the blocks in the main wall and some of the block faces are damaged. There was evidence of some temporary repair works to cracks and joints with what appeared to be mastic. The treads on the access steps are becoming abraded and will require attention in future.



Exposed aggregate on access steps (Asset Ref. 1221D901D1602C04)



Repaired section of toe with chipped block adjacent. (Asset Ref. 1221D901D1602C04)

The section of the wall between the two small promontories, Asset ref. 1221D901D1602C07 is again in fair condition. There is cracking to splash beam in several areas and numerous chipped / damaged blocks. There is a vertical crack in the buttress to the southern set of steps.



Sea wall with minor, localised defects (Asset Ref. 1221D901D1602C07)



General view of wall showing area of damaged blocks and previous repairs to coping / splash beam. (Asset ref. 1221D901D1602C07)

The southernmost section of the main wall including the southern promontory and the return section to Martin's Gill is Asset ref. 1221D901D1602C05 is again overall fair. However, there is chipping and cracking to the coping in small areas throughout length. Numerous lower blocks from beach level to 2m up are damaged on front face. There is a horizontal crack on seaward section extending along 8 blocks. The toe is exposed on seaward section and the beach is lower on the south facing part where there are a number of damaged toe blocks. As the low beach levels here may be exacerbated by the discharge from the outfall it is suggested that consideration could be given to extending the scour apron to seaward and diverting the flow away from the wall toe.





View of south end of wall and discharge from outfall. Damaged toe blocks to wall on right. (Asset Ref. 1221D901D1602C05)



Horizontal crack in upper wall on southern promontory. (Asset Ref. 1221D901D1602C05)

A short section of rock revetment with gabion baskets beneath is located at the southern end of Filey Seawall near Martin's Gill, (Asset Ref. 1221D901D1602C02). This defence extends into Sub-Management Unit Mu29A and is to manage the interface between the hard defences to the north and eroding natural cliff to the south. The rock armour has degraded again since the previous inspection. The rock is in a single layer and is stacked near vertically, so is unstable, particularly as the slumping cliffs behind may be pushing rock over. There were two areas of collapse - at the centre and at the south end. The rock needs rebuilding with additional rock to a more stable profile.



Rock revetment with gabion baskets beneath. Photo from 2009 inspections. (Asset Ref. 1221D901D1602C02)



Rock revetment with gabion baskets beneath. 09/11/2012. (Asset Ref. 1221D901D1602C02)



General view of rock armour at interface with natural cliff (Asset Ref. 1221D901D1602C02)



Collapsed section of rock and slumping cliff behind. (Asset Ref. 1221D901D1602C02)

### 3.26 Management Unit 29 – Filey Bay

#### *Coastal Slope Condition Assessment*

This Management Unit is divided into three smaller Sub-Management Units, as follows (appendix A, Maps 8 and 9):

#### **MU29A – Muston Sands**

This Sub-Management Unit comprises **units MU29/AA to MU29/AI** along Muston Sands. None of these units have changed activity level since 2009.

**Units MU29/AA and MU29/AB** are located immediately south of Filey town and are classified as Locally Active. Despite the presence of some rock armour protecting the toe of **unit MU29/AA**, there are very common areas of intense erosion and active recession of the headscarp. **Unit MU29/AB** is not defended at the toe and is steep and undergoing active erosion as a result. Both units were classified as Partly Active in the 2009 walkover survey.

**Units MU29/AC to MU29/AI** extend southwards to Mile Haven and are all classified as Locally Active. These relatively shallow cliffs are cut into soft glacial sediments that are vulnerable to erosion. They are generally well vegetated however, with only localised areas of erosion. For example, the unit toes are steep and exposed with evidence of mudsliding onto the beach. There is recession of the headscarp in places, and some sliding and slumping mid-slope.



**MU29/AA** Very common intense erosion and headscarp recession (Locally Active)



**MU29/AB** Eroding toe and sliding mid-slope (Locally Active)



**MU29/AC** Well vegetated with some toe erosion (Locally Active)



**MU29/AD** Recession of the headscarp (Locally Active)



**MU29/AE** The slope is well vegetated with erosion at the toe and headscarp (Locally Active)



**MU29/AF** Well vegetated with some toe erosion (Locally Active)



**MU29/AG** The slope is showing localised signs of erosion (Locally Active)



**MU29/AH** Heavily vegetated with toe erosion, which is severe in places (Locally Active)



### **Mu29B – Hunmanby Sands**

This Sub-Management Unit consists of **units MU29/AJ** at Mile Haven to **MU29/BE2** at Hunmanby Gap.

**Unit MU29/AJ** is a very small unit located immediately south of the inlet at Mile Haven. It is composed of similar material to those units in Sub-Management Unit Mu29A and is classified as Partly Active. It is characterised by a receding cliff line, slumping and sliding mid-slope and erosion at the toe. This unit has not changed classification since 2009.

**Units MU29/AK to MU29/BA** comprise the area in and around the hamlet of Flat Cliffs, extending southwards to Butcher Haven. All units are continue to be classified as Locally Active. The low lying cliffs are generally well vegetated with localised areas of erosion. On-going racking of roads, walls and footpaths was evident at Flat Cliffs, but there was no observed increase in activity by 2012. Only unit **MU29/AO** changed activity class, from Partly Active in 2009 to Locally Active in 2012 as a mudslide became stabilised.

**Units MU29/BB to MU29/BE** are located between Butcher Haven and Hunmanby Gap and are all classified as Partly Active. These cliffs are generally steeper than those units further north and are characterised by headscarp recession and very common areas of intense erosion. The toes of these units are particularly active with slumping and sliding of materials onto the beach. None of these units have changed classification.

**Unit MU29/BE2** is a newly defined unit at Hunmanby Gap. The cliffs here are relatively shallow and well vegetated. There is localised erosion at the unit toe and some sliding and cracking mid-slope resulting in a classification of Locally Active.

Except where specified, the units within this Sub-Management Unit have not changed activity status since 2009.



**MU29/AJ** Areas of intense erosion at the toe and headscarp (Partly Active).



**MU29/AK** Well-vegetated low lying cliffs (Locally Active).



**MU29/AL and M** Erosion at the toe and headscarp, sliding mid-slope (Locally Active).



**MU29/AN** Toe erosion on an otherwise vegetated slope (Locally Active).



**MU29/AR** Continuing mudslide activity and toe erosion at Flat Cliffs (Locally Active).



**MU29/AS** Continuing mudslide activity and toe erosion at Flat Cliffs (Locally Active).



**MU29/AT** this large unit is showing eroding at the toe with thick vegetation higher up the unit (Locally Active).



**MU29/BA** The small unit at Butcher Haven does not support vegetation on its lower slopes and is undergoing erosion. (Locally Active).



**MU29/BB and BC** Steeper cliffs with very common areas of intense erosion (Partly Active).



**MU29/BD** Slumping and sliding on the beach (Partly Active).



**MU29/BE** Headscarp and toe erosion (Partly Active).



**MU29/BE2** The Hunmanby Gap unit is more stable than the units to the NW (Locally Active).

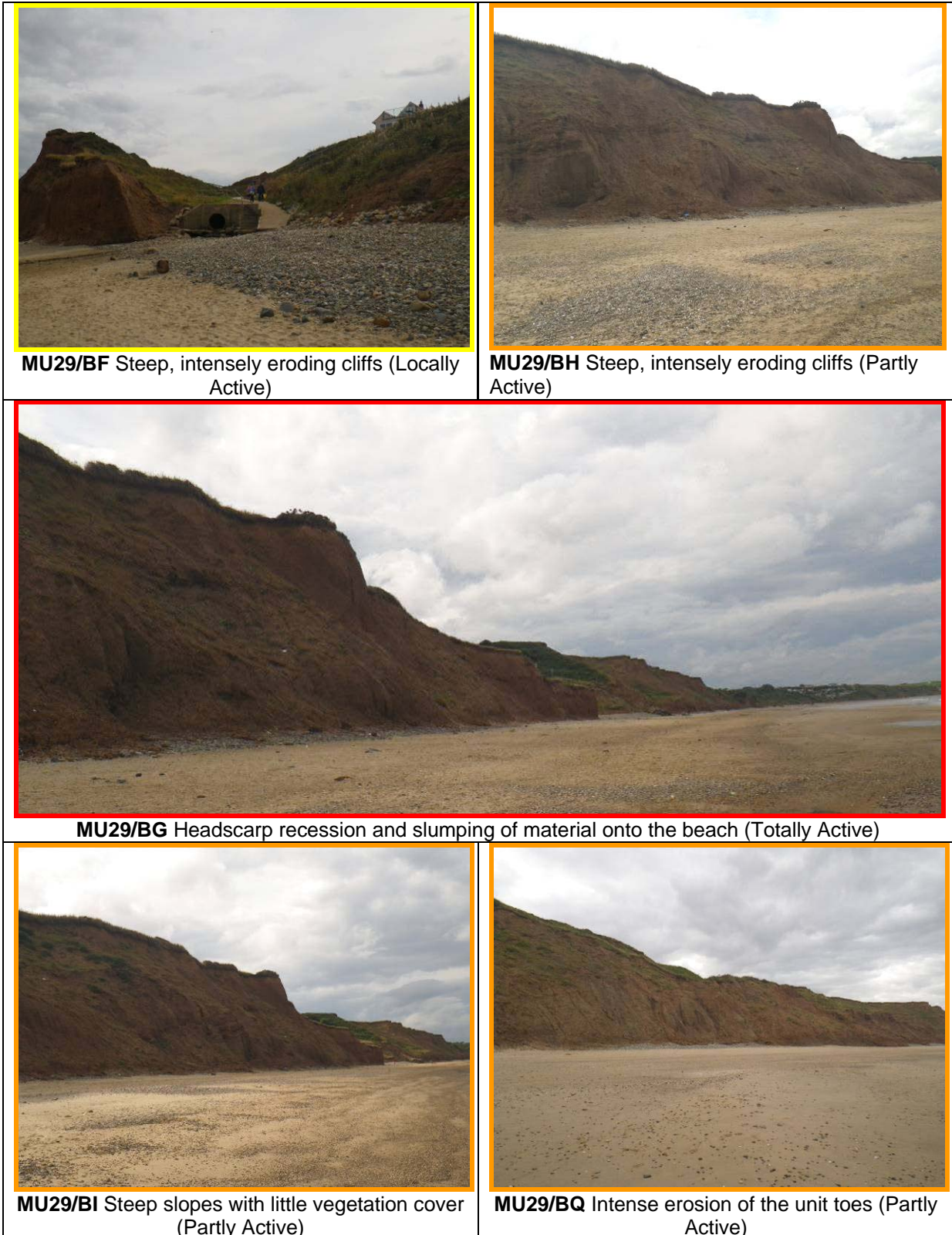
### **Mu29C – Reighton Sands**

This Sub-Management Unit consists of **units MU29/BF** near Hunmanby Gap to **MU29/BQ** below Reighton Moor.

**Units MU29/BF, MU29/BG and MU29/BH** are located just south of Hunmanby Gap. These cliffs are steep and affected by intense erosion down most of their length. The headscarp is retreating and there is some slumping of materials onto the beach. All three of these units

were classified as Totally Active in 2009, MU 29BG is still Totally Active. Both MU 29 BF and BH have been downgraded in 2012 to Locally Active and Partly Active respectively.

Further south, units **MU29/BI to MU29/BQ** are located above Reighton Sands. All of the units are classified as Partly Active, apart from **MU29/BN**, which was classified Locally Active (it is the only unit which has changed classification). These units are characterised by steep slopes which support some vegetation cover. There is recession of the headscarp, common areas of intense erosion mid-slopes and a steep, eroding toe section.



*Coast Protection Asset Condition Assessment*

There are no formal coastal defence assets within Management Unit 29, although the rock revetment and baskets extend into this Sub-Management Unit from Mu28B. See the Coast Protection Asset Assessment section for Mu28B for details. There are no other coastal defence assets within this Sub-Management Unit.

### 3.27 Management Unit 30 – Filey Bay South

*Coastal Slope Condition Assessment*

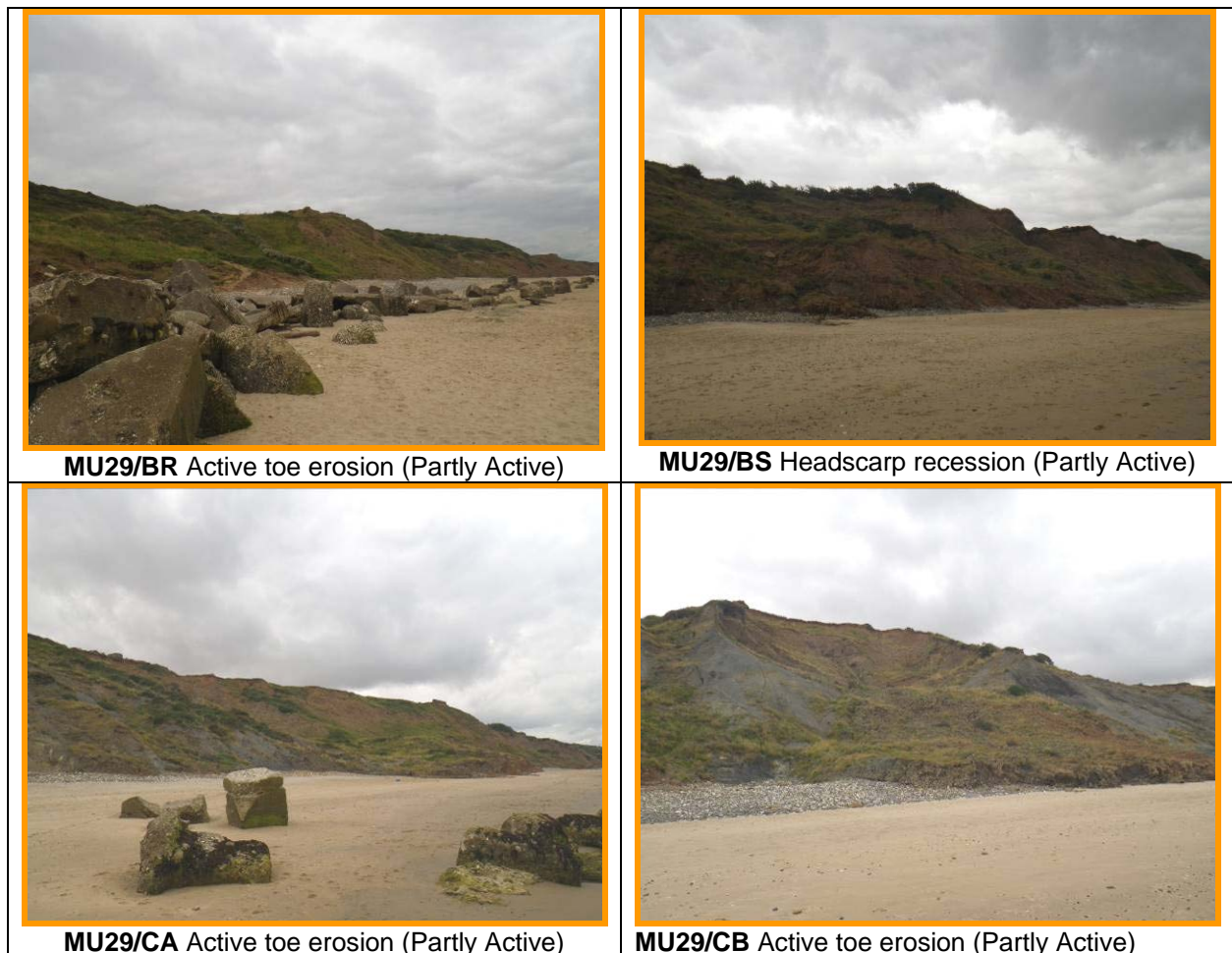
This Management Unit is divided into two smaller Sub-Management Units: MU30A Reighton Gap and MU30B at Speeton Sands (Appendix A, Map 9).

Sub-Management Unit 30A is located beneath the Reighton Sands Holiday Village and consists of **units MU29/BR to MU29/CCa**.

**Units MU29/BR, MU29/BS and MU29/CA** form the majority of this Sub-Management Unit and were Partly Active during the 2009 and 2012 walkover surveys. These units have a limited vegetation cover, and have active mudslides and toe erosion leading to headscarp recession and debris lobes on the beach.

**Unit MU29/CB** forms a small mudslide embayment at the eastern end of the holiday village. The entire unit has active mudsliding and an eroding headscarp. The unit was classified as Totally Active in 2009 but changed to Partly Active in 2012.

**Unit MU29/CCa** forms a shallower and less active embayment than the adjacent MU29/CB. The slopes have failed recently, but the failure is becoming more vegetated, with marine erosion at the toe. The unit was classified as Locally Active in 2009 but this was changed to Totally Active in 2012.







**MU29/CCa** The mudslide system continues to slump onto the beach (Totally Active)

Sub-Management Unit 30B comprises units MU29/CC to MU29/CJ above Speeton Sands.

**Unit MU29/CC** forms a large, shallow, well vegetated embayment known as Middle Cliff. There is localised activity at the unit head and mid-slope. The unit has been upgraded from Locally Active in 2009 to Partly Active in 2012.

**Unit MU29/CD** forms another large shallow embayment which is also well vegetated. Despite this though, the slopes are almost entirely affected by activity in the form of cracking and sliding especially on the mid-slopes. As a result this unit is classified as Partly Active, as it was in 2009.

**Unit MU29/CE** is very similar in form to unit MU29/CC and is classified as Locally Active. The slopes are well vegetated with dense trees and shrubs in places. There is some erosion occurring mid-slope and the headscarp.

**Units MU29/CF to MU29/CI** are located at Speeton Cliffs and are all classified as Locally Active. These units are characterised by outcrops of chalk near the unit toes which are actively eroding onto the beach below. In places the headscarp is near vertical and exposed. All of these units have been downgraded from Partly Active in 2009.

The high chalk cliffs within unit **MU29/CJ** are much steeper than those to the north, with large mantles of slumped material at the unit toe. There is some evidence of rockfall and marine erosion at the cliff base but otherwise the cliffs appear fairly stable. Therefore, this unit was classified as Locally Active in 2009 and 2012.



**MU29/CC** Erosion and mudsliding at Middle Cliff (Partly Active)



**MU29/CD** Mid-slope mudsliding (Partly Active)



**MU29/CE** Actively eroding cliff toe (Locally Active)



**MU29/CF** Actively eroding cliff toe (Locally Active)



**MU29/CG** Actively eroding cliff toe (Locally Active)



**MU29/CI** Actively eroding cliff toe (Locally Active)



**MU29/CJ** Active toe erosion and localised mudsliding (Locally Active)

*Coast Protection Asset Condition Assessment*

There are no coastal defence assets within this Management Unit

## 4 Comparison with Previous Assessments

### 4.1 Coastal Slope Condition Assessment

The change in condition of the cliffs is shown in Maps 1 to 11 in Appendix A. Areas of increased or sustained high levels of activity are summarised below:

#### *Increased Activity*

The majority of the units in the 2012 walkover retained the same activity status as they had in 2009. None of the units had their classification changed from Partly Active to Totally Active between 2008/09 and 2012. Only one unit, MU29/CCa in Filey Bay was increased from Locally Active in 2009 to Totally Active in 2012.

The most common change observed between 2009 and 2012 was reclassification from Locally Active to Partly Active (nine units in total). Areas where the activity classification has increased from Locally Active to Partly Active:

- **MU 25/Y** and **MU25/Z** just south of Cayton Bay
- **MU26/AS** an isolated spot on North Cliff near Filey Brigg
- **MU23/B** south of Holbeck Hall landslide, near Scarborough
- **MU 29/CC** in Filey Bay, which is next to **MU29/CCa**, which increased from Locally Active to Totally Active.
- **MU4/2** in on the eastern side of Staithes where there have been a number of rockfalls in the last year
- **MU 8/1** is south of Runswick Bay.
- **MU 13/5** is south of Saltwick Bay
- **MU17/2** in the middle of Robin Hoods Bay

Notable areas of increased activity during the 2012 walkover survey were found at Filey Bay and Cayton Bay. Other areas of increased activity are shown in Maps 1 to 11 however these are less significant.

#### *Sustained High Activity*

Sustained levels of high activity were observed at the following locations. These units were classified as Totally Active in 2009 and 2012.

- Staithes (MU4/1a) The steep face of Cowbar Nab is subject to large rockfall activity.
- Filey Brigg (Mu27/ L, M and N) Three of the units show ongoing intense erosion and failure of the glacial sediments.
- Hunmanby Gap (MU29/BG): These steep cliffs are almost entirely affected by intense erosion and mudslides.

### 4.2 Coast Protection Asset Condition Assessment

Generally, the condition of the defences has not changed dramatically since the 2009 inspection, with many just suffering from minor erosion. The maps in Appendix B show symbols on the assets that have a change in the overall condition grading. However, in many cases the changes that were noted are to localised sections or elements and have not changed the overall grading. Recent repair work was evident in a number of places and therefore some conditions of the defences improved, with upgraded residual life classification of 11-20 or >20 years. However, some defences where repair work has not taken place have deteriorated and are now in further need of repair. It is these assets which are highlighted below.

#### **Mu4 – Staithes**

There is little change since 2009 in the condition grading of the defences within Staithes harbour, with the overall classification ranging from fair to poor, with certain asset elements good or very poor. The rock armour to the breakwaters remains in good condition. The sheet

piling to the south side of the north breakwater remains significantly corroded and undercutting is starting to occur in places.

The rear harbour sea wall made from a mixture of concrete, blockwork and masonry materials backing on to residential properties (Asset Ref No. 1221D901D0402C22) has deteriorated further since the last inspection, although it is still classed as poor. Cracks, missing joints and voids to the centre parts of wall have all contributed to the down grading of the defence and the need of urgent repair. Undercutting to the toe of the wall is still evident as in the previous survey.

#### **Mu7 - Runswick Bay**

Many of the defences along the sea front at Runswick Bay remain in a similar condition as reported by the Halcrow 2008 and 2009 inspections. There is a large crack in sea wall here (Asset Ref. 1221D901D0601C01), and large horizontal cracks to the breakwater / groyne (Asset Ref. 1221D901D0601C02). Repair work to cracks are evident throughout the northern defences, although where some cracks have been repaired, additional new cracks have appeared which also need repair work. Furthermore some sealant within joints has deteriorated and is in need of replacement.

#### **Mu9 – Sandsend Village**

The defences at the Sandsend Village have deteriorated since the Halcrow 2009 inspections. The toe of the revetment around the car park at the north is exposed and undercut and the rock to protection needs repositioning and topping up. There is a void at the adjacent slipway that needs repair. The toe apron to the main vertical wall remains exposed and continues to worsen. There is a void under the toe apron of the section of wall with cantilevered footway. That needs repairing before the wall becomes compromised. Repair work has been undertaken to the concrete revetment east of Sandsend but an adjacent section had failed and developed a large void.

#### **Mu11-13 - Whitby**

Defences along West Cliff in Whitby appear to be in a generally good condition, although sections of the promenade in the west that do not have protective rock armour are suffering from toe scour..

The two breakwaters in Whitby (1221D901D0803C02 and 1221D901D0803C03) continue to show some signs of deformation as well as evidence of block displacement. Urgent repair works were undertaken to the south end of the eastern outer breakwater, but further sections of sheet piling are known to be in poor condition.

There were broken / missing timber fenders on the quay 1221D901D0803C06 near the fuel berth. These should be replaced urgently to give protection to the piles supporting the quay.

The defences to the east of the harbour show more evidence of erosion and most assets show cracking and erosion or loss of joint material. The rock armour protecting the toe of the slop at the Haggerlythe, just south of the root of the East Pier has been damaged and needs reprofiling and topping up with larger armour.

#### **Mu16 – Robin Hood's Bay**

Defences around the settlement of Robin Hood's Bay are in a similar state to that observed during previous surveys. The large vertical defence wall (Asset Ref. 1221D901D1003C02) to shows increased deterioration with seepage and cracking. The short, section of defence to the north of the central slipway (Asset Ref. 1221D901D1003C04) continues to show erosion, joint washout and cracking, as well as the repair works evident to the vertical cracks need repairing again. Erosion continues adjacent to the rock armour at the southern end of the Robin Hood's Bay Village and it is suggested that in future after further erosion the armour should be re-profiled to form a double sided structure.

#### **Mu20-21 – Scarborough North Bay**

Defences here are generally in a similar state to when visited previously. Vertical cracks to the full height of the sea wall are still evident throughout the sea walls (Asset Refs. 1221D901D1201C02, 1221D901D1201C03, 1221D901D1201C07, 1221D901D1201C08,

1221D901D1201C21 and 1221D901D1202C23), as well as repair work to parts of the vertical cracks. Repair work to continuing cracks and joint loss is still needed.

The each was low in front of the high sea walls at the south end of North Bay, 1221D901D1201C07, C21, C08 and C23, exposing the toe apron to wave damage increasing deterioration of the walls which have a number of significant defects.

The rock armour and Accropode revetment with a raised concrete sea wall behind between the South end of Clarence gardens and the East Pier remains in good to fair condition. The small vertical cracks in the wave wall noted in 2009 did not seem to have significantly changed.

#### **Mu21-22 – Scarborough Harbour**

A number of defects noted previously in the harbour have deteriorated since the last inspection by Halcrow in 2009. The loose stone steps on the inner face of East Pier have worsened and need repair. The walls around the Old Harbour are still aged and exhibiting mortar loss in many places throughout their lengths, particularly at lower levels. A large void was observed under the corroded steel sheet piles on the SE corner of the breakwater by the lighthouse. The west pier appears to be in the same condition as previously reported, with continuing corrosion to steel work, cracks and erosion in prominence (Asset Refs. 1221D901D1301C07 and 1221D901D1301C19).

#### **Mu22-23 – Scarborough South Bay**

There has been a continuing degradation of assets within this area since the previous Halcrow 2008 survey. Loss of joint material and full height cracks (Asset Ref. 1221D901D1301C09) are visible as well as severe erosion to the walls. At the Spa seawall there are numerous defects including undercutting to the exposed and damaged toe apron, loose blocks in both main wall and crest wall, undermining of the toe, cracking and loss of front face, particularly at the southern section. There had been significant improvements to defences south of the Spa (Asset Refs. 1221D901D1302C02 and 1221D901D1302C03) through repair works to rebuild sections, but additional sections remain in poor condition and further work is required.

#### **Mu24-25 – Cayton Bay**

It appears that maintenance and repair to the private defences at the former pumping station have continued since the previous Halcrow 2008 and 2009 surveys. However, the defence structure at the public access point south of the former pumping station is in very poor / failed condition and it is suggested it is demolished and the access ramp improved. The length of defence immediately to the north has also failed and needs removal / making safe.

#### **Mu28a-29a – Filey**

Defences at the sailing club (Asset Ref. 1221D901D1601C03) have been repaired at the south end since the last survey, but the central section is now in very poor condition with holes through the corroded and abraded piles.

Defences present through the town show evidence of maintenance and repair in the form of repointing and the replacement of coping stones. However more still require repair and there are a significant number of damaged facing blocks.

The wall at Cobble Landing had major cracks and loose blocks that need attention, along with undercutting of the toe apron. The toe beam is damaged at the bottom of the recurve wall on the return section of wall near Martin's Gill. The short section of rock armour at the south end 1221D901D1602C02 is unstable and should be reprofiled..

## 5 Problems Encountered and Uncertainty in Analysis

### *Coastal Slope Condition Assessment*

As in 2009, no significant problems were encountered in the 2012 Coastal Slope Condition Assessment. A limited view of the cliff was afforded at a small number of CBUs, but in all cases, sufficient lengths of the cliff could be seen to assess its condition. It had been hoped that the walkover survey could be supplemented by inspection of the vertical and oblique aerial photography that was due to be undertaken around the same time as the walkover survey. However, due to weather delays the aerial survey has been delayed and was not available at the time of the report writing.

### *Coast Protection Asset Assessment*

Very few problems were encountered onsite during the Coast Protection Asset Assessment. Access issues posed the largest problem although most assets were located in public spaces and were easily accessible. Access to private property was not an issue. Local tides tables provided key information for the appropriate planning of each day's inspections. The toe of defence assets around Castle Cliff and Scarborough Harbour are constantly submerged and therefore an inspection of only the visible elements from land has been undertaken. This also applies to the breakwaters at Whitby and Staithes. High beach levels particularly in Scarborough's North and South Bay Promenades prevented full inspections of the defences, therefore only visual inspections where possible. This problem was also encountered in the previous Halcrow 2009 and 2008 inspections.

Assets that proved difficult to inspect leading to uncertainty in analysis were those situated in a marginal or submarine environment throughout all tide conditions;

- Staithes outer parts of north and south breakwaters (1221D901D0403C01 and 1221D901D0403C03)
- Whitby offshore breakwaters (West/East) (1221D901D0803C01/C04)
- Whitby inner breakwater walls (West/East) (1221D901D0803C02/C03)
- Whitby Harbour LB – Fishing boat fuelling, docking area (1221D901D0803C06)
- All assets around Scarborough's Castle Cliff and Harbour

A future solution to this problem would be to undertake additional inspections using a boat. Although, obviously these areas are used by commercial boats and therefore access could be problematic. Furthermore, boat handlers may not want to work at close proximity to hard structures in a period of tide change and slack water may not give enough time to inspect assets properly. An alternative could be remote photography from a suspended or remote controlled camera. It would be necessary to consult the harbour master before any such work was undertaken.

## 6 Conclusions and Recommended Actions

### *Recommended Actions for Coastal Slopes*

It is recommended that monitoring of the entire frontage should be continued regularly by interpretation of data collected by aerial survey under the Cell One programme.

Hotspots of activity continue to be inspected biannually in the field to ensure that they are being monitored and managed effectively. That includes areas of sustained high activity, or areas which have shown an increase in activity since the 2009 walkover survey.

Areas of particular concern are as follows.

- **Staithes:** The cliffs at the end of Cowbar Nab continue to be Totally Active despite the defence of the toe. There have been rockfalls reported on the cliffs adjacent to Staithes Beck and on the cliffs on the eastern half of the bay that back High St. The continuation of activity at Staithes poses a risk to beach users and residents of High St and should be closely monitored.
- **Whitby:** The East Cliff area fronting St Mary's church experienced rock fall activity in November 2012. The event was associated with drainage problems and was exacerbated by with by the wet conditions of the year. This area should be closely monitored to understand levels of risk the residents of Henrietta St are exposed to.
- **Robin Hoods Bay:** There is a large overhang in MU16/1 to the north of the defended section of Robin Hoods Bay which is likely to collapse if marine erosion is allowed to continue. To the South of Robin Hoods Bay MU17/1 is showing signs of instability such the opening of tension cracks.
- **Cornelian Bay:** The toe units at Cornelian Bay were highly active between 2008 and 2009. This activity has now slowed to some degree. However, it is possible that the Cornelian Bay system could deteriorate and become prone to instability in the future. Such a reactivation would pose a risk to properties on the northern side of the Knipe Point development. As a result the monitoring of Cornelian Bay should continue.
- **Cayton Bay North:** During 2008 there was a reactivation of large scale landsliding at Cayton Cliff, putting properties at Knipe Point at risk. The activity of these cliffs was observed to have slowed during the 2012 survey but this landslide should continue to be monitored.
- **Filey Brigg:** Many units around the Brigg have shown sustained high levels of activity. Instability here poses a risk to walkers along the Brigg and beach users.
- **Filey Town:** Localised cliff instability was evident in 2008 which had led to the closure of some footpaths. Other impacts of the 2007 rainstorm event have been remediated, but the Town's coastal cliffs should be regularly inspected to minimise the threat to people and property. The activity in this area has decreased between the 2009 and 2012 walkover surveys. However, the instability could begin again due to heavy rainfall.
- **Speeton Sands:** the cliffs at this location tend to be highly active. There are two units where the activity has increased in 2012 but this whole stretch of coast in Filey Bay tends to erode periodically and should continue to be monitored.

The next inspections under the current programme will be undertaken during 2014.

### *Recommended Actions for Coast Protection Assets*

The grading of all defences and structures have been assigned using the Environment Agency asset condition assessment guidelines.

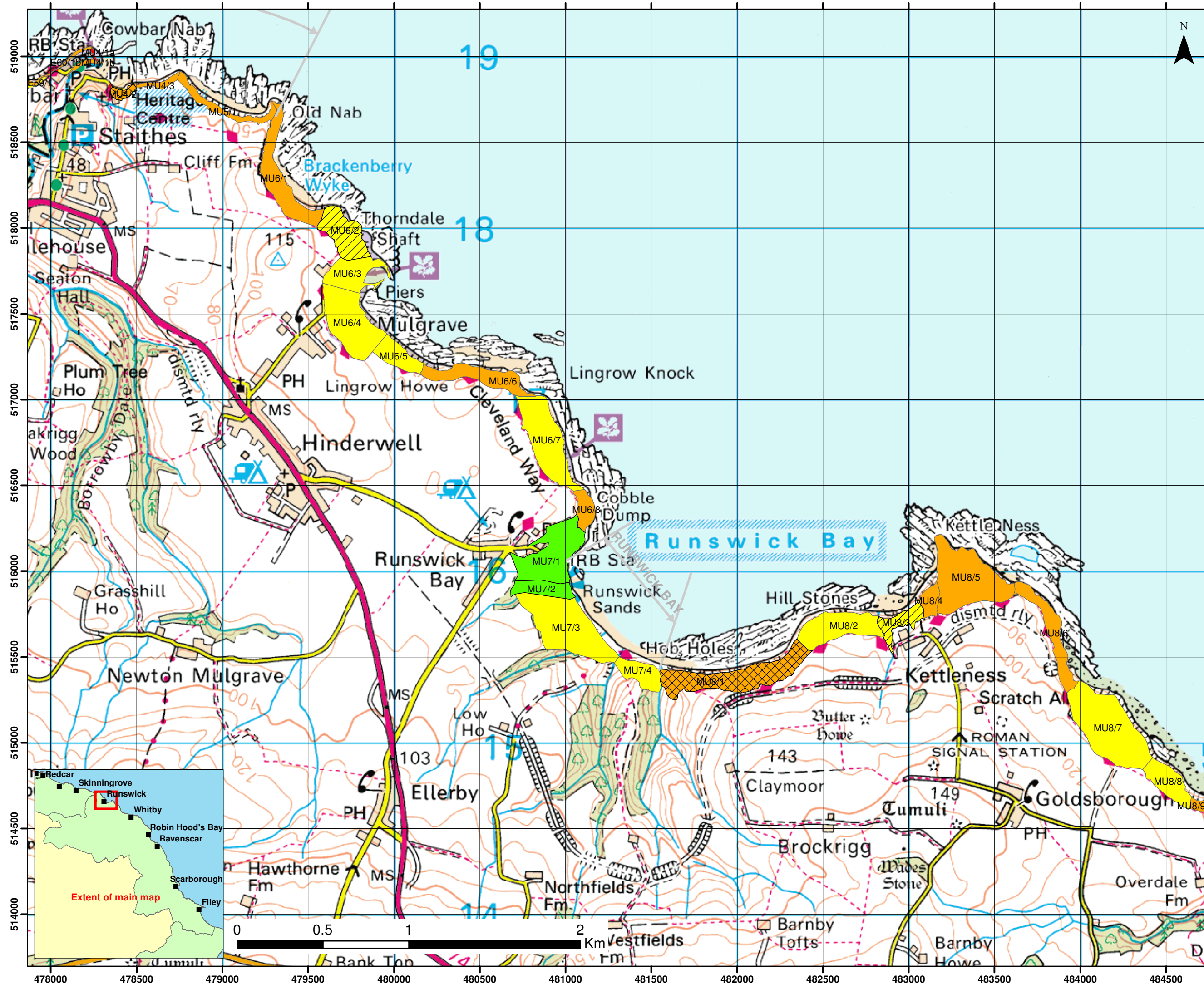
The table in Appendix B includes a summary listing of the defence inspection results including all of the recommendations that have been made. Note that the "Urgency" and "Residual Life" are NFCDD asset descriptors. Urgency categories within NFCDD are: Routine, Urgent and No Repairs. Residual life categories are: <1, 1-5, 6-10, 11-20 and >20 years and are based on visual inspection only.



For detailed comments on asset construction and condition, as well as many more photos of the defences and locations refer to the SANDS database NFCDD asset inspection records for each area.

## **Appendix A**

### **Coastal Slope Condition and Change**



**KEY**

**Cliff activity 2012**

- Totally active
- Partly active
- Locally active
- Inactive
- Dormant
- Not surveyed in 2012

**Change since 2009**

- Increase in activity
- Reduction in activity
- No change in activity

Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

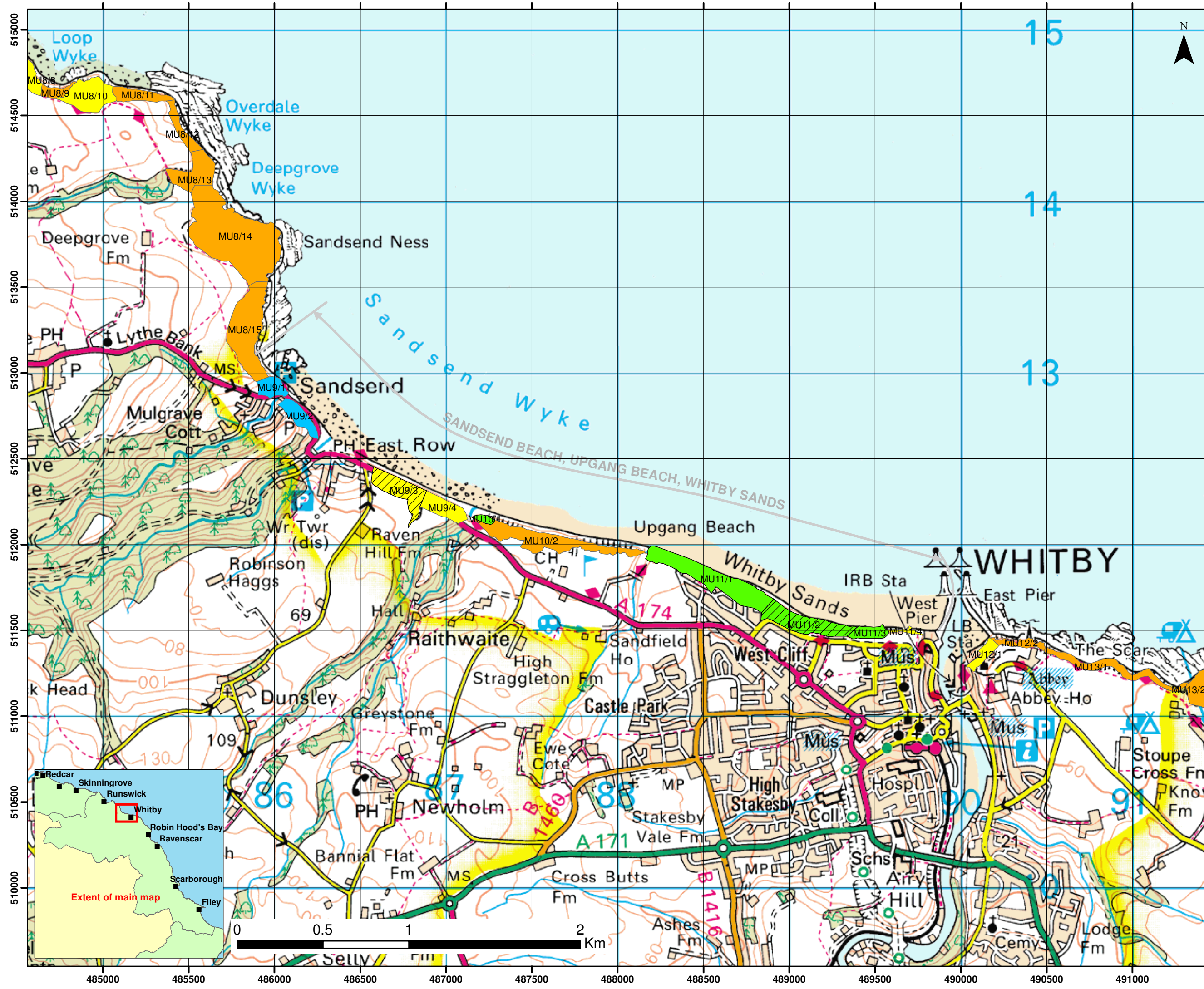
**Map 1  
Cliff Activity**

**Scarborough  
Borough Council**

2012 Coastal Inspection

**Halcrow**  
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**KEY**

**Cliff activity 2012**

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- Inactive
- Dormant
- Not surveyed in 2012

**Change since 2009**

- Increase in activity
- Reduction in activity
- No change in activity

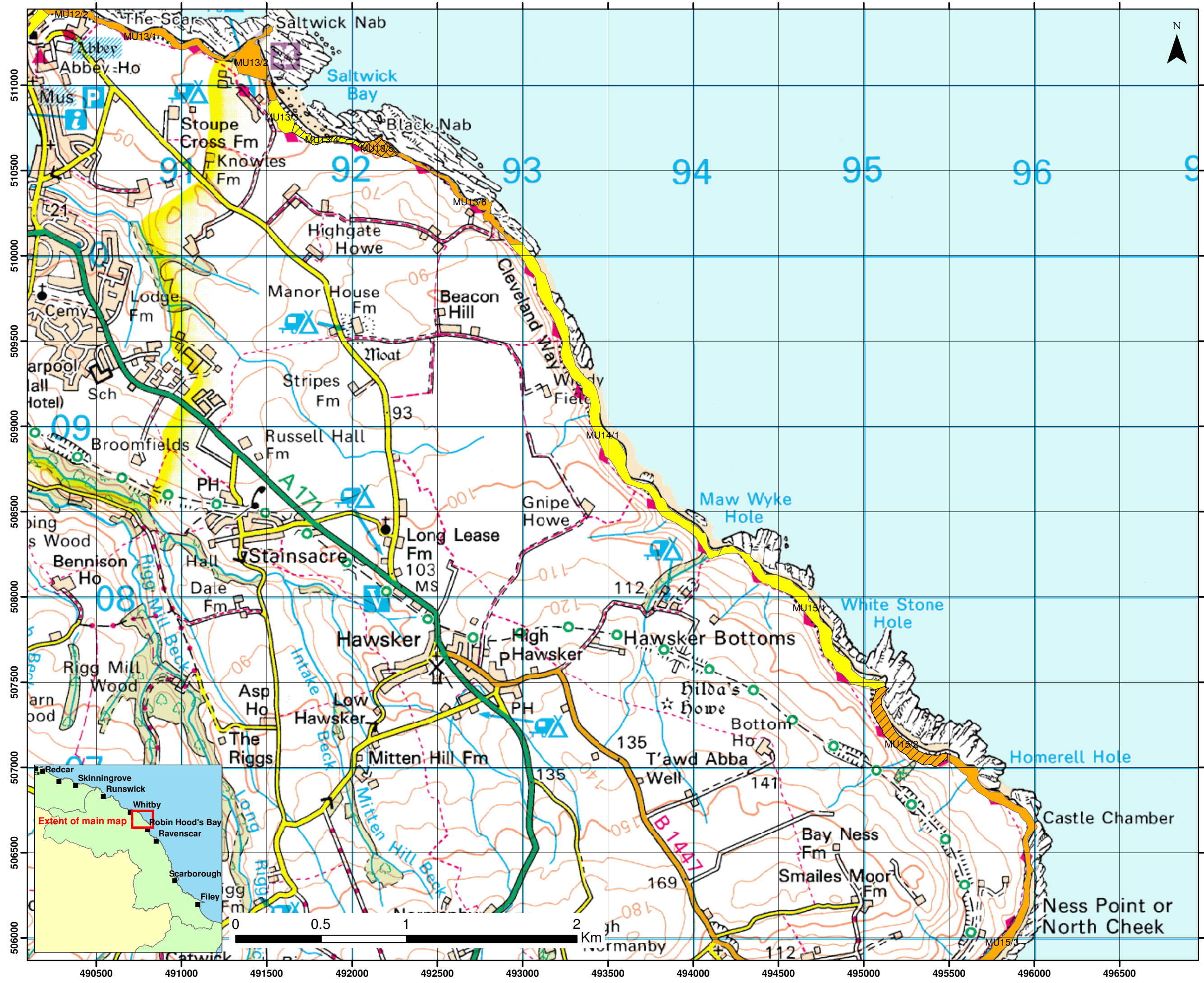
Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 2  
 Cliff Activity  
 Scarborough  
 Borough Council**

2012 Coastal Inspection

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**Change since 2009**

- Increase in activity
- Reduction in activity
- No change in activity

Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

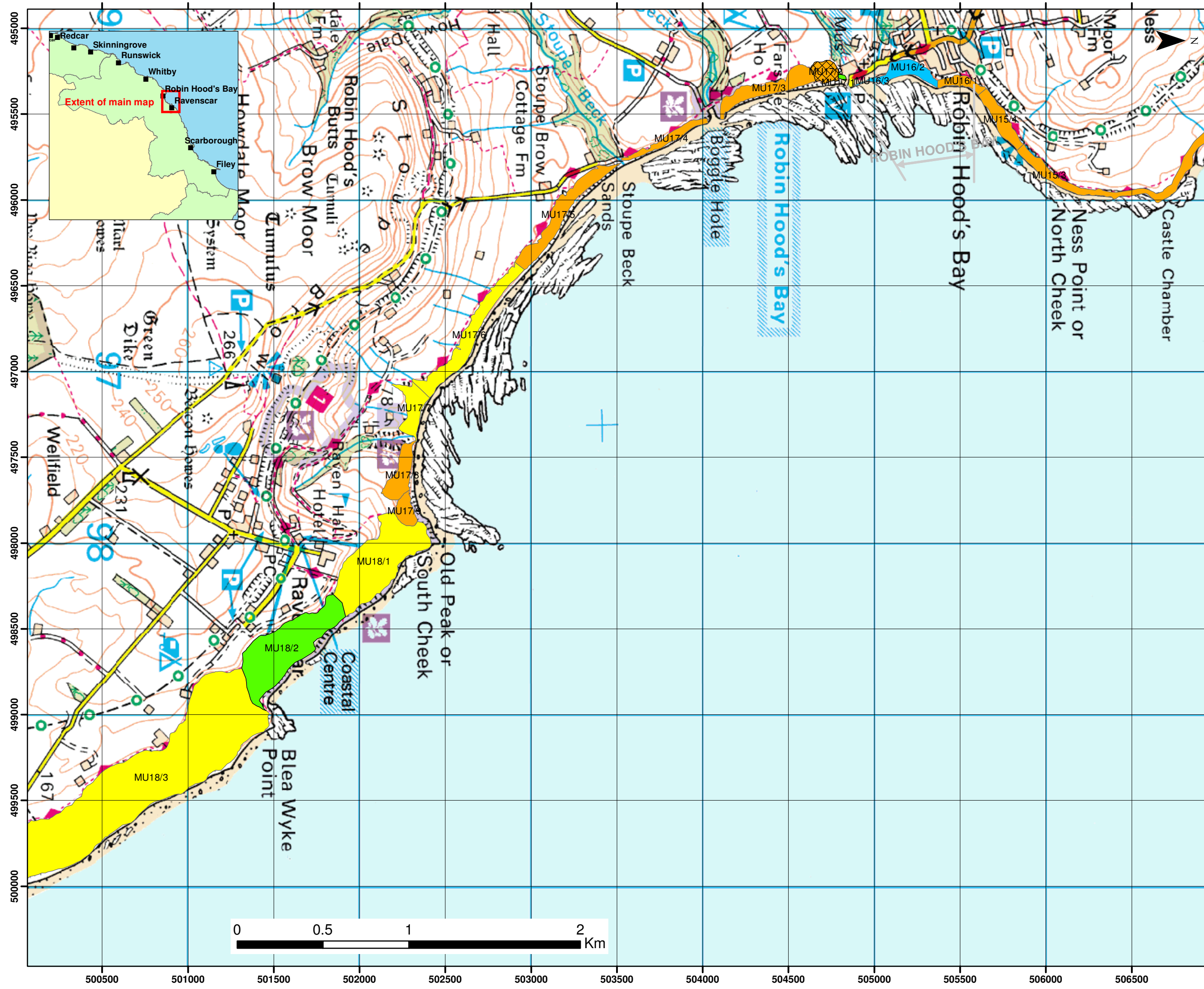
**Map 3  
Cliff Activity**

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Borough Council**

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**KEY**

**Cliff activity 2012**

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**Change since 2009**

- Increase in activity
- Reduction in activity
- No change in activity

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 4**  
**Cliff Activity**

**Scarborough**  
**Borough Council**

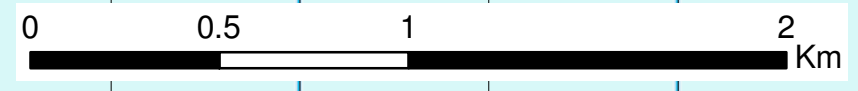
2012 Coastal Inspection

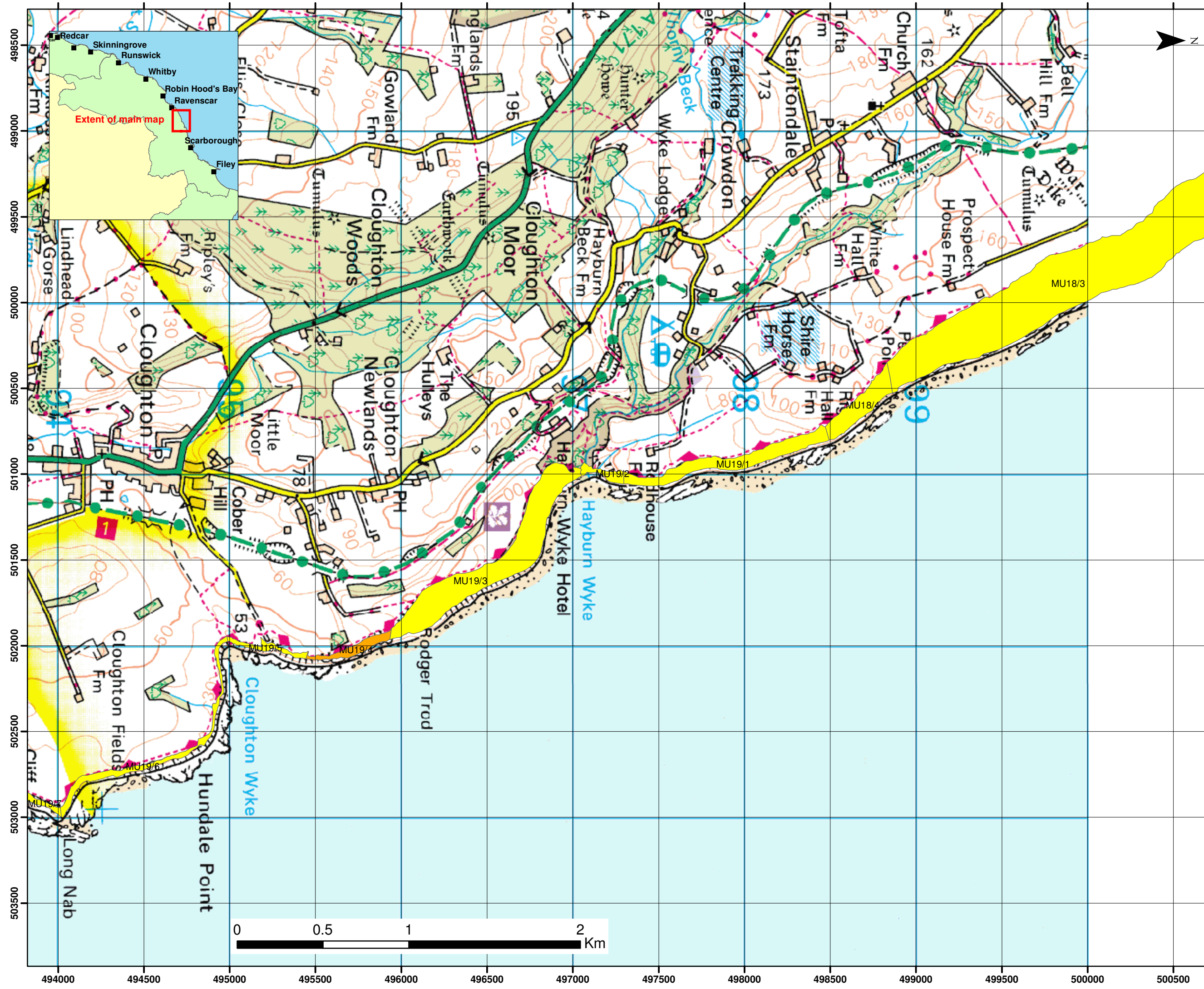
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**KEY**

**Cliff activity 2012**

- Totally active
- Partly active
- Locally active
- Inactive
- Dormant
- Not surveyed in 2012

**Change since 2009**

- Increase in activity
- Reduction in activity
- No change in activity

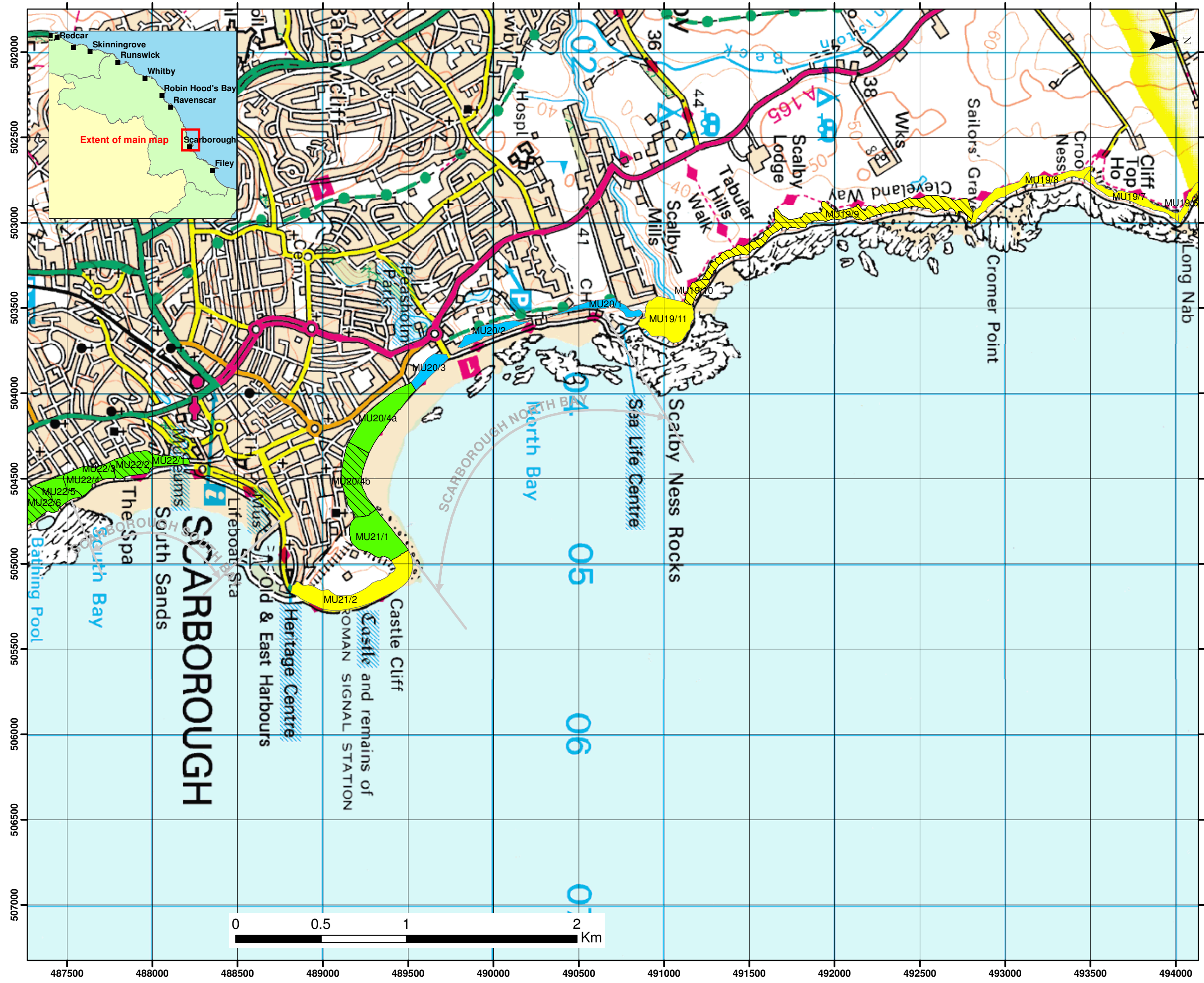
Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 5  
 Cliff Activity  
 Scarborough  
 Borough Council**

2012 Coastal Inspection

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**KEY**

**Cliff activity 2012**

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- Partly active
- Locally active
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- Not surveyed in 2012

**Change since 2009**

- Increase in activity
- Reduction in activity
- No change in activity

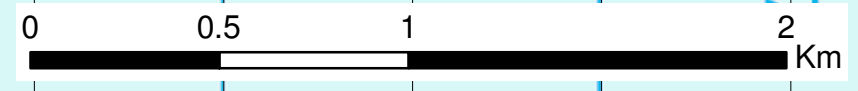
Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 6**  
**Cliff Activity**  
**Scarborough**  
**Borough Council**

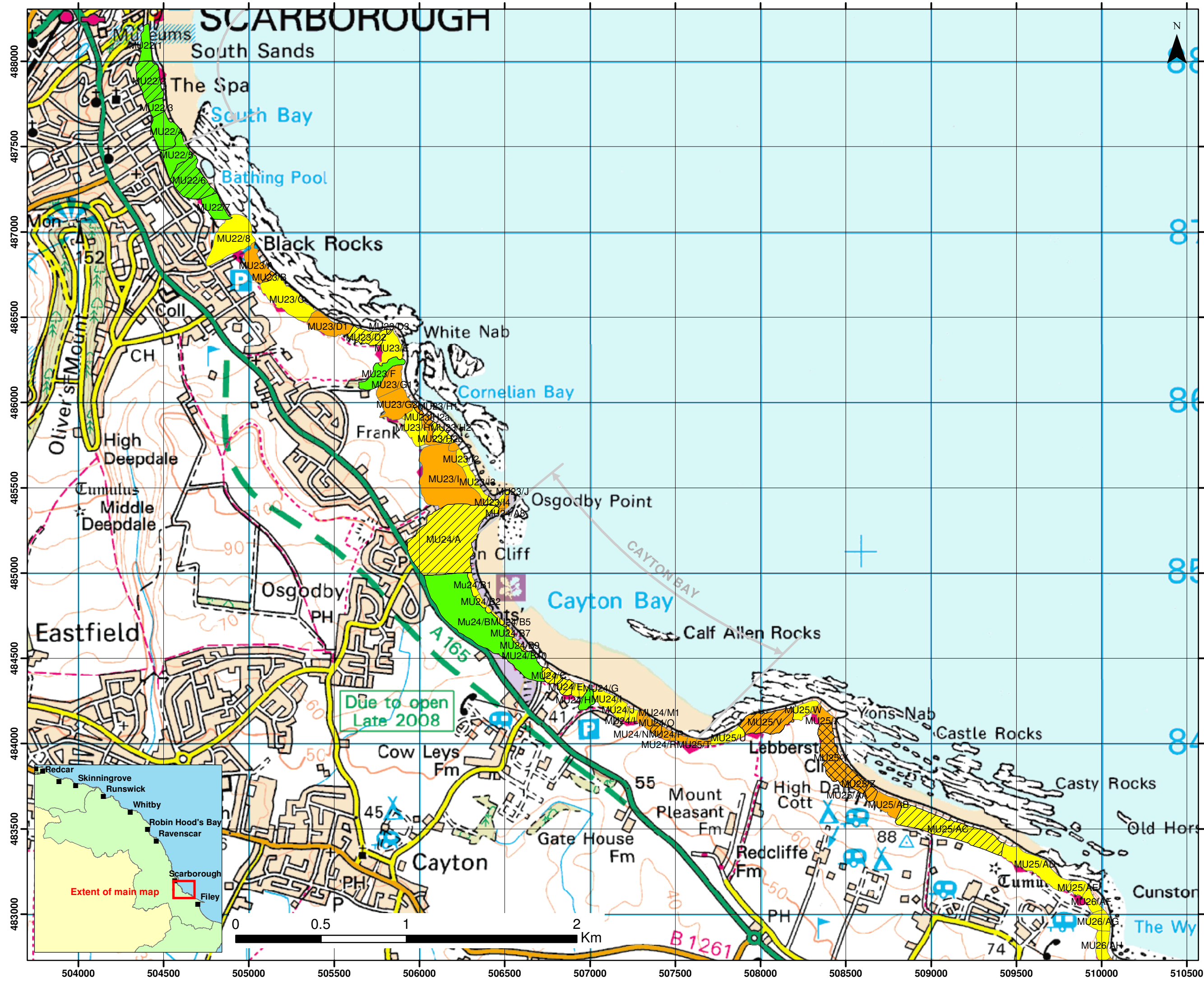
2012 Coastal Inspection

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**KEY**

**Cliff activity 2012**

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- Not surveyed in 2012

**Change since 2009**

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- Reduction in activity
- No change in activity

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 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

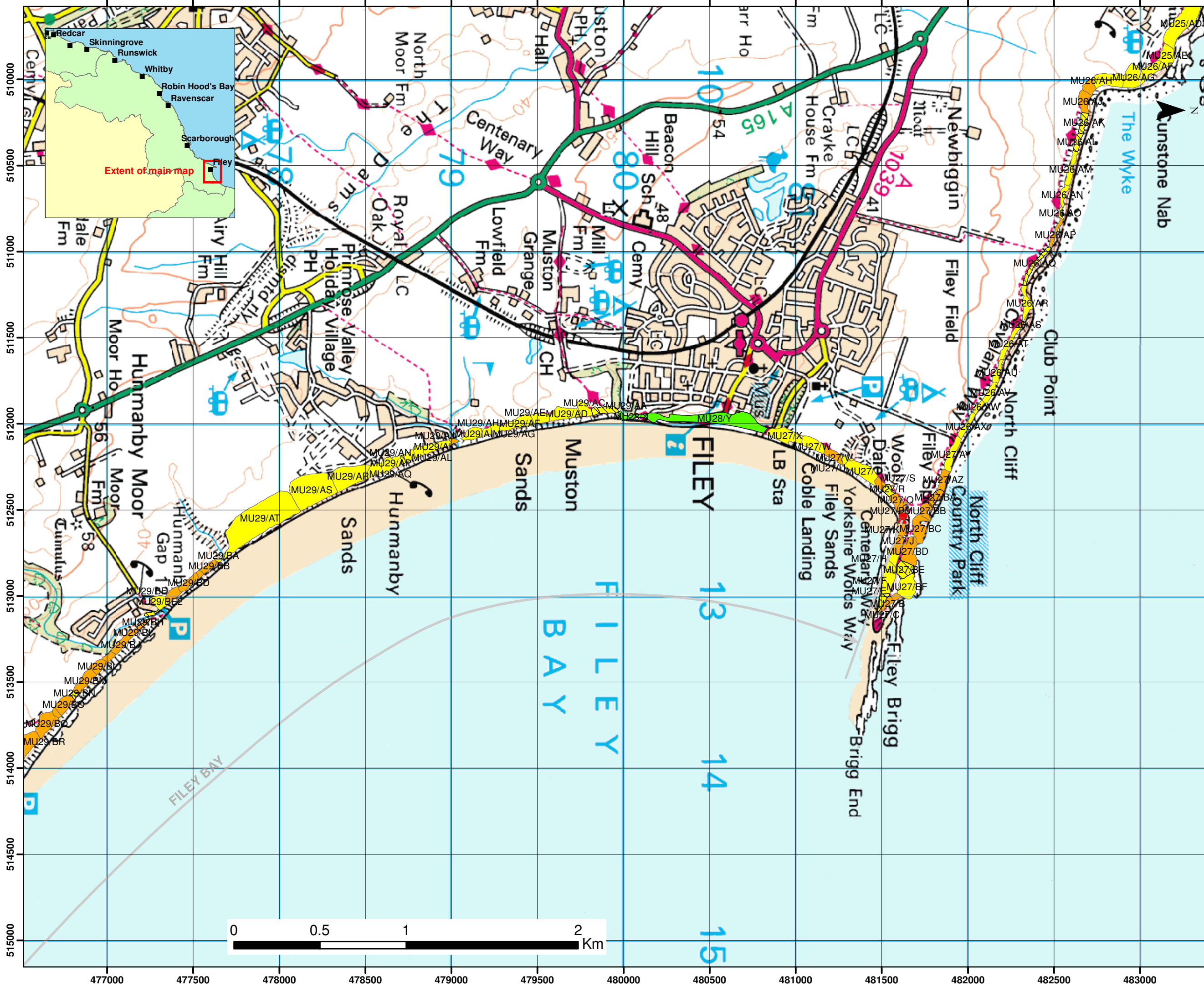
**Map 7  
Cliff Activity**

**Scarborough  
Borough Council**

2012 Coastal Inspection

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**KEY**

**Cliff activity 2012**

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- Not surveyed in 2012

**Change since 2009**

- Increase in activity
- Reduction in activity
- No change in activity

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 8**  
**Cliff Activity**

**Scarborough**  
**Borough Council**

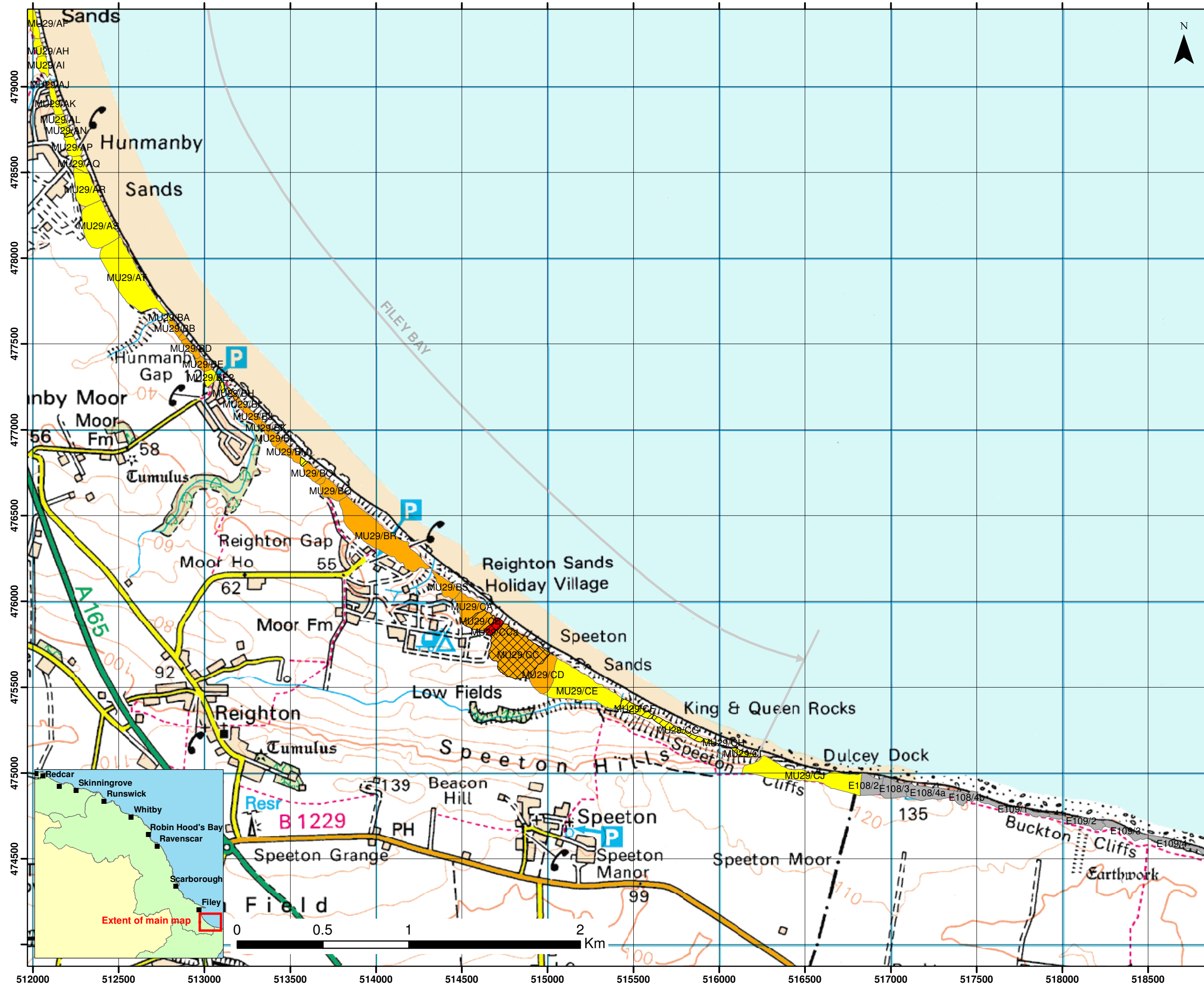
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**Change since 2009**

- Increase in activity
- Reduction in activity
- No change in activity

Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

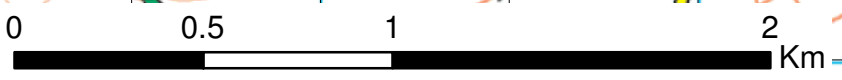
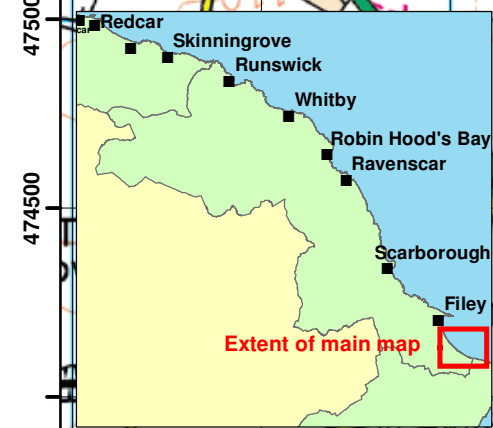
**Map 9  
Cliff Activity**

**Scarborough  
Borough Council**

2012 Coastal Inspection

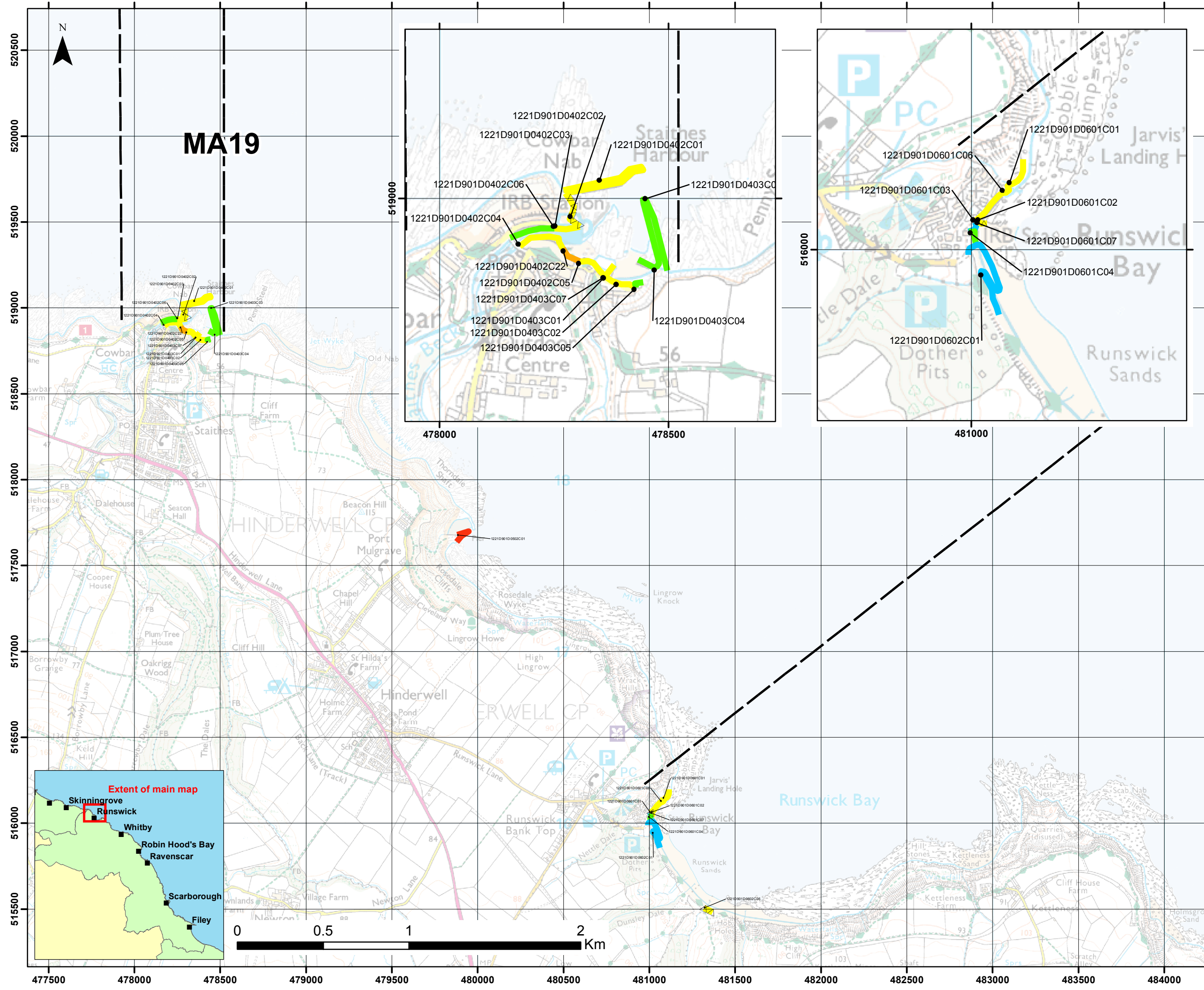
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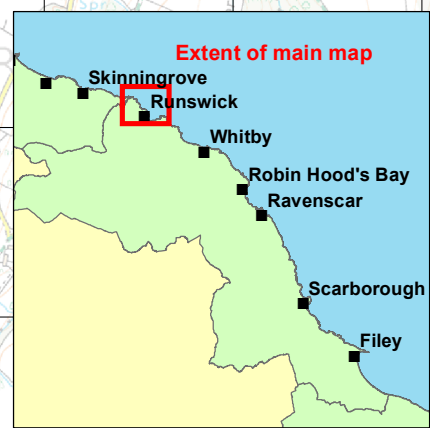
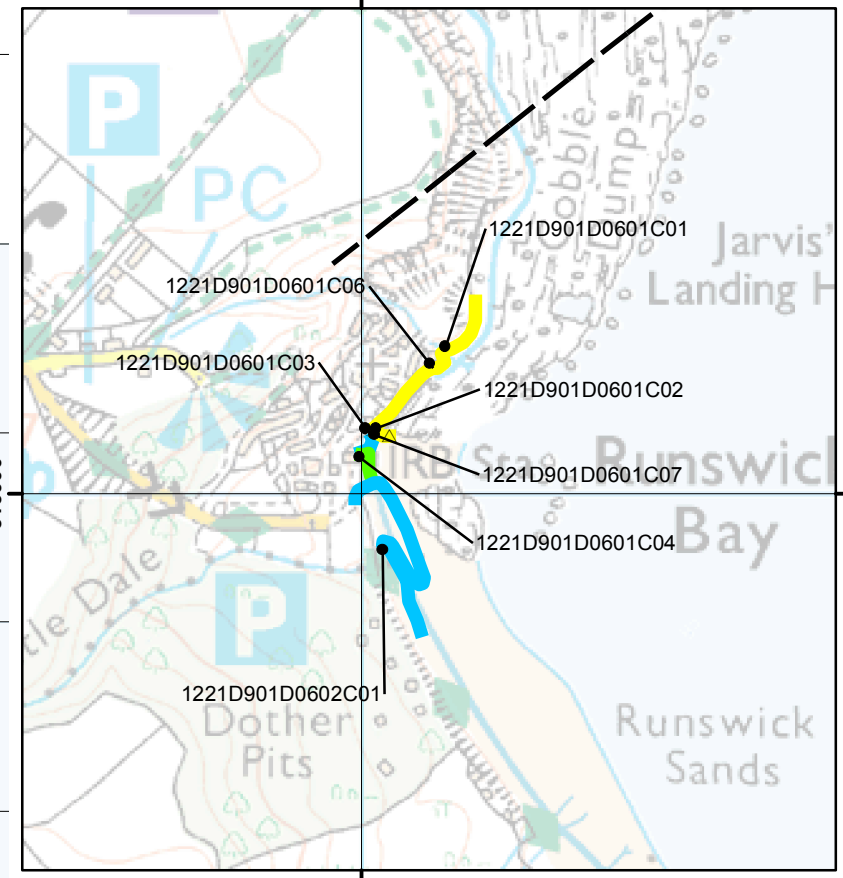
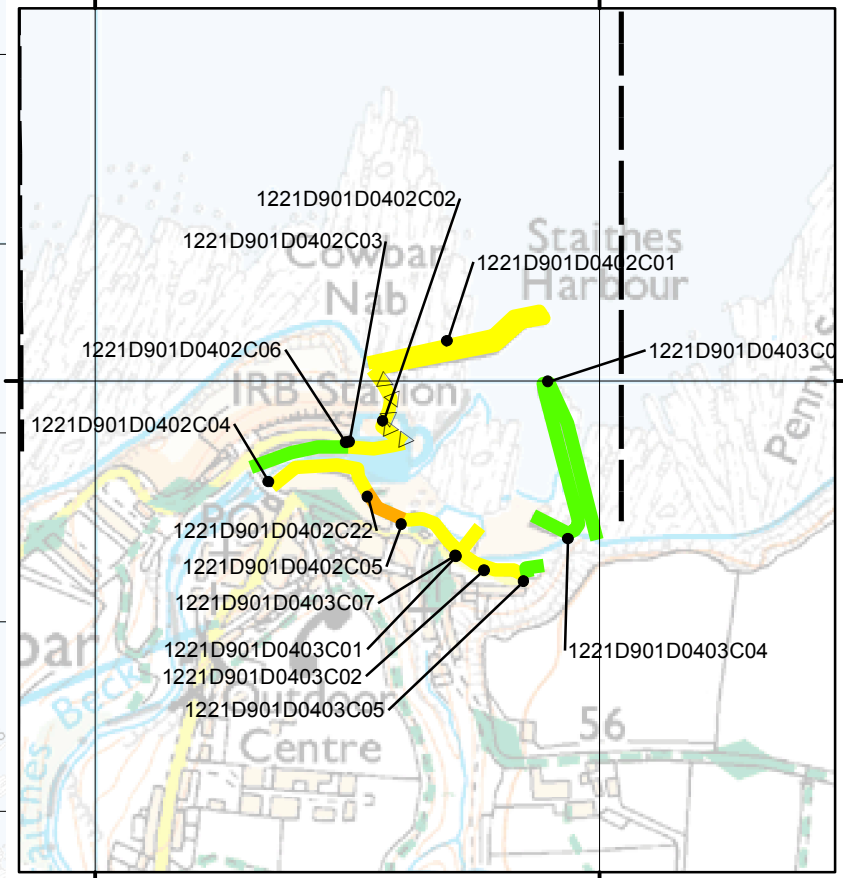
## **Appendix B**

### **Coast Protection Asset Condition and Change**



**KEY**

- Management Unit
- Asset condition (2012)**
  - Very good
  - Good
  - Fair
  - Poor
  - Very poor
- Asset condition change**
  - Worsened since 2009/10
  - Improved since 2009/10



Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

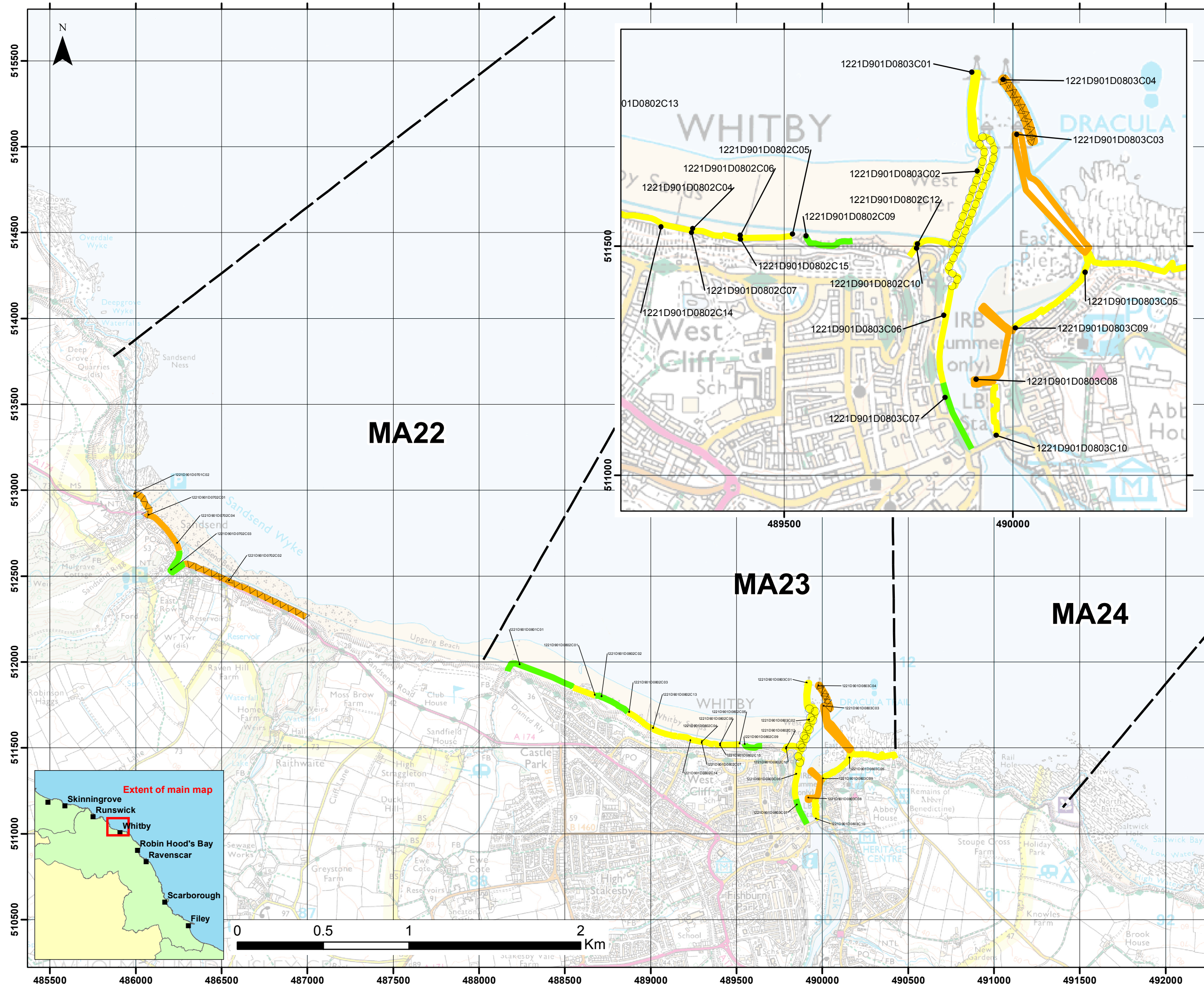
**Map 1  
 Coast Protection Asset  
 Condition 2012**

**Scarborough  
 Borough Council**

2012 Coastal Inspection

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**KEY**  
 - - Management Unit

Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

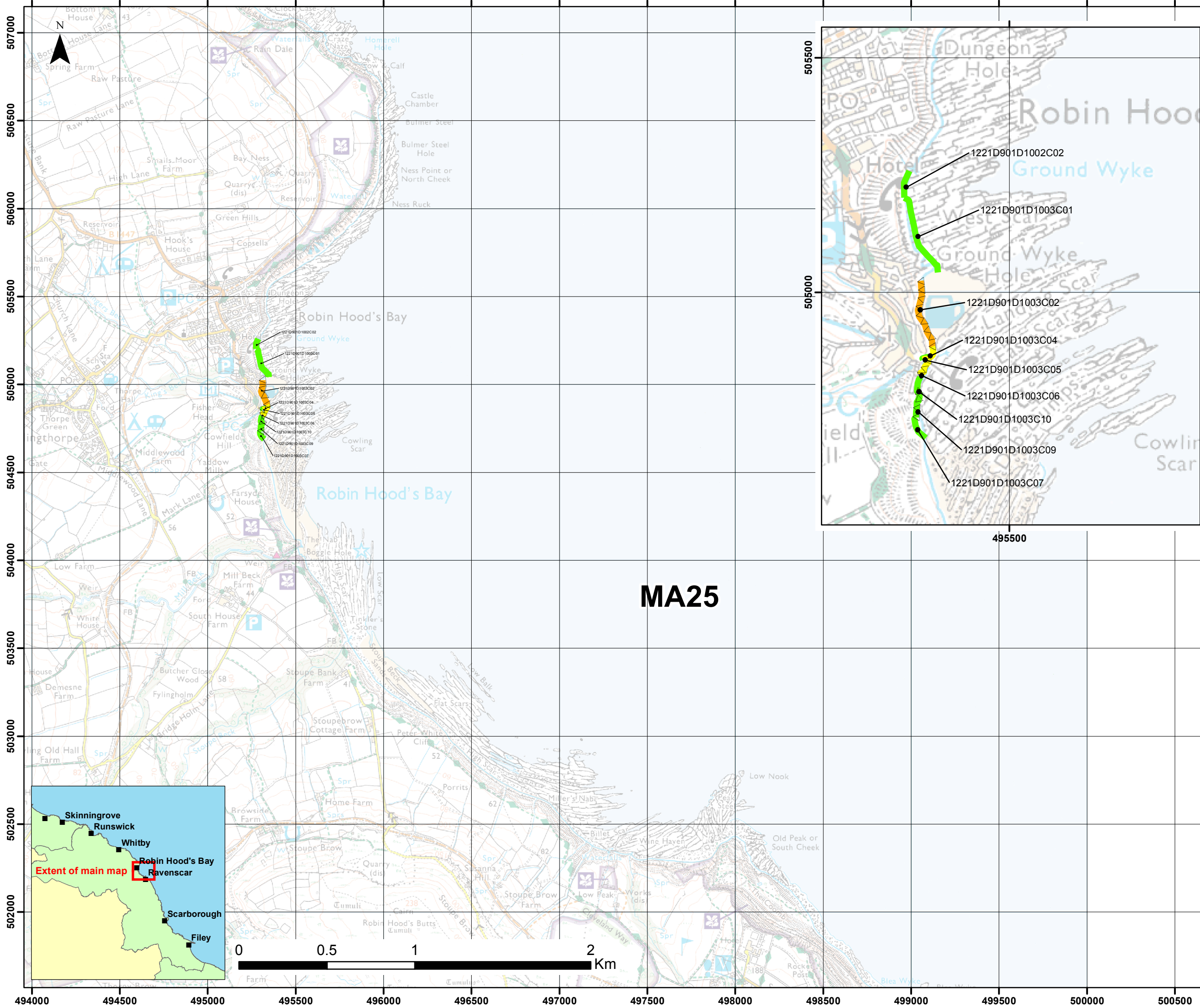
**Map 2  
 Coast Protection Asset  
 Condition 2012**

**Scarborough  
 Borough Council**

2012 Coastal Inspection

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**MA25**

**KEY**

--- Management Unit

**Asset condition (2012)**

Very good

Good

Fair

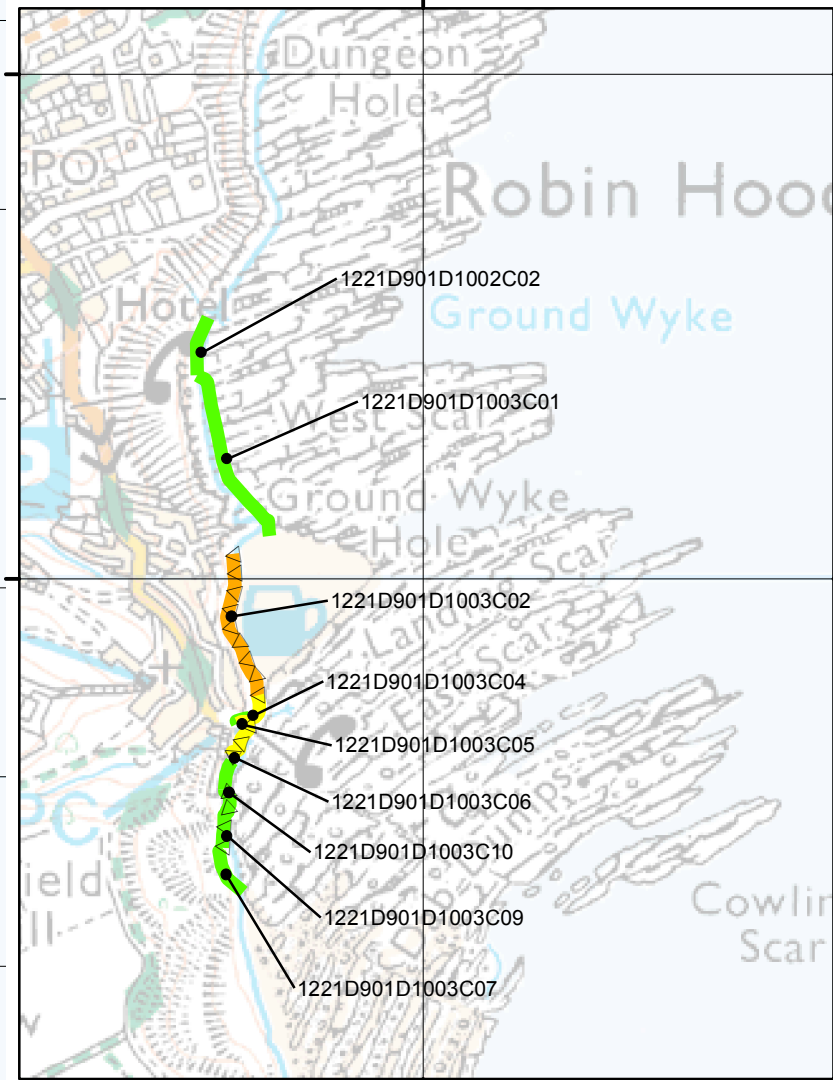
Poor

Very poor

**Asset condition change**

△△△△ Worsened since 2009/10

○○○ Improved since 2009/10



Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 3  
Coast Protection Asset  
Condition 2012**

**Scarborough  
Borough Council**

2012 Coastal Inspection

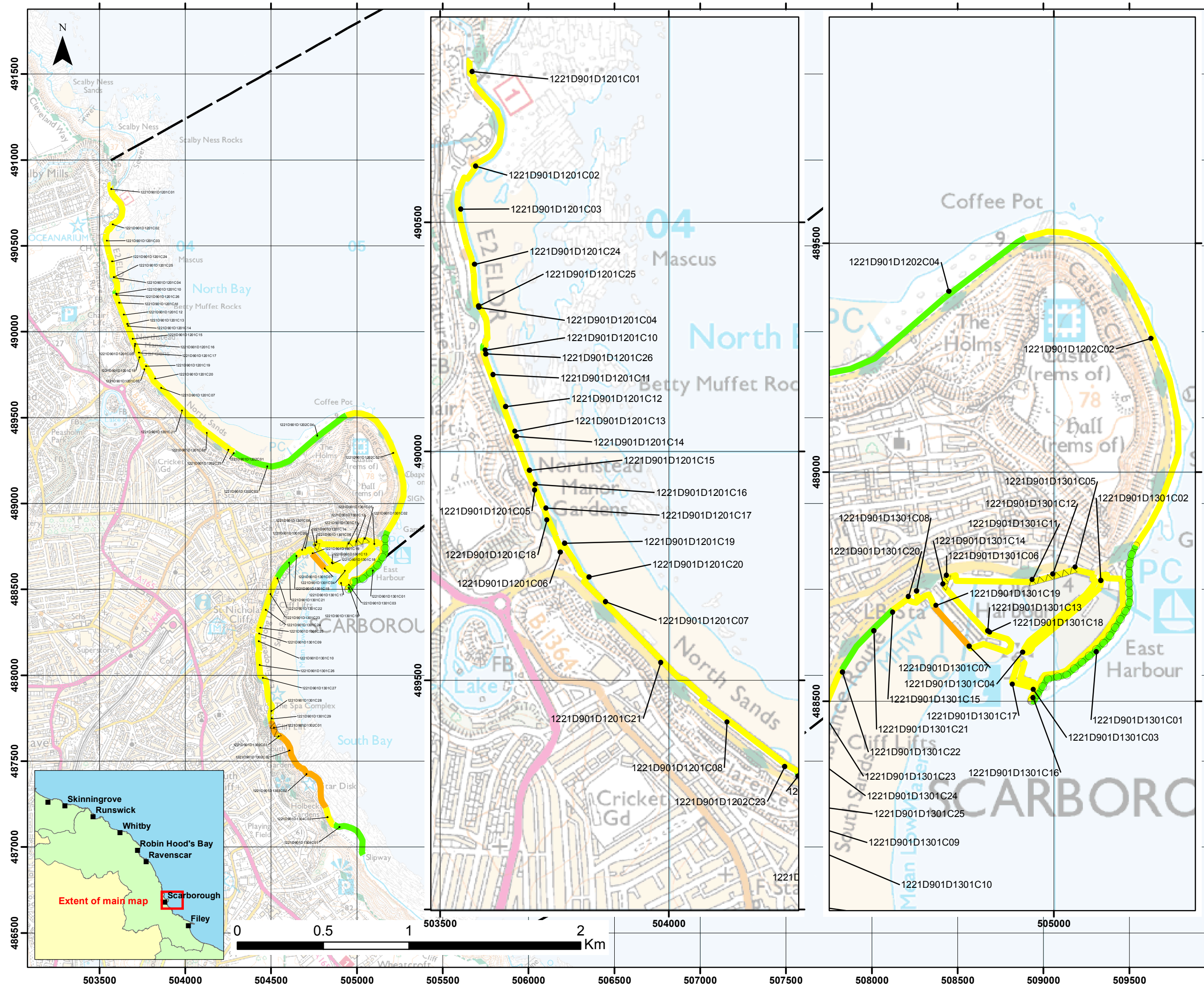


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**KEY**

- Management Unit
- Asset condition (2012)**
  - Very good
  - Good
  - Fair
  - Poor
  - Very poor
- Asset condition change**
  - △△△ Worsened since 2009/10
  - Improved since 2009/10

Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

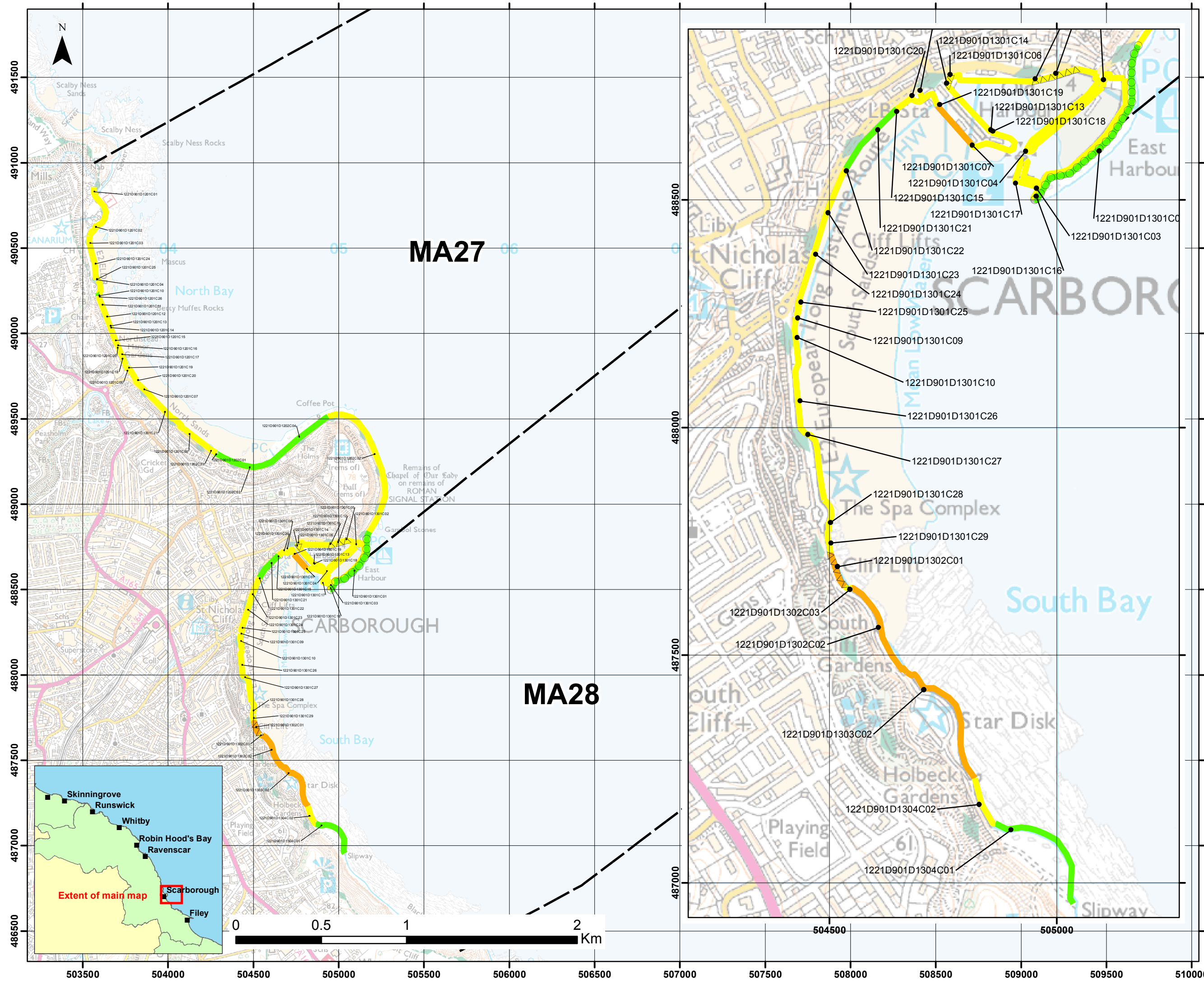
**Map 4**  
**Coast Protection Asset Condition 2012**  
**Scarborough Borough Council**

2012 Coastal Inspection

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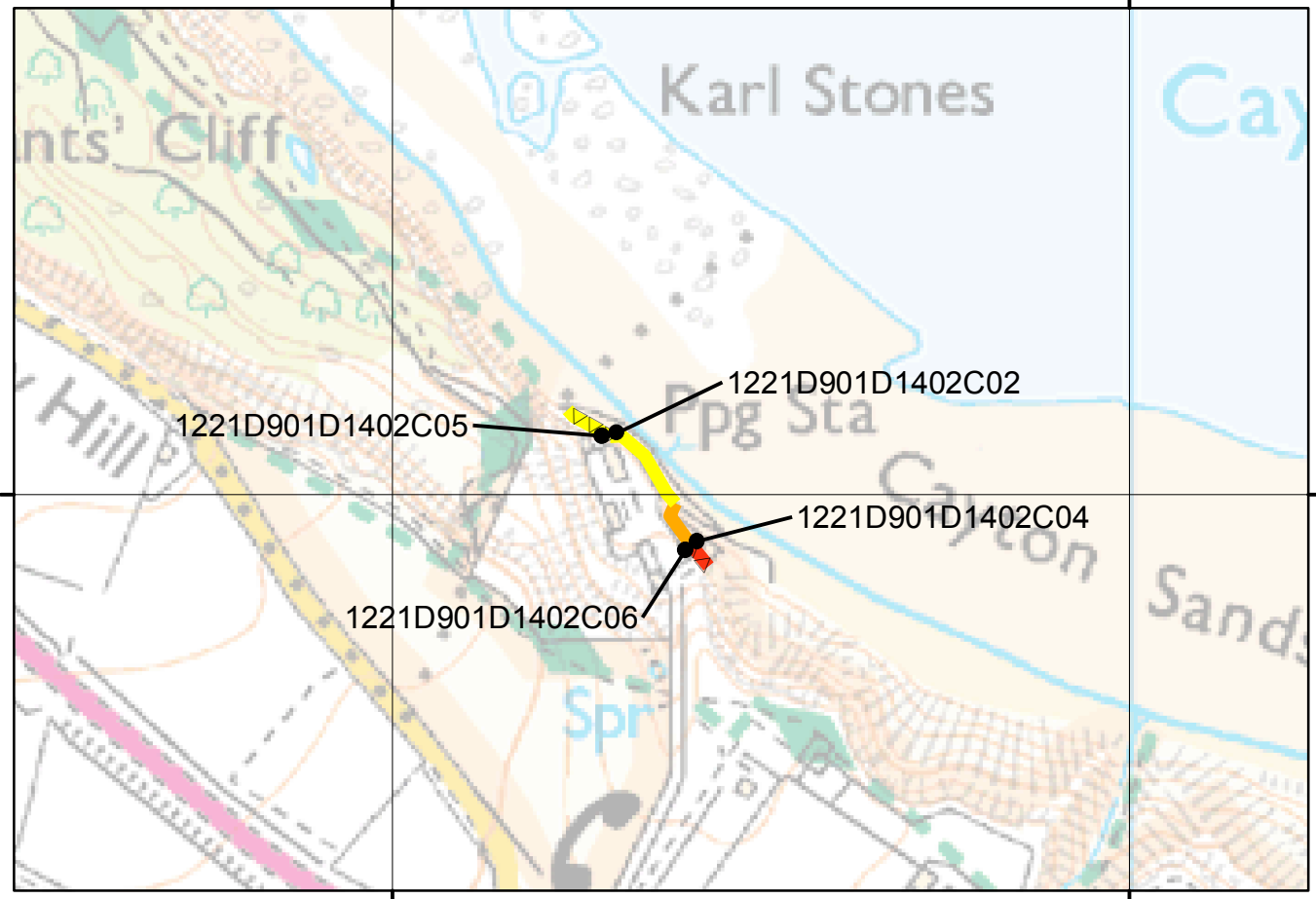
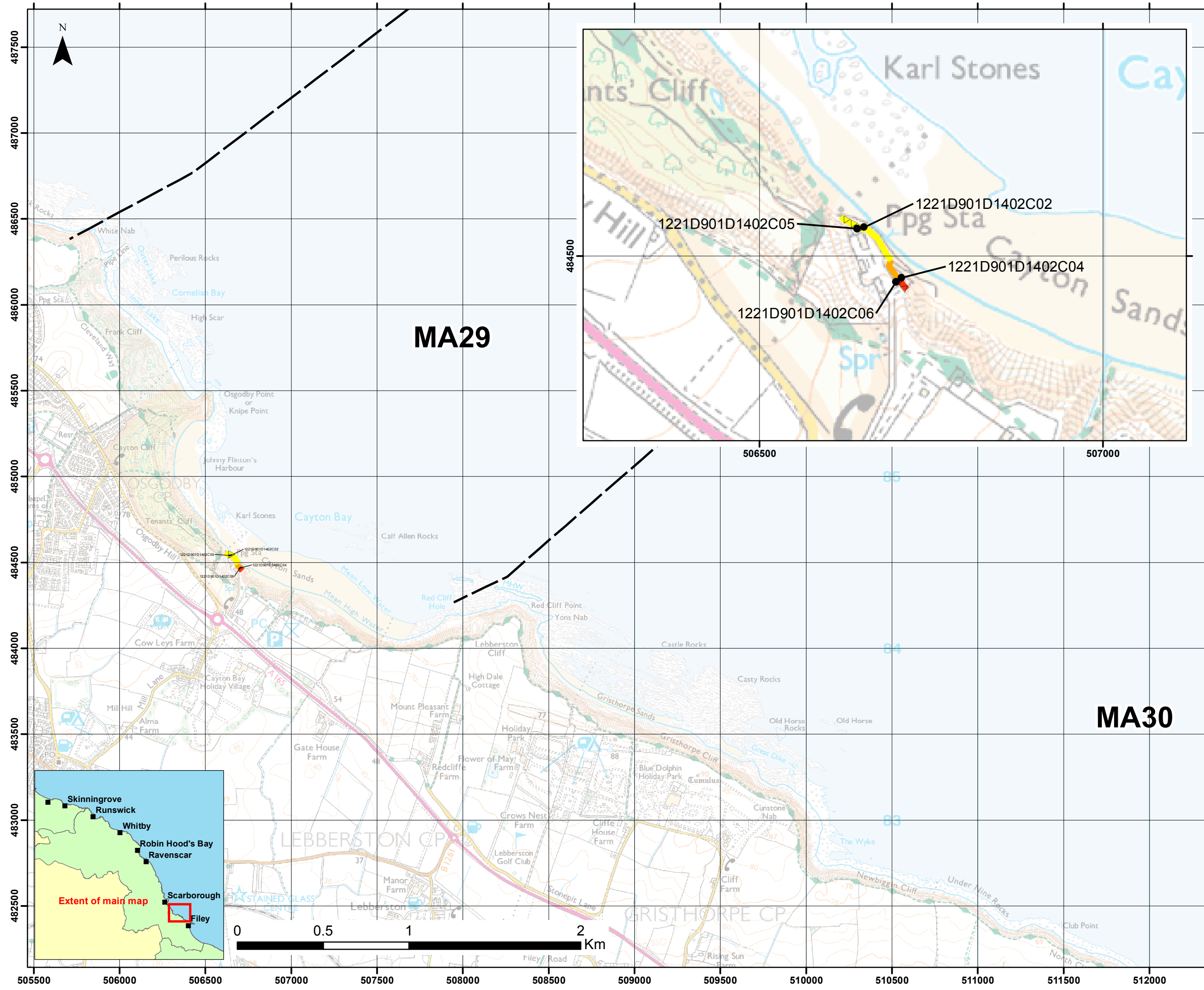
Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 5**  
**Coast Protection Asset Condition 2012**  
**Scarborough Borough Council**

2012 Coastal Inspection

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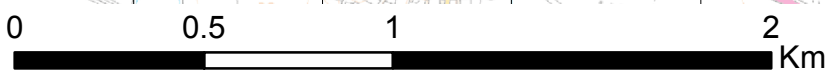
Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

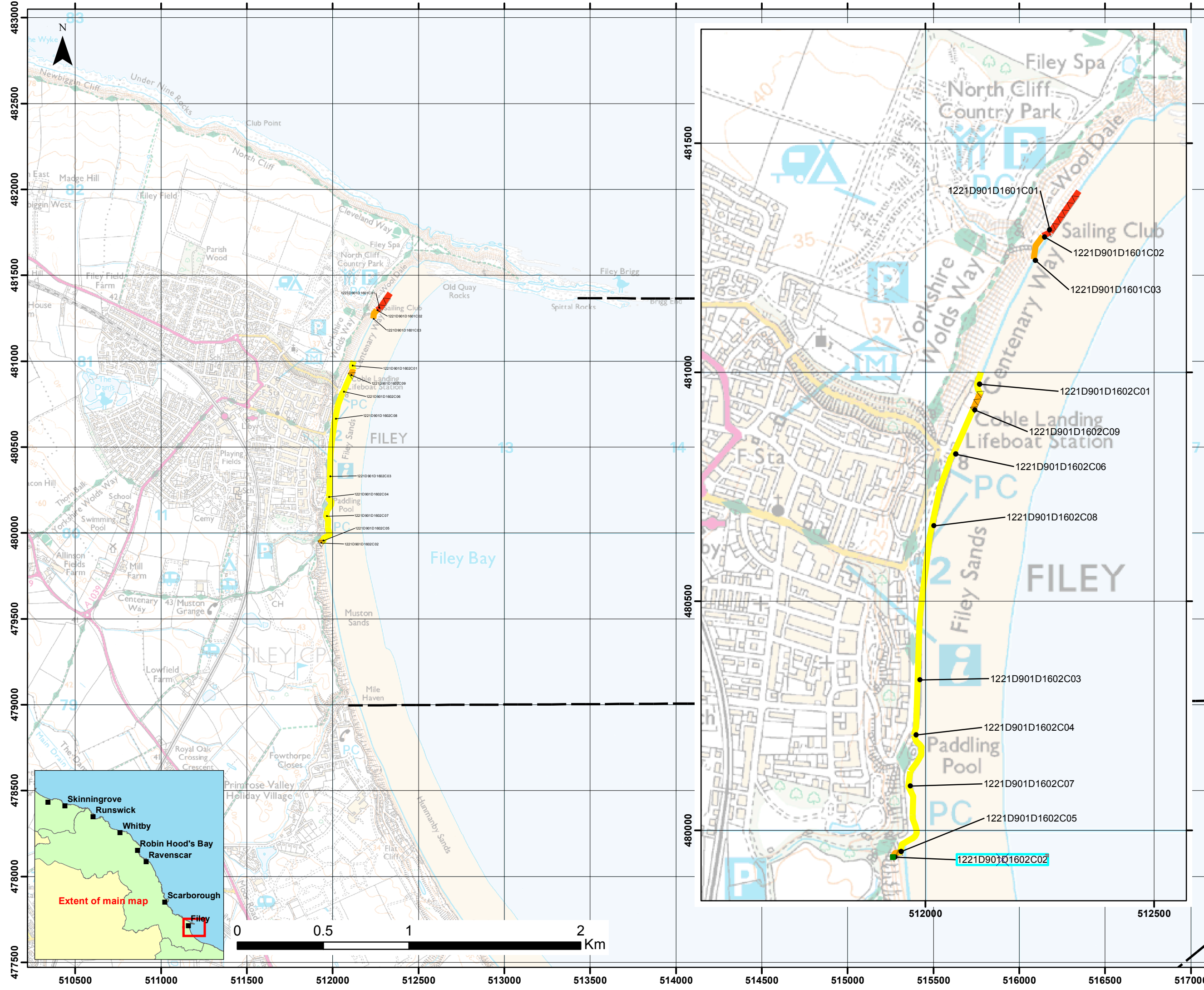
**Map 6**  
**Coast Protection Asset Condition 2012**  
**Scarborough Borough Council**

2012 Coastal Inspection

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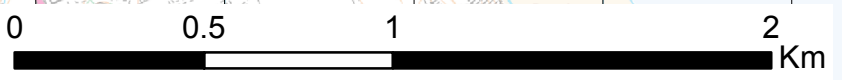
Client: North East Coastal Group  
 Project: Cell 1 Regional Coastal Monitoring Programme 2011 to 2016

**Map 7**  
**Coast Protection Asset Condition 2012**  
**Scarborough Borough Council**

2012 Coastal Inspection

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SBC NFCDD Coastal Defence Inspection Results\_r1.xlsx

Asset Number	Asset Type	Asset Location description	Asset Length (m)	Inspection Date	Inspection Comments	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
<b>Staithe</b>										
1221D901D0402C01	Breakwater	NZ78271901, NZ78441906. North breakwater.	370.8	30/10/2012	Tightly packed armour in v good cond. Corrosion to the sheet piling, one sheet pile displaced, missing steel capping. Significant cracking to the left hand beam (rock armour side, outer end). Cracking to promenade. Undercut inner side conc encasement.	3	4	>20	Repair cracks, monitor sheet piling corrosion and repair undercutting to wall.	routine
1221D901D0402C02	Sea wall with rock armour	NZ78301893, NZ78271901. South of Northern breakwater.	91.4	30/10/2012	Rock armour in good cond. Eastern part of prom cracked and spalling pos. due to placement of rock armour. South end promenade eroded and exposed aggregate, cracking spalling blockwork.	3	3	>20	Continue to monitor repair cracked wall and repair prom surface.	routine
1221D901D0402C03	Sea wall	NZ78251893, NZ78301893. RNLI slipway.	55.3	30/10/2012	Exposed agg at the face of the wall and in jt location, also horizontal cracks to wall. Slipway surface in good condition timber as new (?), timber piles cracked and weathered. Gabions gen in fair condition, but one section settled. corroded rails to sw.	3	3	11 - 20	Monitoring and repair cracks to wall.	routine
1221D901D0402C04	Sea wall.	NZ78261889, NZ78301886. South bank from bridge.	117.1	30/10/2012	Several large cracks, partic near to the corner of the wall Repair work to parts of wall evident, but some not holding. Some undercutting at toe. Missing bblocks and voids. Vegetation at toe and in parts of the wall. Minor cracks evident thought wall.	3	4	11 - 20	Monitor, repair cracks fill voids and undercutting to toe.	routine
1221D901D0402C05	Wall	NZ78301886, NZ78361882. Between East groyne and slipway.	70.5	30/10/2012	Multiple cracks and spalling. Loss of concrete render. Crack under the promenade beam to wall. Recent repair works noticeable. Washout at joints to slipway wall. Spalling of elevation layer in parts to wall. Cracks along promenade. Slipway v slippery.	3	4	11 - 20	Continue to monitor and repair cracks and joints.	routine
1221D901D0402C06	Channel side.	Staithe, LB of River D/S of footbridge.	100.3	30/10/2012	Promenade in fair condition. Toe armour to wall not well packed. Repair to failed cliff and revet upstream of bridge underway. Vegetation at top of wall. handrails repaired sance last inspection.	2	2	11 - 20	Complete repair to cliff facing, replace adj revetment at toe.	routine
1221D901D0402C22	Wall	Between slipway and groyne on South wall.	47.7	30/10/2012	AS prev: Missing joints and blocks, deep voids between the blocks, significant cracks to centre part of the wall NZ7829618863. Undercutting of the toe, and exposed toe. Groyne in good condition. Missing joints to slipway wall.	4	4	6 - 10	repairs to wall joints, cracks and toe.	routine
1221D901D0403C01	Wall.	NZ78361882, NZ78421880 South wall next to last slipway.	73.1	30/10/2012	Vertical full height crack through the wall between stairs and groyne as prev survey. Exposure of aggregate throughout wall. Vegetatiuon at top of wall. Cracking to promenade. Setps in fair conditon.	3	3	11 - 20	Continue to monitor and repair crack to wall and promenade cracking.	routine
1221D901D0403C03	Breakwater	NZ78491884, South Breakwater.	327.5	30/10/2012	Concrete crext units cracked in the middle of the length, spalling to the edge of wall NZ7847018896. Overall in structurally sound condition Rock armour tightly packed. Exposure to aggregate and const joints to the old part of the wall (inner face).	2	3	>20	Continue to monitor, monitor cracks and repair spalling.	routine
1221D901D0403C04	Breakwater with rock armour	NZ78431886, NZ78461884 Behind South breakwater.	39	30/10/2012	As prev survey: Good condition concrete breakwater, some slight localised erosion to top surface. Vegetation growth to walls Beach level is higher on the shore side.	2	2	>20	Continue to monitor.	routine
1221D901D0403C05	Revetment/slipway.	NZ78421881, NZ78441881 Next to cliff.	26.8	30/10/2012	Good condition no sig. cracks visible. Boats moored up along all of slipway, wall at top of slipway in good condition.	2	2	>20	Continue to monitor.	routine
1221D901D0403C06	Undefended cliff.	NZ78441881, NZ78461884	39.8	30/10/2012	Totally active. recent cliff falls. Warning signs present, but public still present.					
1221D901D0403C07	Groynes.	NZ78361882, NZ78381885. In-between South slipways.	32	30/10/2012	Spalling to second step and exposure to the aggregate, vertical crack to second step, rest of groyne in good condition, minor vegetation growth at seaward end.	3	3	>20	Continue to monitor and repair steps	routine

SBC NFCDD Coastal Defence Inspection Results\_r1.xlsx

Asset Number	Asset Type	Asset Location description	Asset Length (m)	Inspection Date	Inspection Comments	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
<b>Port Mulgrave</b>										
1221D901D0502C01	Pier.	NZ79871763, NZ79941769. Port Mulgrave pier.	161.4	30/10/2012	Very poor condition and considered redundant. Now less than half its original length due to erosion and wave action. Surface damage to top of the breakwater is significant and is due to deformation and failure throughout the length of the breakwater.	5	5	1 - 5	Assume as redundant, needs confirming. - same as previous inspection	routine
<b>Runswick Bay</b>										
1221D901D0601C01	Wall	NZ81081614, NZ81111619. Next to Upgarth Hill	72.4	19/04/2013	Erosion and abrasion / spalling to the wall toe. Cracks, erosion and spalling to capping beam. Wash out of the joints under the capping beam. Missing joints and filler joints in places on wall and prom. undercutting at toe of wall.	3	3	11 - 20	Repair joints, cracks and undercutting as well as fill the voids to wall.	routine
1221D901D0601C02	Breakwater	NZ81011606, NZ81031605.	26.1	30/10/2012	Breakwater / groyne. Large deep horizontal cracks at shore end of breakwater both sides, exposure of aggregates throughout breakwater. Smaller vertical cracks to breakwater at sea end.	3	3	11 - 20	Repair cracks and continue to monitor.	routine
1221D901D0601C03	Sea wall.	NZ81001604, NZ81081614. North of breakwater.	91.3	30/10/2012	Exposure of aggregate to toe, washout of the joints to block wall. Undercutting to toe, vertical crack to poured concrete wall. Erosion to toe at South part of wall as well as horizontal cracks. Some cracks to prom. Repairs to steps and toe being undercut.	3	4	11 - 20	Continue to monitor and repair cracks, voids and undercutting.	routine
1221D901D0601C04	Revetment	NZ81011601. Lifeboat slipway.	43.8	30/10/2012	As prev: Rotting timber supports to RNLI slipway, as well as exposure to aggregates to masonry supports, RNLI slipway seems to be redundant. Cracks to side walls of smaller slipway. Southern slipways in good condition.	2	3	11 - 20	Continue to monitor and repair cracks to north slipways.	routine
1221D901D0601C06	Sea wall.	North side of Runswick Bay	25.3	30/10/2012	Cracks to top of bagwork Some horizontal cracks at base of toe, with diagonal cracks in masonry wall above. Repair work evident to large cracks. Cracks to wall, as well as repair work evident to previous cracks.	3	3	11 - 20	Continue to monitor and repair cracks.	routine
1221D901D0601C07	Pumping station.	Runswick Bay. Pumping station.	33.3	30/10/2012	Pumping station and associated sea wall and berm. Wall and berm in very good condition. Corrosion to handrail standards, especially on steps.	1	1	>20	Continue to monitor.	routine
1221D901D0602C01	Rock armour.	NZ81051591, NZ81011601	318	30/10/2012	As prev insp: No defects to rock armour, positioned well and tightly packed. No loose rocks on the beach, slipway in good condition.	1	2	>20	Continue to monitor	routine
1221D901D0602C05	Wall	South end of bay.	56.2	30/10/2012	Wall in fair condition, some rotting to timber wall and shuttering. Conc toe not visible due to high beach level. Cracks throughout concrete tank blocks at South end of wall.	3	3	11 - 20	Continue to monitor and repair/replace timber.	routine
<b>Sandsend</b>										
1221D901D0701C02	Recurved Wall.	NZ86061286, NZ85981297. Wall protecting car park.	174.5	31/10/2012	Toe of wall exposed and undercut in many places. Toe armor displaced not protecting toe. Exposure of rebar to bottom of wall at N end. Bottom part of wall losing thickness. Large void under S side of slipway. Missing filler in joints & cracks to slipway.	4	3	11 - 20	Repair toe armour / undercutting to toe and cover exposed re bar.	urgent
1221D901D0702C01	Wall	NZ86061286, NZ86241268	259.1	31/10/2012	Groynes are missing almost all planks - derelict. Apron exposed and undercut. Timber planks & stakes next to apron missing and rotten. Missing joints filler under capping beam. Missing sealant in many joints in wall.	4	5	>20	Re-seal joints between poured sections of sea wall, and replace apron.	routine
1221D901D0702C02	Revetment.	NZ86281257, NZ86981226. North of Raven Hill.	774.5	30/10/2012	Large void 1.5m across in failed section just east of village. Cracks throughout revetment and missing sections of concrete overlay exposing rubble and stone underlayer. Undercutting to bottom of revetment. Improvement scheme planned.	4	4	1 - 5	Repair cracks and undercutting and continue to monitor.	urgent
1221D901D0702C03	Wall.	NZ86211252, NZ86251264. Wall extending from East Row Bridge	232.4	30/10/2012	As prev survey - blockwork wall to channel sided in good condition. Minor abrasion to a few blocks, a few cracks in mortar joints.	2	2	>20	Condition to monitor.	routine
1221D901D0702C04	Wall.	NZ86251264, NZ86241268. NE of East Row Bridge.	42.1	31/10/2012	Deep void under apron at S end behind toe piles. Toe piles exposed & corroded but gen intact. Groynes missing most of timber & derelict. Vertical crack to masonry wall near pipe at centre of wall. Some mortar missing in joints in masonry wall.	4	5	11 - 20	Repair voids under toe apron. Consider rock scour protection to toe piles.	routine
<b>Whitby</b>										

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Asset Number	Asset Type	Asset Location description	Asset Length (m)	Inspection Date	Inspection Comments	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
1221D901D0801C01	Wall.	NZ88161194, NZ88541185	439.3	31/10/2012	Seawall not vis. Rock armour good, well packed but movement in sev local areas. Prom has some surface cracks & several slabs may be sinking, with standing water at E end. Small wall back prom in gd con, but waves overtop. Toe not insp at W end due to WL	2	3	>20	Continue to monitor surface cracking in promenade.	routine
1221D901D0802C01	Wall	NZ88541185, NZ88671180	136.6	31/10/2012	Concrete wall has minor cracking. Surface abrasion over whole lower half of wall original surface is absent. Toe exposed and undercutting where no rock armour . V local damage to capping. Promenade flat and with no major defects.	3	3	6 - 10	Consider extending rock revetment.	routine
1221D901D0802C02	Wall.	NZ88671180, NZ88861170	216.1	31/10/2012	Rock armour in a good condition, closely packed, no signs of deformation. Sea wall also in good condition, where visibles. Promenade surface showing some signs of cracking and sealant loss between concrete sections.	2	3	>20	Continue to monitor joints between promenade sections.	routine
1221D901D0802C03	Wall.	NZ88861170, NZ89231154	166.8	31/10/2012	Lower half of wall abraded/eroded. Toe exposed at northern section due to low sand level - heavily undercut/eroded & missing in part. Apron missing locally. Surface erosion is visible to the wall, no cracking apparent. Prom has damage from wave overtop.	3	3	>20	Consider extending rock armour along this section.	routine
1221D901D0802C04	Sea wall.	NZ89231154, NZ89291153	65.4	31/10/2012	As prev: horizontal (at northern end) and one vertical crack in southern third of wall. Erosion/abrasion to lower half of wall. Northern half has been repaired. Hand rails intact where present, but with corrosion throughout. Minor cracking to promenade.	3	3	11 - 20	Repaint hand rails, repair eroded front face.	no repairs
1221D901D0802C05	Wall	NZ89401152, NZ89511152	43.1	31/10/2012	Timber construction holding back rock is stable. Concrete toe showing loss of surface and abrasion but looks sound. Blockwork walls appear sound with no visible defects, except vegetation near top..	3	3	>20	Continue active monitoring, potential undercutting.	routine
1221D901D0802C06	Wall.	NZ89361152, NZ89401152	37.5	31/10/2012	Blockwork wall, visible cracking and joint washout. Abrasion and loss of blocks and mortar in lower section at E end under ramp Water seeping through wall . Service pipe leaking significantly, with water and vegetation growth affecting structure of wall.	3	3	11 - 20	Repair or encase toe. Repair cracking in masonry wall. Repair pipe.	routine
1221D901D0802C07	Sea wall.	NZ89291153, NZ89361152	71.9	31/10/2012	Blockwork wall - cracking/loss of mortar in places. Generally stable although these points of weakness could cause failure. Higher concrete wall in a good condition, only minor defects visible. Minor cracking in promenade. Corrosion to hand rails.	3	3	>20	Repoint blockwork, replace or repair/paint handrails.	routine
1221D901D0802C09	Sea wall.	NZ89541152, NZ89651151	115.8	31/10/2012	High sections of blockwork sea wall built in between in-situ rock outcrops. Sections of masonry appear sound condition, limited mortar loss, but in several locations tie in of edges to cliff geeting outflanked / abraded. .	2	2	>20	Repair edges of panels where tie in to cliff	routine
1221D901D0802C10	Wall.	NZ89771147, NZ89781150. West side of West Pier.	26.8	31/10/2012	Displaced block, abrasion, open joints.	3	3	11 - 20	Continue to monitor repair displaced block	routine
1221D901D0802C11	Undefended frontage.	NZ89651151, NZ89771147	129.1	31/10/2012	Evidence of recent cliff falls onto beach.				Warning signs of cliff falls	
1221D901D0802C12	Wall	NZ89781150, NZ89861150 Start of west pier at slipway.	87.7	31/10/2012	Battery wall. Deep voids between blockwork, few blocks vertically cracked. Voids between corners of blocks, toe partially visible. Slipway wall capping beam and wall to W eroded, with displaced block. Promenade in good condition.	3	3	11 - 20	Continue to monitor and repair deep voids cracks and monitor erosion.	routine
1221D901D0802C13	Wall.	NZ88861170, NZ89231154	158.4	31/10/2012	Exposed damaged toe N of beach cafe. Cracks to wall visible above slipway E of beach cafe, require repair. Beach level is higher at southern end, toe not exposed here. Cracks in joint along prom 0.5m from edge.	3	3	>20	Repair cracks to wall above slipway. Fill/seal joint prom gaps. Repair toe in W.	routine
1221D901D0802C14	Sea wall.	NZ88861170, NZ89231154	86.2	31/10/2012	Erosion/abrasion to lower half of wall. Minor holes throughout. Loss of section of render at W ramp . Apron not visible. Minor cracking to prom throughout. Areas of chipping/cracking along top edge, repaired since last survey, some need repeat.	3	3	11 - 20	Repair chipped areas approx 0.5m from edge throughout.	routine

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1221D901D0802C15	Sea wall.	Beneath red brick building.	71.8	31/10/2012	Concrete toe showing signs of cracking, abrasion and loss of concrete and undercutting. Blockwork walls appear sound with only visible defect vegetation near top.	3	3	11 - 20	Repair toe, undercutting.	routine
1221D901D0803C01	Breakwater arm	NZ89921172, NZ89921187 West breakwater arm.	315.5	31/10/2012	Limited inspection to toe covered in water at low tide. Rust to handrailings, H&S slippery timber plank promenade. Some timber ends rotting. Abrasion to edges of concrete structure and exposure of aggregate. Timber supporting structure weathered.	3	3	>20	Repair concrete cracked joints and improve slippery planks for H&S.	routine
1221D901D0803C02	Breakwater	NZ89861145, NZ89931173 North pier.	639.7	31/10/2012	Fair to locally poor. Settlement of blocks, large gaps btwn mid W face. Inspection limited on E side of pier as water covers toe at LW. Missing blocks at LW line NE corner, E side & in face by 4th ladder from S end. Open joints at N end.	3	4	11 - 20	Investigate and repair displaced / missing blocks	urgent
1221D901D0803C03	Breakwater.	NZ90161146, NZ90001174. East Pier.	637	31/10/2012	Large cracks to promenade and settlement of poured concrete slabs. Erosion to capping beams. Voids to blockwork at NE bend. Displacement to blockwork, large cracks at several locns. Loose blocks at S end by rock armour.	4	4	6 - 10	Continue to monitor and repair and consider capital improvment scheme.	urgent
1221D901D0803C04	Breakwater.	NZ90041172, NZ89971186. East breakwater.	330.9	31/10/2012	Limitd insp due to WL Recent scheme repair to void at S end due to corroded toe piles. Eroded joints and gaps in wall. No access to promenade, although visible rust to railings, timber structure in poor cond.	4	4	11 - 20	Repair further sections of toe pile.	routine
1221D901D0803C05	Rock Armour	NZ90171146, NZ90421143. East side of pier.	420.7	31/10/2012	Cliff toe protection in fair conditon outside harbour. Some areas need reprofiling - displaced armour. Some natural rock within rock armour. Inside harbour evidence of wave damage to slope above revetment & displaced /missing rock - poor condition.	3	4	6 - 10	Continue to monitor and add rock armour & reprofile at Haggerlyth.	routine
1221D901D0803C06	Harbour Wall	LB Whitby Harbour	215.4	31/10/2012	Timber edge beam rotten and parts missing. Unable to inspect wall fully due to limited access. Where wall is visible some voids to blockwork. Deck support piles corroding. Limited access due to fish quay. Broken vertical fenders at fish quay lack bracing.	3	4	>20	Re-inspect with a boat. Repair fenders at fuel berth.	urgent
1221D901D0803C07	Harbour Wall	LB Whitby Harbour	157.4	31/10/2012	Timber fenders along length, vegetation to upper part of wall . Promenade in good condition. Wash out of joints at stairs at middle of wall length. Lower wall obscured by seaweed.	2	2	>20	Remove upper vegetation growth, repoint joints at steps..	routine
1221D901D0803C08	Harbour wall.	RB Whitby Harbour RNLI Station and Pier.	391.3	31/10/2012	South pier wooden structure some splits and rotting wood. Very weathersd blocks on s side of north pier. Appears to be void under NE toe of N pier and displacement of facing/crack to deck slab at end.. Missing mortar betwn blocks and cracked blocks.	4	4	11 - 20	Re inspect parts from boat, as well as repair voids, cracks and joints.	urgent
1221D901D0803C09	Harbour Wall	South of Collier Hope and Mussel Beds	154.9	31/10/2012	Riparian wall in various states. Protected by sand and cobble beach. Spalling/to the render and expsure of the aggregate.	3	3	11 - 20	Continue to monitor, repoint where needed. Replace missing blocks.	routine
1221D901D0803C10	Harbour Wall	RB D/S of Whitby Bridge	135.2	31/10/2012	Joint washout to blockwork wall, seaweed obscuring apron. Area of damage to blocks 20m d/s of bridge. Limited access, visual inspection from RNLI and bridge.	3	3	>20	Continue to monitor - repair washed out joints to wall.	routine

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Asset Number	Asset Type	Asset Location description	Asset Length (m)	Inspection Date	Inspection Comments	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
<b>Robin Hoods Bay</b>										
1221D901D1002C02	Rock armour.	Robin Hood's Bay.	59.4	07/11/2012	Rock armour remains tightly packed and in good condition. Installed in 2001. Large amounts of seaweed on beach at time of inspection.	2	2	>20	Continue to monitor.	routine
1221D901D1003C01	Rock armour revetment	NZ95340504, NZ95270520	183.4	07/11/2012	Wall was built in 2001 Rock armour mostly v good apart from one area in centre where there are gaps / displacements. Slipway ramp in good cond, some abrasion to slab and joints near toe. Wall very good. Fence above wall needs repair.	2	2	>20	Continue monitor.Repair fence Repack armour in centre to fill gaps.	routine
1221D901D1003C02	Wall.	NZ95330488, NZ95310502	150.5	07/11/2012	Toe not visible high beach levels. Joints open & enlarged in places at base. Conc wall poor - displaying surface cracking, rust staining and mineral encrustation visible due to seepage. Wall crest showing more cracking and repairwork that is failing.	4	5	6 - 10	Continue to monitor. Undertake capital repairs.	urgent
1221D901D1003C03	Undefended frontage	NZ95310503, NZ95340504	56	07/11/2012	Short undefended section. Active but slow erosion. Cutting back adjacent to wall to south.	4				
1221D901D1003C04	Wall	NZ95320486, NZ95330488	29.3	07/11/2012	Wall displaying surface erosion and joint washout. Area with deep voiding, approx 0.5m deep. Northern section has exposed toe and several large cracks, repairs now need repairing. Loose spalling blockwork style render to upper wall is H/S issue.	3	4	11 - 20	Grout voids, repair spalling, repoint joints, toe-undercutting, repair cracks.	routine
1221D901D1003C05	Apron	NZ95310485, NZ95320486	15.6	07/11/2012	Slipway in gen good condition. Some cracking but appears stable at present. Several missing cobbles near toe and some cracks/ missing joints, particularly around embedded timber rails.	2	2	11 - 20	Continue to monitor, investigate and fill voids, repoint as necessary.	routine
1221D901D1003C06	Wall	NZ95310481, NZ95310485	51.9	07/11/2012	Patchwork of repairs/repointing throughout but further work needed. Crack visible in S end of conc toe. Some undermining of S end of conc toe. Missing stone blocks in return end at south.	3	4	11 - 20	Continue to monitor and repoint / repair.	routine
1221D901D1003C07	Wall.	NZ95320468, NZ95310481	54.3	07/11/2012	Rock armour is tightly packed and performing well. Southern end of rock armour may need extending or reprofile to double sided to counter outflanking due to recent slumping / cut back of slope of coastal slope behind.	2	2	>20	Reprofile armour at southern end. Recent slumping.	routine
1221D901D1003C09	Wall.	NZ95320468, NZ95310481	62	07/11/2012	Constructed in 2001. Rock armour is gen tightly packed and good cover, but displacement of two units near toe in centre. Promenade and slipway in good cond. Fire damage to section of surfacing near gate to ramp. Gate to ramp corroded. Overall good.	2		>20	Repaint gate. Monitor armour for need to reprofile in future.	routine
1221D901D1003C10	Wall.	NZ95320468, NZ95310481	29.2	07/11/2012	Cracks beneath capping beam and damage to prev repairs.Cracks in S end of wall, where prev repairs are failing and condition is lowest of whole defence. Rock armour at toe in good condition. Timber steps at N end of prom worn with evidence of repairs.	2	3	>20	Continue to monitor. Repair spalling and joints where necessary.	routine
<b>Scarborough North Bay</b>										
1221D901D1201C01	WallSBC 38-20A-01	TA03569082, TA03569085. North of the Sea Life Centre.	37.4	07/11/2012	Some joints missing mortar. Small cracks throughout wall, as well as small holes near bridge. Promenade in good condition.	3	3	11 - 20	Continue to monitor and repair vertical construction joint and cracks.	routine
1221D901D1201C02	Wall.SBC 39-20A-02	TA03549057, TA03569082. Wall and promenade next to Sea Life Centre.	327.2	07/11/2012	Slipway not usable due to toe erosion. Wall toe getting undercut to N & S. Sheet piling visible in places holes in piles where visible. Exposed aggregate in places to wall. Cracks to splash wall but looks sound. Prom good cond, evid of overtop to rear.	3	3	11 - 20	Continue to monitor, refill filler to joints and repair cracks.	routine
1221D901D1201C03	Wall.SBC40-20A-02	TA03589031, South of Sea Life Centre.	120.6	07/11/2012	Toe piling only exposed at steps at N end. Erosion of external blockwork throughout sea wall. Vertical crack to sea wall at south end of stretch. Corroded handrails at Northern part of wall. Cracking and spalling to prom slabs.	3	3	>20	Continue to monitor and repair cracks to wall and handrail.	routine
1221D901D1201C04	Sea wall.SBC 41-20A-02	TA03599020, TA03589031 At North end of beach huts.	99.1	07/11/2012	Recent repair to capping. Missing joints at S slipway/ramp. Abrasion to S bottom part of wall. Blockwork missing to promenade back wall. Promenade in good condition.	3	3	11 - 20	Continue to monitor repair cracks and missing blockwork on back wall (not elemen	routine
1221D901D1201C05	Sea wall.SBC 42-20A-16	TA03758981, TA03599020	55.6	07/11/2012	High beach, only capping visible. Exposed aggregate in localised locations. Some chipped capping along length. Sections of capping damaged / missing from rear wall, one severe case 1m+ long. New rear wall under construction at new dev at S end.	3	3	11 - 20	Repair rear wall section at TA0371289908.	routine



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1221D901D1201C06	Sea wall.SBC 43-20B-01	TA03818971, TA03758981	34.2	07/11/2012	Some of joints are worn. Missing elevations to S section. Spalling to concrete. Several significant cracks running full height of structure. Prom. is cracked. Missing joint sealant in bottom of new wall, N ent.	3	3	11 - 20	Repair cracks.	routine
1221D901D1201C07	Sea wall.SBC 44-20B-02	TA03818971, TA04078946 East of Alexandra Gardens.	158.9	07/11/2012	Section of damaged coping in centre of wall. Missing blocks near toe S of centre. Previous repair work to cracks need repair. Corrosion to hand rails. Large sect of prom recently relaid in concrete. Erosion / undercutting at steps S end. Steps abraded.	3	3	11 - 20	Cracks need repointing throughout sea wall Repair damage to coping and toe.	routine
1221D901D1201C08	Sea wall with buttresses.SBC 45-20B-02	TA04078945, TA04288930	206.9	07/11/2012	Erosion to the elevation of the blockwork wall. Vertical cracks to capping beam and horizontal cracks to blockwork. Minor cracks and erosion to buttresses. Localised undercutting to toe. Cracks to prom. Vert crack just N of rock armour start.	3	4	11 - 20	Continue to monitor and repair cracks, monitor beach levels.	routine
1221D901D1201C10	Sea wall.SBC 41-20A-04	TA03599020, TA03589031	13	07/11/2012	Lower part of wall blocks eroded, few cracks appear on capping beam, needs maintenance, repoint missing mortar. High beach level, toe not visible. Promenade in good condition.	2	3	11 - 20	Repoint missing mortar to sea wall.	routine
1221D901D1201C11	Sea wall.SBC 42-20A-04	TA03758981, TA03599020	58.7	07/11/2012	Beach high. Evidence of repairs to capping. Abrasion to wall blocks and steps rounded. Cracks in poured concrete capping to wall, promenade in good condition. S section of rear revet looks recent replacement. Some sections of capping repaired since last	3	3	11 - 20	Repair cracks to capping.	routine
1221D901D1201C12	Sea wall.SBC 42-20A-06	TA03758981, TA03599020	58.4	07/11/2012	Sea wall mostly buried by sand. Section of coping to wall have been repaired, promenade in good condition. Rear revet in fair cond.	3	3	11 - 20	Continue to monitor.	routine
1221D901D1201C13	Sea wall.SBC 42-20A-08	TA03758981, TA03599020	58.2	07/11/2012	Beach high, only top row of blocks and capping visible. Cracks between sections of capping, erosion to capping exposing aggregate. Missing joints in grouted revetment to rear.	3	3	11 - 20	Repair cracks to capping and inspect when blockwork visible.	routine
1221D901D1201C14	Sea wall.SBC 42-20A-10.	TA03758981, TA03599020	58.4	07/11/2012	Cracks to capping with some erosion exposing aggregate in places, Some capping slabs repaired, but remaining showing signs of damage. High beach at time of inspection.Rear revet fair.	3	3	11 - 20	Repoint mortar loss and repair cracks to capping.	routine
1221D901D1201C15	Sea wall.SBC 42-20A-12	TA03758981, TA03599020	31.9	07/11/2012	Only concrete capping of wall visible due to high beach, wall capping and promenade in good condition, no visible defects. Rear wall - ramp below chalets / beach man centre appears near new cond, some rust staining at fixings..	3	3	11 - 20	Continue to monitor.	routine
1221D901D1201C16	Sea wall.SBC 42-20A-14	TA03758981, TA03599020. In front of Beach Management Centre.	32	07/11/2012	Only capping visible due to high beach. Some missing mortar to first (North) slab, cracking to capping at joints as well as the edges. Promenade in good condition. Voids / missing mortar / grout in rear revetment.	3	3	11 - 20	Repair cracks to capping and inspect at low beach height.	routine
1221D901D1201C17	Sea wall.SBC 42-20A-18	In front on new apartments.	22.8	07/11/2012	Only capping visible. Localised gapping at joint, in centre of defence. New wall to rear has replaced rock revetment.	3	3	>20	Repair joints between coping.	routine
1221D901D1201C18	Sea wall.SBC 42-20A-20	In front of new apartments.	43	07/11/2012	Horizontal cracking along capping along much of length. Promenade in fair condition. Rear wall as new.	3	3	11 - 20	Repair/replace damaged capping / coping beams.	routine
1221D901D1201C19	Sea wall.SBC 43-20B-03	TA03818971, TA03758981. In front of new development.	93.2	07/11/2012	Splash beam between walls spalling and damaged. Faces missing on some blocks. Exposure of aggregate of wall and missing joints. Exposure of aggregate to promenade side of north wall. Evidence of some patch repairs.	3	3	11 - 20	Repair missing joints and chipped parts of capping and splash beams.	routine
1221D901D1201C20	Sea wall (raised).SBC 44-20B-01	South of new development.	40.8	07/11/2012	Rus staining to coping to wall, abrasion / chipping of mid lvel splash beam. Slipway / prom in good condition. Beach high - only upper wall inspected.	3	3	11 - 20	Continue to monitor inspect at low beach height, and repoint missing joints.	routine
1221D901D1201C21	Seawall.SBC 44-20B-05	TA03818971, TA04078946 East of Alexandra Gardens.	211.1	07/11/2012	Missing joints, exposed toe and undercutting. Vertical cracks previously repaired. Erosion to capping. Cracks and holes between capping and prom. Missing blocks at toe. Missing section of handrail on bottom of ramp. Prom surface being replaced.	3	3	11 - 20	Repair cracks and missing joints as well as exposed toe and beach level.	routine
1221D901D1201C24	Wall.SBC 40-20A-04	TA03589031, TA03549057	65	07/11/2012	As prev survey: Exposed aggregate and erosion / spalling to capping beam and blockwork. Beam cracked/void in corner between steps and wall face. Cracks throughout promenade.	3	3	11 - 20	Continue to monitor. Repair damaged capping beam and cracks in promenade..	routine
1221D901D1201C25	Wall.SBC 40-20A-06	TA0357690349 North of slipway and beach huts.	73.8	07/11/2012	Erosion to external face of blockwork exposing aggregate, cracked blockwork in places, cracking to parts of promenade. Revetment to rear of prom appears in fair cond.	3	3	11 - 20	Continue to monitor and repair cracks.	routine

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1221D901D1201C26	Sea wall.SBC 42-20A-02	TA03758981, TA03599020	13.7	07/11/2012	Sea wall mostly buried by sand. Spalling in poured concrete capping to wall, promenade in fair condition.	3	3	11 - 20	Repair cracks to capping.	routine
<b>The Holms and Castle Headland</b>										
1221D901D1202C01	Wall.SBC 46-20B-01	TA04288929, TA0493895. East of Albert Road.	124.8	07/11/2012	Original wall hidden by rock armour, splash wall seems to be in good condition, but local rust staining . Tightly packed rock armour in gen, but one or two loose rocks near toe. Scour at toe of steps prevents use at low tide.	2	2	>20	Continue to monitor.	routine
1221D901D1202C02	Wall.	TA05178883, TA04988952. East of Scarborough Castle.	886.7	08/11/2012	Vertical cracks on some of the splash wall modules, some chipping at joints, Accropodes slightly eroded and chipped throughout. No concern at present. Promenade slab sound. Piling not all visible, inspection only from crest.	3	3	>20	Continue to monitor and repair cracks and joints to splash wall.	routine
1221D901D1202C03	Wall.SBC 46-20B-04		429.2	08/11/2012	Constructed 2003ish. The Holms. Prom & Splash wall in good cond. Some of prom surfacing damaged locally. Armour well packed and good cover. Original wall not visible.	2		>20	Continue to monitor.	routine
1221D901D1202C04	Wall.SBC 46-20B-07		219.9	08/11/2012	Rock with toe piles. Original wall hidden by armour, splash wall seems to be in good condition. Tightly packed rock armour appears stable, no loose rocks. Toe piling working well, some natural rock against piling. Prom good con. Some toe piles chipped.	2	3	>20	Continue to monitor.	routine
1221D901D1202C23	Sea wall.SBC 45-20B-03	North of Albert Road.	31.5	07/11/2012	2 large vertical cracks extending throughwall Another crack extending half way through the wall. Missing blockwork and lower part of wall eroded and exposed aggregate. Cracks to promenade.	3	3	11 - 20	Continue to monitor, repair all cracks and monitor beach level.	routine
<b>Scarborough Harbour and South Bay</b>										
1221D901D1301C01	Breakwater.	TA04958849, TA05178883 North Harbour Breakwater.	444.9	16/10/2012	Element 1 is under the rock armour. Crest wall good. Rock armour & accropodes in generally good condition, and well packed. Minor abraision to edges, less tightly packed or missing armour units at south end of wall. Several cracked pieces of armour.	2	4	>20	Continue to monitor.	routine
1221D901D1301C02	Wall.	TA05108874, TA05148874. Next to fair ground.	77.9	16/10/2012	Wall unable to be inspected due to timber decking and high sand level under decking. Missing joints to the wall at slipway edge. Missing grout between stone blocks in slipway surface	3	3	>20	Repoint missing joints to slipway wall and repair slipway surfacing.	routine
1221D901D1301C03	Breakwater	TA04958853, TA04938860. Lighthouse island.	83.5	16/10/2012	Inner wall at entrance breakwater. Numerous cracks to blocks and missing mortar in joints. Vegetation and fenders obscuring most of walls.	3	3	11 - 20	Continue to monitor and repoint cracks and joints.	routine
1221D901D1301C04	Breakwater.	TA04948860, TA05088877. Inner wall promenade breakwater.	463.1	16/10/2012	Appears fair. Missing fill between blocks throughout wall, fenders and vegetation obscuring the lower parts of wall. Promenade in good condition.	3	3	11 - 20	Continue to monitor and repoint cracks and missing joints.	routine
1221D901D1301C05	Wall.	TA05048878, TA05088877. South of roundabout opposite arcade.	43.2	16/10/2012	Cracking and missing joints to top of capping, arches look structurally sound, rust to the access ladders. Promenade in good condition.	3	3	>20	Continue to monitor repair cracks and missing joints.	routine
1221D901D1301C06	Wall.	TA04768876, TA04958876. Opposite Information centre.	195.8	16/10/2012	Back wall appears to be fair to good, where visible although cracks and missing joints in places. Suspended quay appears to be fair condition, some cracks in protective coating.	3	3	11 - 20	Monitor and repair underside of suspended deck and cracks to wall.	routine
1221D901D1301C07	Breakwater.SBC 49-21B-04	TA04738870, TA04908862. Beach end of West Pier, between stairs.	58.7	16/10/2012	Scour apron undermined / failed near bend in wall. Horizontal and vertical cracking at bend of wall, repair work failing. Exposed aggregate throughout wall. Numerous cracks throughout wall.	3	3	11 - 20	Continue to monitor and repair cracks, voids and damaged apron.	routine

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1221D901D1301C08	Sea wall.SBC 49-21B-01	TA04708872, TA04738870	69.2	16/10/2012	No change from last inspection: Some mortar loss to joints of wall, some minor erosion to capping beam next to the West Pier, as well as minor mortar loss of joints to toe.	3	3	>20	Continue monitoring, repair joints.	routine
1221D901D1301C09	Wall.SBC 52-22A-02	TA04428822, TA04438827. Wall at underground tunnel entrance.	41.5	16/10/2012	Missing mortar in joints to wall and signs of abrasion. Open joints in blockwork surface to slipway at north end. Unable to inspect wall fully due to beach level. Several full height vertical cracks to upper road wall. Promenade in good condition.	3	3	11 - 20	Continue to monitor and repair joints and cracks.	routine
1221D901D1301C10	Wall.SBC 52-22A-04	TA04508772, TA04428822. South of slipway.	100.7	16/10/2012	Missing mortar joints to wall, occ and cracked blockwork to lower part of wall, vegetation near slipway. Beach lowers to Southern end.	3	3	11 - 20	Continue to monitor, repair cracks and joints.	routine
1221D901D1301C11	Wall.	TA04958876, TA04998877, Opposite Subway restaurant.	47	16/10/2012	Few minor cracks to wall, spalling to capping. Promenade in good condition. Upper wall good. Slipway blocks missing mortar joints in places. Concrete piles at lower wall appear to have rotated in past but appear stable.	3	3	>20	Continue monitoring, repair cracks / joints.	routine
1221D901D1301C12	Wall	TA04998877, TA05048878. Next to masonry arches.	51.7	16/10/2012	Corrosion evident sheet piles, especially lower part, but appear fair. Fenders and promenade in good condition. Missing mortar in joints in slipway surfacing at western end.	3	3	>20	Continue to monitor.	routine
1221D901D1301C13	Piling.	TA04758875, TA04908862. West pier wall.	140.2	16/10/2012	Cracks throughout concrete backfill edge, corrosion to piles, but appear fair to good where visible. Promenade in good condition.	3	3	11 - 20	Repair cracks to concrete backfill future inspection from boat.	routine
1221D901D1301C14	Revetment	TA04758875, TA04768876. West of Information centre.	19.5	16/10/2012	Missing mortar in wall at top and in places throughout slipway, no missing cobbles, sidewalls in good condition.	3	3	>20	Continue active monitoring repoint missing joints.	routine
1221D901D1301C15	Wall.SBC 51-22A-02	TA04538856, TA04698873	40.3	16/10/2012	Missing mortar joints throughout wall, especially to coping unable to inspect wall fully due to high beach level. Prom good. Handrail OK	3	3	11 - 20	Repair joints between blocks.	routine
1221D901D1301C16	Breakwater.	Scarborough Harbour. North inner breakwater wall.	362.1	16/10/2012	Vegetation at bottom half of wall. Wall was repaired 2004/5. Erosion to wall joints throughout esp at toe, missing mortar / voids. Some cracks to promenade. Rotten timber edge beams & rusted brackets. Loss of fill under steps cracking at other steps.	3	3	>20	Continue to monitor, fill cracks and toe voids.	routine
1221D901D1301C17	Breakwater.	TA04958853, TA04938860. Wall at south side of Lighthouse island	97	16/10/2012	Outer face. Sheet piles corroded, but look generally fair, although obscured by vegetation growing on the bottom of the piling. Void under southern corner, see photo.	3	4	11 - 20	Repair cracks and repair toe void.	routine
1221D901D1301C18	Breakwater.	West Pier, Scarborough South Bay.	115.6	16/10/2012	Fair overall. Corrosion to piles throughout, vegetation at lower parts obscuring wall. Cracking and missing render at steps. Cracking in the pier deck concrete.	3	3	11 - 20	Continue to monitor, repair cracks to promenade.	routine
1221D901D1301C19	Breakwater.SBC 49-21B-02	TA04738870, TA04908862. Shore end of West Pier.	110.4	16/10/2012	Vertical crack from top to bottom of wall at middle section of length, appears same as last inspection. Horizontal and vertical cracks and exposed aggregate throughout wall. Few minor cracks to promenade. Timber toe piles exposed and in poor condition.	4	4	11 - 20	Continue to monitor and repair cracks.	routine
1221D901D1301C20	Slipway with wall. SBC 51-22A-01	Next to Life boat house.	28.5	16/10/2012	Missing joints and small cracks to the capping, missing filler in joints to cobble slipway.	3	3	11 - 20	Repair missing joints and cracks and inspect at lower beach height.	routine

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1221D901D1301C21	Wall. SBC 51-22A-04	TA04538856, TA04698873	57.8	16/10/2012	Wall in good cond, occasional missing mortar. Prom good. Beach high so only inspected upper wall.	2		6 - 10	108,9 Repoint when necessary.	routine
1221D901D1301C22	Wall. SBC 51-22A-06	TA04538856, TA04698873	114.9	16/10/2012	Beach high so only upper wall visible. Wall appears in good condition. Missing section of lower handrail and broken upper suction.	2		6 - 10	Repair handrails	routine
1221D901D1301C23	Wall. SBC 51-22A-08	TA04538856, TA04698873	101.8	16/10/2012	Beach high so only upper wall inspected. Wall appears in fair to good condition.	3		6 - 10	Repoint gaps in blocks.	routine
1221D901D1301C24	Wall. SBC 51-22A-10	TA04538856, TA04698873	109.7	16/10/2012	Beach high, only upper wall visible. Southern section face of masonry abraded. Prom good.	3			monitor and repoint when necessary	routine
1221D901D1301C25	Wall.SBC 51-22A-12	TA04538856, TA04698873. In front of Hotel.	99.1	16/10/2012	Beach level high. Missing mortar in joints in places. Promenade in good condition. Outfall flap bottom covered by sand. Unable to fully inspect wall as high beach level.	3	3	11 - 20	Continue to monitor and repair joints, inspect at low beach level.	routine
1221D901D1301C26	Wall. SBC 53-22B-02	TA04508772, TA04428822. South of slipway.	162.1	16/10/2012	Wall in fair to good condition. Some cracked blocks but seem stable. Missing mortar / open joints here and there. Crest wall has weathering / abrasion damage to some stone blocks and missing mortar or cracks in joints.	3	3	11 - 20	Replace weathered blocks in crest wall. Grout joints.	routine
1221D901D1301C27	Wall.SBC 53-22B-05	TA04508772, TA04428822. North of The Spa.	158.1	16/10/2012	Beach rel high at time of survey. Toe piling corroding. Crest wall has open joints from washout of mortar. Multiple repairs, some not holding well. Repaired concrete coping stones loose. Many cracks, open joints and displ blocks in main wall.	3	4	6 - 10	Develop improvement scheme. Repair cracks and joints to hold wall until scheme.	urgent
1221D901D1301C28	Wall.SBC 53-22B-06	TA04508772, TA04428822 Opposite The Spa	76.4	16/10/2012	As prev inspt: Open joints and cracked blocks throughout, cracking to splash beam esp in south. Erosion / scour at toe along Northern section of wall.	3	4	6 - 10	Monitor and patch up until improvement scheme implemented.	urgent
1221D901D1301C29	Wall.SBC 53-22B-07	TA04508772, TA04428822. South of The Spa.	57.4	16/10/2012	Open joints, major spalling and loss of concrete to lower splash beam below infilled openings. Small void at toe near to South end. Promenade in good condition.	3	4	6 - 10	Continue repair joints and monitor erosion until scheme implemented.	urgent
1221D901D1302C01	Wall.SBC 54-22B-01	TA04538765, TA04508772. Next to cliff railway.	77.5	16/10/2012	Open joints in lower wall and two large areas of missing facing blocks - poor. Cracking and corrosion /rust staining to beams supporting upper prom near stairs. Cracking & rust staining to cols. Major weathering loss of stone blocks in rear splash wall.	4	4	1 - 5	Patch up until scheme can be implemented.	urgent
1221D901D1302C02	Wall.SBC 55-22B-01	TA04628752, TA04538765. In front of Beach Chalets.	231.8	08/11/2012	Several sections rebuilt facing and wave wall. But central S section needs urgent attention where facing lost. Repairs to upper wall and prom evident, but large sections missing joints in prom slabs. Ind missing joints.	4	5	6 - 10	Continue to monitor and repair / refurbish.	urgent
1221D901D1302C03	Wall.SBC 54-22B-03	TA04628752, TA04538765. South of cliff railway.	19.2	16/10/2012	Full height crack to stair wall. Horiz crack and wash out of joints in main wall. Joint mortar loss in many places. Cracks and signs of movement in stairs. Repair work to prom visible and crack across full width.	3	4	1 - 5	Regular repair to joints, cracks and void.	urgent

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1221D901D1303C02	Sea wall.SBC 56-22B-05	TA04828723, TA04668746.Wall at Dickinsons Point.	308.2	08/11/2012	Deep voids/ missing joints in blockwork in lower wall need attention. Lower promenade missing filler between slabs; some new slabs but others eroded. Loss of facing to second wall, cracks/spalling to splash beam.	4	4	6 - 10	Urgently repair voids to lower wall, and repair cracks throughout.	urgent
1221D901D1304C01	Rock armour.SBC 56-22B-08	TA05038695, TA04868713. Land slip.	294.7	08/11/2012	Southern ramp has vertical drop to rocks and crack in bottom slab. Rock armour tightly packed, good cover and looks in good condition. Toe not all inspected due to tide cover.	2	2	>20	Continue to monitor, monitor stability of cliffs, repair cracked ramp	routine
1221D901D1304C02	Bastion and sea walls.SBC 56-22B-07	TA04868713, TA04828723. East of Holbeck Gardens.	112.5	08/11/2012	Cracks to bastion throughout. Replaced section at head of bastion. Missing / damaged parts of lower capping beam. Unable to inspect lower wall due to high beach level. Corroded handrail with missing sections.	3	4	11 - 20	repair handrail on upper level, repair cracks.	routine
<b>Cayton Bay</b>										
1221D901D1402C02	Wall.SBC 58-24B-01	TA06618455, TA06648454	34	08/11/2012	North of old PS. Poured concrete and concrete blockwork toe below a stepped seawall with curved coping stone. More recent construction than adjacent walls. Repairs to out flanking at northern end of wall with bricks. Generally looks sound.	3	3	>20	Repair toe voids. continue to monitor condition of wall, joints and toe.	routine
1221D901D1402C04	Wall.SBC-60-24B-01	TA06698449, TA06758445	32.6	08/11/2012	Southern section of apron is missing, lower sea wall has been undercut and failed. Blockwork missing and displaced. Apron has also been uplifted. Some repairs to deck with concrete. Upper wall missing southern section. Toe undermined	4	5	6 - 10	Repair or removal / making safe.	urgent
1221D901D1402C05	Sea wall.SBC-59-24B-01	TA06698449, TA06658454	67.3	08/11/2012	Private wall to old PS. Lower apron has recent repairs with poured concrete, but cracks forming. Recent repointing to lower wall joints evident. Berm not able to inspect. Higher wall in slightly better than lower. Beach high, but toe may be undercut.	3	4	6 - 10	Private maintenance.	routine
1221D901D1402C06	Wall/apron.SBC-60-24B-01	Nr Pumping Station in Cayton Bay.	19.9	08/11/2012	Mass concrete wall has failed and is breaking up. Repair work undertaken to deck to make safer for pedestrians - a skim of poured concrete now covers voids. However, the structure remains unsafe Needs removing and replacing with safer beach access.	5	3	1 - 5	Demolish and remove and construct safer beach access ramp.	routine
<b>Filey</b>										
1221D901D1601C01	Simple Cliff / Scarp	TA12278130, TA12338139	108.9	08/11/2012	Undefended section. Former slope stabilisation below boat park has failed. Fully active. Geotextile debris washing onto beach. Erosion at S next to Sailing Club piling should be monitored.	5	4	6 - 10	Remove debris from beach.	
1221D901D1601C02	Breastwork	TA12248126, TA12278130	18.3	08/11/2012	Rock armour scattered and totally ineffective. Timber breastwork is failed and still laying on beach. Coastal slope appears to be actively eroding.	5	5	11 - 20	Rebuild or allow to become fully redundant remove debris.	no repairs
1221D901D1601C03	Piling.SBC-64-28A-02	TA12228121, TA12248126	55.8	08/11/2012	Sheet piling heavily corroded with large holes within sheet pile leading to voids under prom in front of club and P/S. Piles adjacent to slip and at N end appear new, but are corroding. Piles remain vertical although gaps between piles are developing.	4	4	6 - 10	Replace sheet piling with new.	routine
1221D901D1602C01	Wall	TA12118095, TA12128100	49.6	08/11/2012	Some areas missing or eroded joints in slipway blockwork. Long horiz crack in wall. Large void in centre of wall near N end of chalets. Abrasion and erosion to rest of wall visible.	3	3	11 - 20	Repair damaged wall.	routine
1221D901D1602C02	Wall.SBC-67-28B-13	TA12068082, TA12118095	18.5	09/11/2012	Gabions covered in small rock armour. Rock is in a single layer and stacked near vertically, so unstable. Two areas of collapse - at centre and S end. Slumping cliffs behind may be pushing rock over. Needs additional rock and reprofile to stable slope.	4	4	1 - 5	Rebuild rock armour to stable slope 1:3	urgent
1221D901D1602C03	Wall.SBC-67-28B-05	TA11978020, TA12068082	318.8	09/11/2012	Chipped / abraded areas of blocks. Loss of face to many isolated blocks throughout. Some drainage pipes blocked. Several new / repaired coping blocks. Exposed aggregate on several coping stones. Loose lower handrail at fixing to bridge.	3	3	11 - 20	Replace chipped coping. Repair / paint bridge. Fix hand rail.	routine

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Asset Number	Asset Type	Asset Location description	Asset Length (m)	Inspection Date	Inspection Comments	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
1221D901D1602C04	Splash WallSBC-67-28B-07	TA11968012, TA11978020	91.8	09/11/2012	Some missing mortar at joints in coping. Evidence of repair to cracks/joints with mastic. Abrasion / chipping to steps. Faces of some blocks missing. Missing joints between some blocks.	3	3	>20	Repair joints & damaged blocks. Monitor.	routine
1221D901D1602C05	Wall.SBC-67-28B-11	TA11957997, TA11968012	103.9	09/11/2012	No cracks visible in promenade, . Chipping and cracking to coping in small areas throughout length. Numerous lower blocks from beach level to 2m damaged on front face. Toe exposed on seaward section. Horizontal crack on seaward section along 8 blocks	3	3	>20	Repair damage to blocks. Consider extending scour apron seaward from outfall.	routine
1221D901D1602C06	Sea wall.SBC-67-28B-01	North of promenade, Filey.	109.8	09/11/2012	Damage to blocks near slipway. Missing pointing between blocks on wall and in slipway. Damage to front face of several blocks. Repairs visible to vertical cracks, but needs repointing.	3	3	11 - 20	Repointing. Repair coping stones and cracks.	routine
1221D901D1602C07	Wall.SBC-67-28B-09		98	09/11/2012	Cracking to splash beam in several areas. No visible deformation to promenade. Numerous chipped / damaged blocks. Vertical crack in S steps buttress.	3	3	>20	Repair front faces of blocks and splash beam.	routine
1221D901D1602C08	Wall.SBC-67-28B-03	TA11978020, TA12068082	301.6	09/11/2012	Some blocks with eroded front face, partic' just above beach level. Numerous splash beam blocks with cracks -also many have been repaired. Several cracked coping blocks. Drainage flap valves part or fully covered in sand. Missing joints in slipway.	3	3	>20	Replac/ repair cracked coping and repair damaged blocks. Repoint slipways joints.	routine
1221D901D1602C09	Sea wall.	N of promenade, Filey.	38.8	08/11/2012	Toe exposed near north end of wall. Major cracks, loose blocks and damaged coping near northern end. Missing joints throughtout and degradation of front faces of blocks and capping.	4	4	11 - 20	Repair cracks, grout loose blocks, protecte toe.	routine