Cell 1 Regional Coastal Monitoring Programme
Walk-over Visual Inspections of Assets

Sunderland City Council
Final Report

September 2014

Sunderland City Council

Walk-over Visual Inspections of Assets

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	0	Final	Jan 2015	AP

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Appendices

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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.

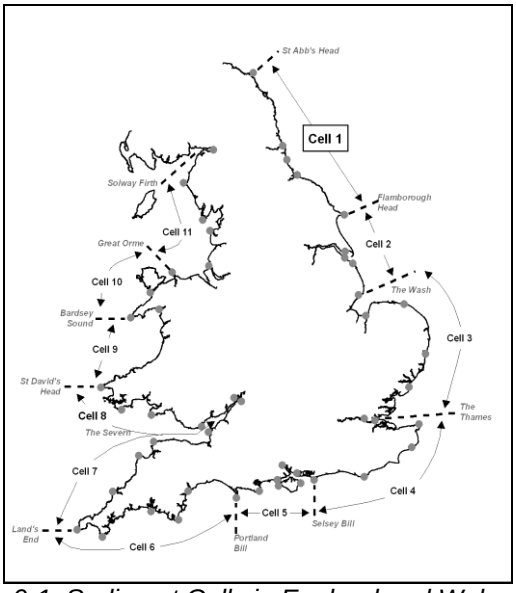


Figure 0-1: Sediment Cells in England and Wales

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:

Northumberland County Council
North Tyneside Council
South Tyneside Council
Northumberland Coast AONB
Sunderland City Council
Durham County Council
Redcar & Cleveland Borough Council
Hartlepool Borough Council
Whitby Scarborough Filey Borough of Scarborough
East Riding of Yorkshire Council
A great place to live, work & play
Environment Agency
Natural England
The National Trust

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 Group Limited (Halcrow) a CH2M HILL company.

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 Sunderland City Council's frontage that were carried out in September 2014.

1 Introduction

1.1 Study Area

Sunderland City Council's frontage is approximately 10km in length overall and extends from The Bents in the north, to Ryhope Dene in the south and is shown in *Figure 1-1.* The frontage includes three management areas, MA6, MA7 and MA8 from the Shoreline Management Plan.

In accordance with previous coastal inspection surveys, this frontage is sub-divided into approximately coastal 36 assets, 31 of which are man-made assets while 5 are natural assets. Detailed maps showing the location of each of these NFCDD assets are presented in Appendix A.

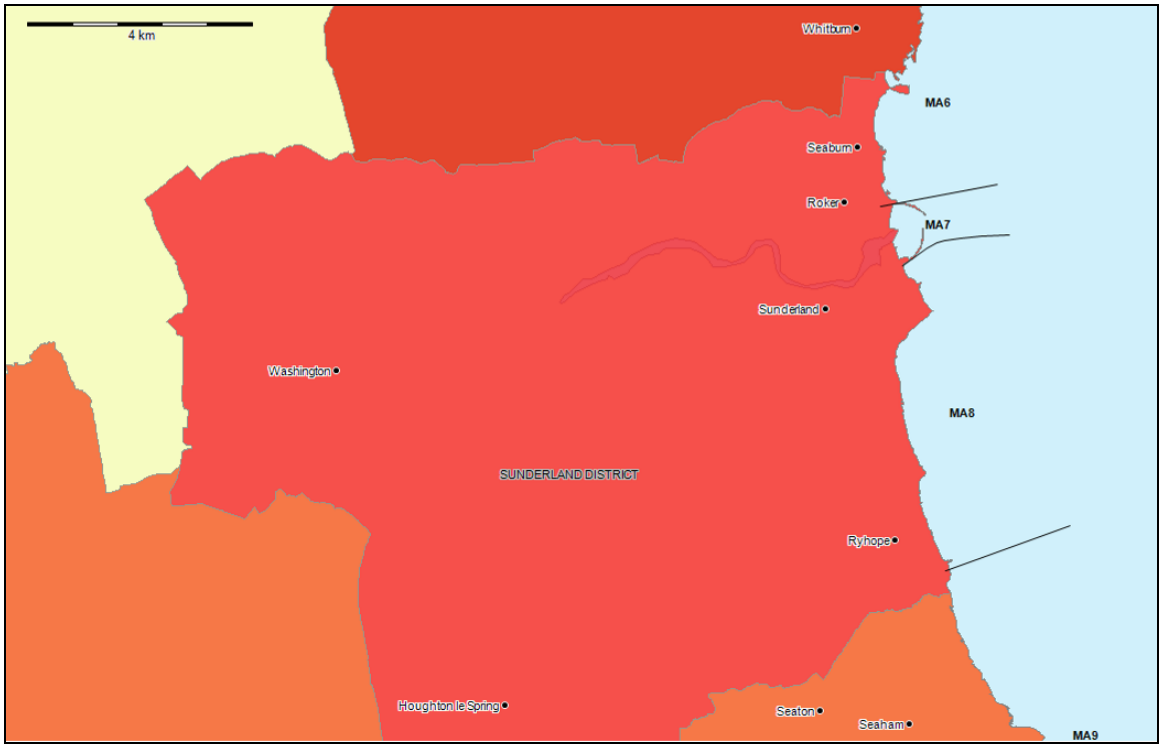


Figure 1-1: Sunderland City Council study area.

The northern section of the frontage to South Bents is made up of undefended limestone cliffs backing rock outcrops and a sand and shingle beach. North of the River Wear, the frontage is defended by about 3.6km of concrete and masonry structures through Seaburn and Roker. The entrance to Sunderland Harbour lies between Roker Pier and the New South Pier. South of the Harbour entrance 2.6km of the frontage is within the Port of Sunderland area, which is owned by the Council but has restricted access. To the south of the port boundary, there is a 1km length of defended frontage at Hendon, south of which 3km of the coastline is undefended and characterised by Magnesian Limestone cliffs capped with boulder clay.

1.2 Methodology

This section presents the approach taken for the slope and asset inspections respectively for the Sunderland City Council coastal frontage.

The visual assessment of both natural and built assets on the Cell 1 coastline was carried out by a team of Chartered engineers in Summer / Autumn 2014. The walkover inspections for the Sunderland City Council frontage were undertaken on the 11th September 2014. The weather experienced during the inspections was dry and bright with good visibility.

The frontage has been split into a number of 'asset lengths' as defined in the National Flood and Coastal Defence Database (NFCDD) that was established by the Environment Agency (EA). These asset lengths have been used for reporting on the walkover inspections since 2008.

The walk over inspections covered both built defences assets and natural defence assets such as cliffs, slopes and dunes. All assets were visually inspection, photographed, graded based on their condition and an estimate made of their residual life. For built assets the grading classification was undertaken in accordance with the Condition Assessment Manual (EA, 2011), with estimates made of the urgency of any necessary repairs. An extract of the grading classification for built assets is presented in Table 1-1. For ease of reference the photos presented in this report have also been bordered with the colours key indicated below.

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 performance of the asset. Further investigation needed.
5	Very Poor	Severe defects resulting in complete performance failure

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

In addition to the above grading classification, for natural asset such as cliffs and slopes the same five point activity scale used in previous cliff activity assessments undertaken by Halcrow for Scarborough Borough Council in Cell 1 was used (Halcrow 2002, Halcrow 2005, Halcrow 2009). An extract of this grading classification is presented in Table 1-2. For ease of reference the photos presented in this report have also been bordered with the colours key indicated below.

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	Retreating cliffline with localised small landslides or areas of erosion.
4	Partly	Retreating cliffline with very common smaller-scale landslides or areas of intense erosion.
5	Totally	Retreating cliff line almost entirely affected by large-scale landsliding or intense erosion.

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

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

For ease of reference the report has been sub-divided into "Management Areas" as defined in the overarching Shoreline Management Plan (SMP2) for the coastline between The River Tyne and Flamborough Head.

In addition to this report, full details of the inspection and a selection of appropriate photographs have been entered into the SANDS database, a copy of which, along with viewing software is provided along with this report.

2 Overview

There have been only relatively limited changes in the condition of the built and natural defence assets along the Sunderland frontage since the previous formal inspections in 2012/13.

The following gives an overview of findings observed during the 2014 inspections:

- **The Bents** – the beaches and coastal slopes in the lee of the Whitburn Steel rock outcrop showed little change since the 2012 inspection with well vegetated slopes south of the district boundary.

- **Seaburn** – The masonry wall to the north of Dykelands Road (Southern part of asset ref. no. 121AB901B0603C01 and asset 121AB901B0603C02) has suffered major storm damage with the handrails and coping blocks removed by wave action and parts of the promenade damaged. The area was fenced off awaiting repair. Beach levels were slightly higher than seen in May 2013 and so the toe of the wall south of Dykelands Road (asset Ref. No. 121AB901B0603C03), which had previously been noted as undercut was not visible. Cracks between the seawall and concrete outfall structures noted in previous inspections were similar or slightly worse and still need attention.

- **Roker Cliff Park** – (Asset Ref. No. 121AB901B0604C02), voids in the grouted masonry revetment landward of the promenade identified in previous reports since 2008 have worsened and expanded with further loss of fill material. There has been further erosion of some of the limestone outcrops which the seawall is founded on / integrated with and this is leading to voids beneath the seawall that will need repairs. The masonry wall around the headland (Asset Ref. No. 121AB901B0605C01) to the north of the Ravine entrance to Roker Park remains in generally good condition, but has been damaged at the most seaward section where a repair to a missing facing block was required.

- **Roker Pier to North Pier** – At the time of the inspection Roker Pier (Asset Ref. No. 121AB901B0702C04) was closed to the public as major refurbishment and repair works were underway. The defences between Roker Pier and the River Wear were in similar condition to that seen in 2012).

- **Port of Sunderland (north)** – The condition of the defences were similar or slightly worse than in previous inspection in 2013. There has been significant wave overtopping damage to the wall crest and informal rubble embankment to the north side of New South Pier.

- **New South Pier** – There were several areas of damage to the blockwork on the upper promenade level of New South Pier that require repair. The masonry seawall to the south of New South Pier was similar or slightly worse than noted in 2013 and the shingle beach levels to the south were much lower, so extension of the rock armour further north is still recommended. The defences to the south consist of rock armour and mixed rubble and have gaps in the rock armour that need topping up.

- **South Outlet -–** further deterioration has taken place to the **North East Pier and South West Breakwater** structures which have been reported in poor to very poor condition since the first inspections under the regional monitoring in 2008.

- **Spur barrier to Hendon Seawall** – As noted in the 2012/13 report, the highest priority section of defence for urgent works in the Port area remains the wall adjacent to the north end of the sewage treatment works, which has an unprotected crest and

inadequate rock armouring (Asset Ref. No. 121AB901B0802C03). The failed section of the rear crest wall on the most southerly defence in the Port (121AB901B0802C01) has been repaired and several other sections reinforced and the missing flood gates at access points though the crest wall had been replaced. The steel toe piling is badly corroded with voids though in places which may compromise the defence through loss of fill. At Hendon Seawall the toe piles were exposed and are badly corroded and abraded in locations not protected by rock armour.

- **Cliffs between Hendon and Ryhope Dene** – The heavy rain in the wet autumn / winter of 2012/13 initiated multiple failures in the upper till slopes. There was active erosion along much of the length at the time of the September 2014 inspections. This will have further reduced the distance between the cliff edge and the public footpath.

3 Condition Assessment

3.1 Souter Point to Roker Pier (MA 06)

3.1.1 The Bents

The Sunderland City Council area starts mid-way through the SMP2 Management Area 06 at The Bents. The most northerly asset is an undefended grassed slope, NFCDD Asset Ref. No. 121AB901B0602C01 located to landward of the Whitburn Steel rock outcrop. This asset length is continuous across the district boundary into South Tyneside area and consists of a grassy coastal slope fronted by vegetated sand dunes, below left and (right). The dunes appeared relatively stable with good vegetation cover and appear similar to the 2012 inspection. The northern part of this asset switches to an eroding clay cliff north of the district boundary, see lower photos below. The outfall structure located close to / north of the boundary that was noted to have failed scour protection in the 2012 report has been reconstructed on a slightly different alignment, see lower right photo below.

View from north - Photo from 2012 report. (Asset Ref. No. 121AB901B0602C01)

Well vegetated slope with shingle berm at toe. (Asset Ref. No. 121AB901B0602C01)

Photo from 2012/13 report showing failed outfall scour protection at north end of unit. (Asset Ref. No. 121AB901B0602C01)

Outfall has been reconstructed at north end of unit. (Asset Ref. No. 121AB901B0602C01)

The promenade at South Bents, Asset Ref. No. 121AB901B0603C01 is fronted by concrete and masonry seawalls. The beach level at the time of the inspection in September 2014 appeared to be similar to the 2010 inspection (see photos below) and the shingle that had been present up against the seawall in 2010 was again visible. The concrete section of wall at the north end was in fair condition, with the beach higher to the north. The masonry wall fronting the remainder of

the asset was has suffered from storm damage over the southern length, with the handrails and coping blocks removed by wave action and parts of the promenade damaged, see lower photos below. The area was fenced off awaiting repair.

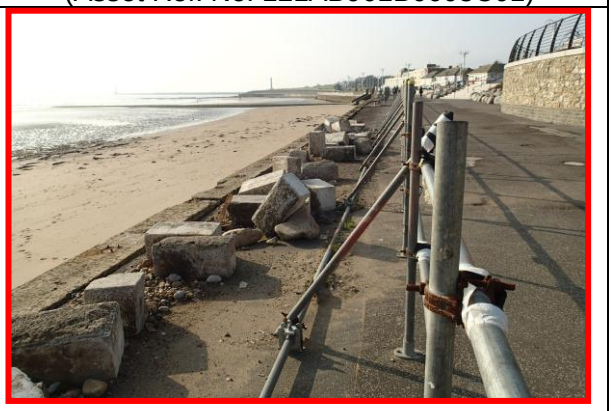
Sandy upper beach surface during first inspection under programme in 2008.
(Asset Ref. No. 121AB901B0603C01)

Shingle upper beach present in July 2010.
(Asset Ref. No. 121AB901B0603C01)

Beach in similar condition to 2008 inspection.
(Asset Ref. No. 121AB901B0603C01)

Sand beach lower, exposing shingle as in 2010.
(Asset Ref. No. 121AB901B0603C01)

Loss of coping blocks and hand rails due to storm damage.
(Asset Ref. No. 121AB901B0603C01)



Storm damage to promenade at south end of asset.
(Asset Ref. No. 121AB901B0603C01)

3.1.2 Seaburn

The beach level falls to the southern end of Whitburn Sands, exposing more of the seawalls. The structure here is formed from masonry with a concrete coping (Asset Ref. No.

121AB901B0603C02). The storm damage noted in the unit to the north was continuous across this defence, with the coping blocks having been displaced or removed, handrails lost and the promenade torn up, see photos below top left and right. The area is fenced off, presumably until a repair can be implemented.

There are two concrete outfall structures located immediately seaward of the seawall (below lower left and right). The previous inspections in 2010 and 2012 noted that there were cracks present at the construction joints around the outfall structures suggesting that minor settlement may have occurred. Although the defects do not appear to have adversely affected the seawall, the structures should be repaired and monitored as appropriate as excessive movement could damage the wall behind. The beach levels were relatively high and so the toe piling was not visible.

Storm damage to promenade.
(Asset Ref. No. 121AB901B0603C02)

Storm damage to seawall at Seaburn.
(Asset Ref. No. 121AB901B0603C02)

Photo from 2012 report.
(Asset Ref. No. 121AB901B0603C02)

Failed coping adjacent to northern outfall.
(Asset Ref. No. 121AB901B0603C02)

The wall between Dykelands Road and the roundabout at Seaburn Terrace (Asset Ref. No. 121AB901B0603C03) was in fair overall condition. Similarly to the 2012 inspection, rust staining was present throughout the crest wall although this maybe from the fixings for the previous benches. The handrails at the beach access steps are badly corroded and the lower section was missing on one side. There was extensive cracking to sections of the wall (example below left). The seaward face of the masonry wall was in fair condition. The beach levels were higher than when the asset was last inspected in May 2013 and the toe was not visible. In May 2013, photo below lower left, the low beach levels had exposed the toe which was undercut locally with evidence of previous bagwork repairs that need to be extended to prevent further undermining and loss of fill.

Crest wall cracks and rust staining at fixings from previous seats.
(Asset Ref. No. 121AB901B0603C03)

Heavily corroded hand rails to south steps at traffic roundabout, with seaward section missing.
(Asset Ref. No. 121AB901B0603C03/C02)

Low beach level in May 2013 exposing seawall toe which is undercut in places and previous concrete bagwork repairs.
(Asset Ref. No. 121AB901B0603C03)

Higher beach level covering toe. Missing mortar / open joints between blocks.
(Asset Ref. No. 121AB901B0603C03)

The beach access steps at Seaburn Terrace and the section of wall to the south were in fair overall condition, see photo above top right and below right. The rear concrete retaining wall appeared to be in good condition. The lower section of the steps were heavily abraded, exposing reinforcement in the wing wall.

Low beach levels exposing lower section of wall in May 2013. (Asset Ref. No. 121AB901B0604C01)

Seawall adjacent to Seaburn Park, showing chloride staining on surface of concrete encasement. Beach levels higher than in May 2013. (Asset Ref. No. 121AB901B0604C01)

3.1.3 Parsons Rocks

The grouted stone revetment landward of the promenade around Roker Cliff Park has had voids and damage identified in all inspections since 2008 (below). This appears to be at least partly related to storm wave overtopping damage and there appeared to have been significant expansion of damage over the winter 2013/14. As noted in previous reports, it would be prudent to infill the voids to minimise the risk of further expansion and the potential reduction in stability of the embankment above.

(Asset Ref. No. 121AB901B0604C02)

The masonry seawall backing Parson's Rocks is in fair to good condition (below left). The masonry structure ties in with the elevated natural limestone rock outcrop, which is abrading and eroding in places, for example at the old access steps just north of the point and on the southern

flank where there is a void starting to extent below the promenade, see photo below lower right, and maintenance repairs are recommended to prevent the damage escalating. The condition of the coping deteriorates towards the south end of the wall with cracking and missing mortar in some joints in the masonry blocks.

Masonry wall at Parsons Rocks.
(Asset Ref. No. 121AB901B0604C02)

Example of damage to coping.
(Asset Ref. No. 121AB901B0604C02)

Eroded natural / grouted rock at access steps to Parsons Rocks.
(Asset Ref. No. 121AB901B0604C02)

Eroded limestone outcrop with void beneath promenade at south of Parsons Rocks.
(Asset Ref. No. 121AB901B0604C02)

3.1.4 Roker

South of Parson's Rocks, the high masonry wall around the headland extending south to the ravine at Roker Park (Asset Ref. No. 121AB901B0605C01) was in generally good condition (below left) with local minor loss of mortar and spalling noted in a few places. The natural cliff above appeared to be relatively stable. At the most exposed section where the wall is most seaward, before the return to Roker Park, there was a single facing block missing from the wall, see photograph below right. This should be repaired before the damages spreads.

High masonry wall in good overall condition.
(Asset Ref. No. 121AB901B0605C01)

Missing block on most exposed seaward extent of the wall.
(Asset Ref. No. 121AB901B0605C01)

The low level concrete wall fronting Marine Walk was in good condition (below left) following improvement works a few years ago. Vertical cracks in the encasing concrete of the northern section were noted in a couple of locations. Some of the handrail fixings were showing corrosion stains. Improvements were being undertaken to the promenade as part of the seafront regeneration scheme at the time of the September 2012 inspections and the promenade was in good condition.

Low concrete encased wall at Marine Walk in good overall condition.
(Asset Ref. No. 121AB901B0605C02)

Southern section of wall protected by wide beach in good overall condition.
(Asset Ref. No. 121AB901B0605C02)

3.2 Roker Pier to New South Pier (Sunderland Harbour MA 07)

3.2.1 Roker Pier

At the time of the inspection Roker Pier was closed to the public as major refurbishment and repair works were underway. The pier was only inspected from the shoreline. The work underway appeared to be undertaking repairs to the pier below the waterline on the seaward side and resurfacing the deck. The overall condition assigned was good as it is assumed that any significant defect to the pier will be dealt with as part of the ongoing refurbishment.

Works underway to refurbish Roker Pier. (Asset Ref. No. 121AB901B0702C04)

Seaward end of Roker Pier viewed from New South Pier. (Asset Ref. No. 121AB901B0702C04)

3.2.2 Roker beach

South of Roker Pier the masonry and concrete seawall, asset 121AB901B0702C01 is in fair overall condition with evidence of previous patch repairs and multiple horizontal cracks in the concrete sections, as seen in the previous inspection in 2012, see photos below. The level of the wide fronting beach that protects this wall appeared similar or slightly higher than that seen in 2012.

Multiple horizontal cracks and previous repairs in concrete wall. (Asset Ref. No. 121AB901B0702C01)

No change to cracks in wall, but beach level slightly higher. (Asset Ref. No. 121AB901B0702C01)

High beach levels at Roker Beach. (Asset Ref. No. 121AB901B0702C01)

Roker beach promenade in fair condition. Area to rear has been resurfaced under regeneration scheme.

	(Asset Ref. No. 121AB901B0702C01)

The rock armour revetment to the south of the public car park was in generally good overall condition. The concrete wall capping was in good condition, but the front face of the wall is covered with rock armour so not inspected. The 2012 inspection had noted that some blocks were missing / had been removed adjacent to the slipway at the north end. The armour may have been topped up or re-profiled, although the beach was higher with an area of gravel covering the lower part of the slipway.

 General view of rock armour from south. (Asset Ref. No. 121AB901B0702C02)	 Rock armour and promenade crest in good condition. (Asset Ref. No. 121AB901B0702C02)

3.2.3 Old North Pier

The 2010 report noted that The Old North Pier is not included in Sunderland City Council's revenue or capital programmes for coastal defences as it is classed as a river wall rather than coastal defence. As noted in the 2010 report the Old North Pier structure will act to retain beach material to the north and act to reduce sediment passing into the navigation channel through the harbour entrance. The structure is included in the present condition assessment for reference.

The structure remains fenced off to members of the public (below left) with signs describing the structure as unsafe and therefore assessment was not possible. From the landward end, the structure appeared in similar condition to that reported in previous inspections with missing concrete and masonry from both the grouted revetment forming the northern face and the masonry wall forming the southern face (below right). Viewed from the south bank of the River Wear it was clear that there are significant voids in the masonry wall and apron to south side.

Old North Pier revetment armouring on northern side. (Asset Ref. No. 121AB901B0702C03)

Voids in apron and undercutting of Old North Pier (photo from 2012).
(Asset Ref. No. 121AB901B0702C03)

View of Old North Pier deck slab through barrier fence. (Pier closed to public due to unsafe condition).
(Asset Ref. No. 121AB901B0702C03)

3.2.4 River Wear to New South Pier

The frontage to the south of the mouth of the River Wear is inaccessible to members of the public as it is located within the restricted area of the Port of Sunderland.

The northernmost structure consists of a rock armour revetment which is in fair overall condition. The rock armour loosely placed with some gaps towards toe and lacks interlock. The crest section of rock is grouted with concrete and is in good condition. The revetment ties into a sheet piled river / navigational wall to the north and a masonry seawall with a precast concrete recurve crest to the south, which extends to the rear as a secondary wall, see below right. The rear wall was inspected only at the seaward end, and is in good condition, with minor spalling and cracking of the concrete and spalling to the surface of the concrete walkway to the rear. The very seaward end, see below left, has reinforcement bars standing vertically from the top of the concrete wall and it appears these were placed to allow the continuation to form a boundary wall which was not completed. There appeared to have been little change to the condition of the asset since the previous inspection in May 2013.

Rock revetment with loosely placed armour.
(Asset Ref. No. 121AB901B0703C03)

View of rock revetment from south, showing little change from 2012.
(Asset Ref. No. 121AB901B0703C03)

The masonry and concrete seawall to the south, which links into the north face of New South Pier is in fair overall condition. There is evidence of minor impact damage and spalling to the seaward face. There are missing blocks at the northern end, where there is risk of outflanking causing the wall to start unravelling, although the situation in 2014 looks very similar to the photographs from 2010 and 2013. As noted in the 2012/13 report, the concrete apron to the rear of the wall (south part only) has experienced a significant deterioration due to wave overtopping with sections missing. The rubble embankment landward of the seawall has been further eroded on the seaward face by wave overtopping. As recommended in the previous report the surfacing to the rear should be repaired / replaced and voids in the rubble surface immediately behind the wall should be filled in order to avoid wave overtopping causing further erosion and pooling behind the wall destabilising the structure.

Crest and rear embankment damage due to wave overtopping – photo from May 2013.
(Asset Ref. No. 121AB901B0703C02)

Crest and rear embankment damage due to wave overtopping.
(Asset Ref. No. 121AB901B0703C02)

3.2.5 New South Pier

As in previous inspections, New South Pier appeared to be generally in good condition above the waterline with only minor defects of mortar loss between masonry blocks and minor cracking to concrete elements noted although inspection of the seaward face was limited to the inner 1/3 as it was only viewed from land. There are several areas of damage to upper slabs and open joints along the top of the upper wall crest, see photo below left. There were no signs of global movement or distress to indicate major problems with the foundations of the structure, but an underwater survey is recommended, particularly towards the seaward end as wave action within

the central chamber was noted in the 2010 report indicating that there must be voids in the structure.

As noted in previous reports there are a number of large blocks missing at the seaward end of the pier, although this is not new damage. It is however advised that the end of the pier is made good in order to prevent the area of damage spreading.

It was noted that the navigation light support and cable stays near the seaward end are highly corroded and in need of replacement, see photo below lower right.

Damaged area of upper deck to New South Pier.
(Asset Ref. No. 121AB901B0703C01)

View of south face of wall from land.
(Asset Ref. No. 121AB901B0703C01)

View of north face and lower deck level of New South Pier from seaward end.
(Asset Ref. No. 121AB901B0703C01)

Navigation light support column and cable stays highly corroded and in poor condition.
(Asset Ref. No. 121AB901B0703C01)

3.3 Sunderland Harbour to Pincushion Rocks (MA 08)

3.3.1 New South Pier to South Outlet

The seawall to the south of New South Pier (Asset Ref. No. 121AB901B0801C03) is a masonry wall continuous with the southern face of New South Pier. In the 2010 inspection a void was visible at the base of the wall, with approximately eight masonry blocks missing from the seaward face (below left). The void was not visible in 2013 or 2014, and there appeared to be a small area of additional rock in front of the location. Above the location of the void the concrete deck slabs had been repaired previously, and cracking between the slabs and the wall was noted in 2010.

There was little change observed in 2014, although slight lifting of the slab was apparent, which may relate to wave uplift pressures within voids in the wall. It is recommended that consideration is given to extending the rock armour further north to cover the area of damage.

Void in base of wall – Photo from 2010 report.
(Asset Ref. No. 121AB901B0801C03)

View of front face of wall 11.09.2014.
(Asset Ref. No. 121AB901B0801C03)

Deck slab above void – Photo from 2010 report.
(Asset Ref. No. 121AB901B0801C03)

Slight lifting of deck slab.
(Asset Ref. No. 121AB901B0801C03)

At the south end of the wall the rock armour was in good condition. The shingle beach level was lower than at the time of the 2013 inspection, exposing more rock armour and similar to the condition in 2010.

South end of wall protected by rock armour – photo from July 2010.

High beach level in May 2013 covering rock

(Asset Ref. No. 121AB901B0801C03)	armour. (Asset Ref. No. 121AB901B0801C03)
 Low beach level in September 2014, similar to 2010 inspection. (Asset Ref. No. 121AB901B0801C03)	

South of the seawall, there are two lengths of rock armour sea defence (121AB901B0801C02 and 121AB901B0801C06) with the remains of a collapsed concrete groyne (121AB901B0801C01) between. The rock revetment (with some concrete blocks) was in fair condition with minor displacement of material and local slumping of the crest.

 Northern section of rock armour. (Asset Ref. No. 121AB901B0801C02)	 Southern section of rock armour. (Asset Ref. No. 121AB901B0801C06)

Remains of derelict concrete groyne from south. (Asset Ref. No. 121AB901B0801C01)

Remains of derelict concrete groyne from south, little change from 2013. (Asset Ref. No. 121AB901B0801C01)

The groyne appeared in a similar condition to that reported in 2008 and 2010 and 2013, suggesting minimal change. The remains do not appear to have adverse effects on the surrounding rock armour and although, the beach has accreted since 2010, the groyne is considered to have a negligible effect on wave energy and sediment transport along the frontage. A degree of protection will be provided by the South Rocks outcrop, erosion of which is possibly the source of the shingle accumulation on the northern part of the beach.

3.3.2 South Outlet

The South Outlet is formed between the North East Pier and the South West Breakwater. The coastal defence structures are in generally poor condition respectively and have experienced further degradation since the 2012/13 inspections, although there were no significant new failures. The size of the structures means that they will continue to provide some protection to the headland even if no remedial action or maintenance program is undertaken. As noted in the previous reports to ensure that the protection provided is sufficient for the needs of the Port a strategy should be developed for the South Outlet defences, which incorporates the development plans of the Port. The South West Breakwater requires extensive remedial work and the North East Pier requires major refurbishment or possible replacement although the importance of maintaining the South Outlet is unlikely to be significant enough to justify the significant capital expenditure required unless it were associated with redevelopment of the area behind.

The North East Pier is split into 3 asset lengths in the NFCDD. The seaward section of defence to the north is asset 121AB901B0801C05, consisting of a variety of derelict concrete, masonry and sheet pile structures, with limited armouring with mixed rock and concrete blocks, supplemented by a bund of stacked rock and demolition waste at the crest. This is in poor condition, see below, and if the vacant land to the rear is to be redeveloped it is recommended that additional rock armour is placed to improve the standard of defence

Derelict former defence structures with Stacked bund of rock armour at crest (Asset Ref. No. 121AB901B0801C05)

Derelict former defence structures with limited rock and concrete rubble. (Asset Ref. No. 121AB901B0801C05)

The seaward section of North East Pier, including the roundhead and both faces is asset 121AB901B0801C04, and this is in very poor condition, although there appears to have been little change since 2010, see photos below. The deck was severely abraded and there were missing sections and exposed reinforcement observed throughout. As reported in previous years the roundhead of the structure has become detached, leaving the exposed nose of the pier vulnerable to wave attack and the photos below indicate ongoing loss of material from the end of the breakwater.

North East Pier – Photo from 2010 report.
(Asset Ref. No. 121AB901B0801C04)

North East Pier photo from 2012/13 report.
(Asset Ref. No. 121AB901B0801C04)

North East Pier crest.
(Asset Ref. No. 121AB901B0801C04)

North East Pier failed roundhead July 2010.
(Asset Ref. No. 121AB901B0801C04)

North East Pier, photo from 2012/13 report
(Asset Ref. No. 121AB901B0801C04)

North East Pier roundhead, photo 11.09.2014
(Asset Ref. No. 121AB901B0801C04)

The asset inner face, asset 121AB901B0801C07 is protected by demolition waste rubble armour and rated with a slightly better condition, below left. The concrete block abutment walls were generally intact although the concrete was extensively abraded with spalling and rust staining present throughout.

Tipped rubble at landward end of North East Pier protecting inner face of defence.
(Asset Ref. No. 121AB901B0801C07)

Random demolition rubble tipped into old dock
(Asset Ref. No. 121AB901B0801C08)

The south outlet basin has been partly filled and protected with tipped rubble which appears to be a variety of broken sections of concrete slabs, masonry and rock, see above right and below left and right. This affords a degree of protection, but is not a formal defence and is assessed as poor condition. There are three asset lengths in NFCDD, which are from north to south 121AB901B0801C08 (above right), 121AB901B0802C07 (below left) and 121AB901B0802C06 (below right).

Badly coroded sheet pile defence at south west side of former South Outlet basin.
(Asset Ref. No. 121AB901B0802C07)

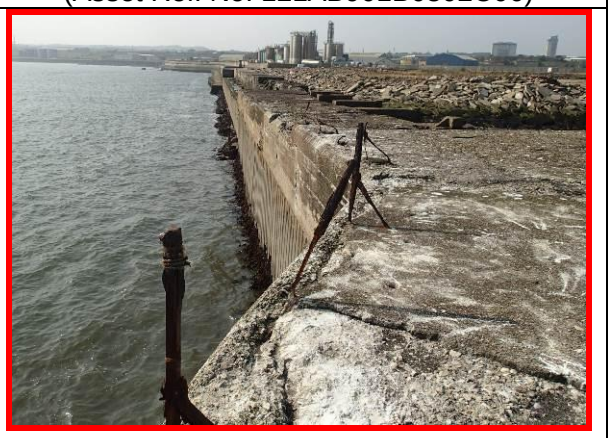
Random demolition rubble tipped into old dock to rear of South West breakwater.
(Asset Ref. No. 121AB901B0802C06)

As described in the 2010 and 2012/13 reports the South West Breakwater is in a derelict condition, with significant damage to and loss of deck sections, displaced core blocks to the north side, missing sections of concrete blockwork and damage and undercutting at the roundhead.

South West Breakwater – missing sections of deck. (Asset Ref. No. 121AB901B0801C07)

Loss of core to northern face of South West Breakwater.
(Asset Ref. No. 121AB901B0802C06)

South West Breakwater – inner face 11.09.2014.
(Asset Ref. No. 121AB901B0801C07)



South West Breakwater – seaward face and deck 11.09.2014.
(Asset Ref. No. 121AB901B0801C07)

3.3.3 Spur Barrier to Hendon Banks Barrier

Located to the south of the South West Breakwater is a large concrete seawall with sheet piled toe and set back crest wall, asset 121AB901B0802C04, of about 500m length, terminating at the north end of the sewage works. The asset was in fair overall condition, with localised damage and cracking to concrete and missing sealant in some construction joints. The toe piles appear corroded although they could only be viewed from a distance, see below left, and an underwater inspection is recommended as voids through the piles could lead to loss of fill material and destabilisation of the wall. The flood boards at the access point near mid-length of the wall that were missing in the 2012/13 report have been replaced, see below right.

Spur barrier wall.
(Asset Ref. No. 121AB901B0802C04)

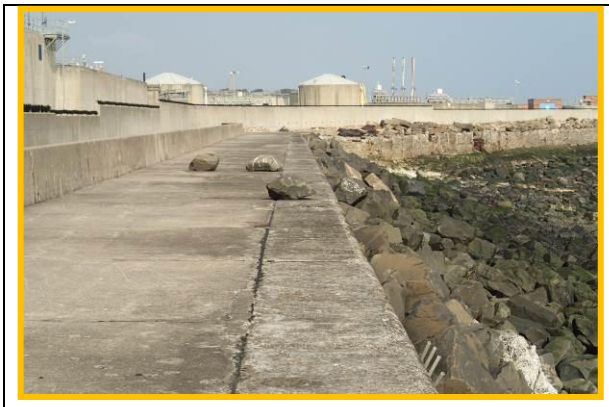
New flood boards at access point in crest wall.
(Asset Ref. No. 121AB901B0802C04)

To seaward of the sewage treatment works tanks there is a relatively new concrete boundary wall, but this is fronted by a section of seawall, asset 121AB901B0802C03, which is poor condition, see photos from 2013 and 2014 below. The crest is unprotected, consisting of broken demolition waste and wave overtopping could undermine the boundary wall. The old insitu concrete seawall has limited protection from rock armour, and a crest of stacked rubble and rock armour that could be easily displaced by wave overtopping in a storm event. As noted in the 102/13 report, it is recommended that a capital improvement scheme is considered for this section due to the high value infrastructure located to the rear.

Loosely stacked rock armour on crest and at toe provides limited protection.
(Asset Ref. No. 121AB901B0802C03)

Defence rock armour in similar or slightly worse condition than in 2013.
(Asset Ref. No. 121AB901B0802C03)

The defence to the south, asset 121AB901B0802C02, is in fair overall condition with, but some of the rock armour appears small sized and inadequately interlocked, with movement during storms causing damage to concrete wall during storms. There were several small pieces of rock armour on the crest slab. It is recommended that the armour is re-profiled and topped up with larger armour and better interlock. There was evidence of damage to the seaward edge of the crest slab particularly towards the south end of the defence where it is more exposed. At the south end of this section the rock armour terminates at a concrete groyne which extends from the defence 121AB901B0802C01 to the south, see below right, with the toe protected by sheet piles and some rock armour. There appeared to be some undercutting and missing masonry that should be repaired, and additional rock armour to the south side is recommended.



Small rock armour units washed onto crest slab causing storm damage.
(Asset Ref. No. 121AB901B0802C02)

Missing facing masonry requires attention.
(Asset Ref. No. 121AB901B0802C01)

The most southerly defence within the port area is asset 121AB901B0802C01, which has been downgraded from fair to poor overall condition. The 2012/13 report noted that a single section of the rear flood wall had failed, presumably during storm wave impact, see photo below left. The failed section had been repaired and some others reinforced. The toe piles are badly corroded and abraded with holes through. A length of coping beam has been lost and further south more has been displaced. Cracking between crest slab and cope indicates that further sections of coping may be lost soon. It is recommended that rock armour reinforcement is considered for this length of wall.

Failed section of crest wall.
(Asset Ref. No. 121AB901B0802C01)

Repaired section of crest wall.
(Asset Ref. No. 121AB901B0802C01)

Missing section of coping at seaward edge of crest slab.
(Asset Ref. No. 121AB901B0802C01)

Badly abraded toe piles near south end of defence showing holes through to voids in wall.
(Asset Ref. No. 121AB901B0802C01)

The breakwater marking the southern extent of the Port of Sunderland has failed at the seaward end, below (left and right), but was in a similar condition to that reported in 2008, 2010 and 2012. In NFCDD this structure forms part of the asset length to the south, 121AB901B0803C02.

Failed seaward end of breakwater at south of port area. Photo from 2010 report.
(Asset Ref. No. 121AB901B0803C02)

Breakwater at south boundary of port area.
(Asset Ref. No. 121AB901B0803C02)

3.3.4 Port of Sunderland to Grangetown (Hendon Seawall)

South of the port boundary the concrete Hendon Seawall, Asset Ref. No. 121AB901B0803C02, was in fair overall condition. Rock armour protection has been placed in front of the wall in several sections and this was in good condition with appropriate voids and interlock between units. There are about ten concrete groynes on the foreshore which appear to be having limited impact on the control of sediment movement, although the large gaps at access points through the groynes will not help, see below left. Steel toe piling was visible along significant lengths of the wall where it is not protected by rock armour, but the piles were heavily corroded and abraded with limited remaining life, see below right.

Concrete groynes on foreshore at Hendon.
(Asset Ref. No. 121AB901B0803C02)

Highly abraded and corroded toe piling.
(Asset Ref. No. 121AB901B0803C02)

Sealant was missing from construction joints in the concrete slabs in a number of locations. Minor spalling was evident around drainage holes with exposed reinforcement in the crest wall to the southern part of the defence, below lower left. There was also abrasion evident to the front face of the wall in places. Additional rock armour to protect the failing piles and abraded wall should be considered in future.

 Rock armour in good condition. (Asset Ref. No. 121AB901B0803C02)	 Abrasion of wall exposing reinforcement. (Asset Ref. No. 121AB901B0803C02)
 Crest wall with corrosion around enlarged drainage holes towards southern end of defence. (Asset Ref. No. 121AB901B0803C02)	 Wall and handrails and rock armour in good condition but defence has badly corroded toe piles; northern section of defence. (Asset Ref. No. 121AB901B0803C02)

3.3.5 Hendon Seawall to Ryhope Dene

The natural coastal frontage to the south of the Hendon Seawall comprises of Magnesian Limestone cliffs overlain by softer glacial till. In the NFCDD records the frontage is split into three asset lengths, which are from north to south 121AB901B0803C01, 121AB901B0804C03 and 121AB901B0804C02. The September 2012 site inspections were undertaken after a period of heavy rainfall and noted many local failures of the upper cliff slopes along this frontage. Observations during the September 2014 inspections found that there despite relatively drier preceding weather there was still evidence of recent multiple slips and slumps in the upper overlying till cliffs. The more resistant limestone at the base of the cliffs erodes more slowly, although the formation of arches and caves can lead to episodic erosion, which can form hazards for the public footpath along the cliff top.

Caves forming in cliff toe at southern end rock armour to the south end of Hendon Seawall. (Asset Ref. No. 121AB901B0803C01)

Cliffs south of Hendon are afforded a degree of natural protection by rubble and small beach at toe. (Asset Ref. No. 121AB901B0803C01)

In the cliffs near local hard points at Salterfen Rocks and Pincushion, there are caves, arches and small stacks present. Cliff faces were sheer with active erosion in the upper till sections along the length.

Multiple local mud slides in upper till slopes and active erosion of lower cliffs with arch formation south of Ryhope Nook. (Asset Ref. No. 121AB901B0804C02)

Mud slides and active erosion in upper till cliff. (Asset Ref. No. 121AB901B0804C03) Also shows undermined concrete cladding on outfall structure at Ryhope Nook.

Eroding cliffs at Halliwell Banks. (Partly active) (Asset Ref. No. 121AB901B0804C02)

Erosion of cliff crest adjacent to foot path near Ryhope dene (Asset Ref. No. 121AB901B0804C02)

The 2010 and 2012/13 reports noted that there were slope failures in close proximity to the cliff top footpath, particularly at Halliwell Banks, see photos below from the 2010 report. This remains the case. Although signs are present to warn members of the public that the cliffs are unstable, there is a public footpath along the cliff edge on the Ordnance Survey mapping and the track

appeared to still be well worn. The proximity of the retreating cliff edge to the footpath therefore remains an ongoing public health and safety concern.

4. Comparison with Previous Assessment

The previous formal assessment across the study frontage was mostly undertaken in September 2012, although the defences in the port area were inspected in March 2013 and several other areas were also revisited in March 2013. The 2014 inspections were completed in September 2014. Comparative photographs have been included in the main text for a number of key locations.

The condition of the hard defences along the frontage were mostly similar or slightly worse than found in the 2008, 2010 and 2012/13 inspections. The table in Appendix B highlights assets that have changed condition. There are three built assets for which the overall condition grading has deteriorated from fair to poor, one that has gone from fair to very poor and one has deteriorated from very good to good. Three of the natural cliff asset lengths towards the south of the borough have been downgraded from 3 (Locally Active) to 4 (Partly Active) and one cliff length has been downgraded from 2 (Inactive) to 3 (Locally Active). Although there was evidence of significant repair works and improvements to the asset elements making up the defences in a large number of locations, the changes were insufficient to improve the overall condition grade as they mostly related to the repair of local defects.

The most significant deterioration in condition identified is the storm damage to the wall and promenade at Seaburn, which was fenced off and awaiting repair at the time of the inspection.

The wall in the Sunderland port restricted area at the sewage treatment works remains high priority as wave overtopping damage to the unprotected crest and insufficient rock armouring is threatening the adjacent property boundary wall and the sewage works itself.

Although the failed crest wall units on the wall at the south of the port area have been repaired the crest wall remains a cause for concern as if other sections are similarly weak there could be failure of significant lengths during a storm. The ongoing general deterioration of the other defences within the Port of Sunderland, many of which are in poor or fair condition are mostly of lower priority due to the limited access to the area and the limited assets at risk adjacent to the defences.

Minor repairs are required to replace lost facing blocks on the wall at Roker Cliff Park to avoid the damage spreading. Also the growing voids in the upper splash revetment need repair to avoid compromising the adjacent slopes.

5. Problems Encountered and Uncertainty in Analysis

The assets were inspected at suitable stages of the tide and there were no problems encountered. Roker Pier was closed to the public and not inspected as major refurbishment works were underway. The Port of Sunderland frontage is not accessible to members of the public and so access was arranged with the cooperation of the City Council and port authorities.

6. Conclusions and Recommended Actions

Further to the visual inspection of all NFCDD assets, specific findings and recommendations for individual assets are given in Appendix B.

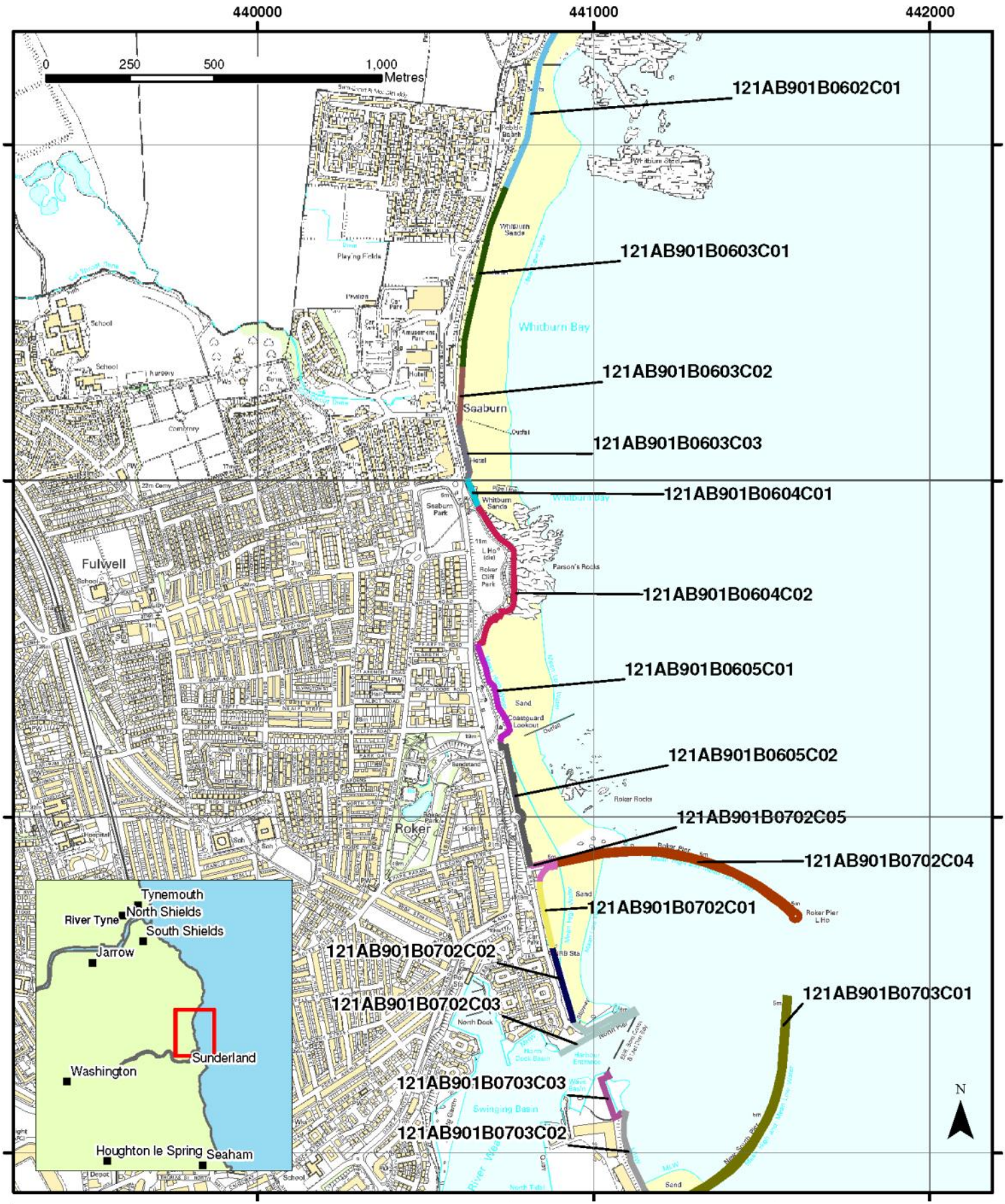
The storm damage repairs to the defences at Seaburn need to be completed. There are also a number of assets that need repairs to avoid the damage spreading and costs of repairs escalating. Several assets, particularly around parts of the Port of Sunderland, remain in need of significant refurbishment and/or maintenance. The defences around the old South Outlet are in poor or very poor condition but improvement works are only likely to be justified as part of a major redevelopment, as the adjacent land is presently unoccupied.

There remains the need for actions with respect to public safety, especially in areas where cliffs are susceptible to local collapse in close proximity to the cliff top footpath from Hendon to Ryhope Dene.

It is highly recommended that continued monitoring is undertaken for all assets, with specific recommendations for individual assets given in the table in Appendix B.

Appendices

Appendix A Asset Locations



Legend

Asset location

NFCDD Asset Number

Lead Authority: Scarborough Borough Council

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 1 - Map 1
Sunderland City Council Frontage

Coastal Walkover Inspection Report

Drawing Scale 1:15,000 at A4

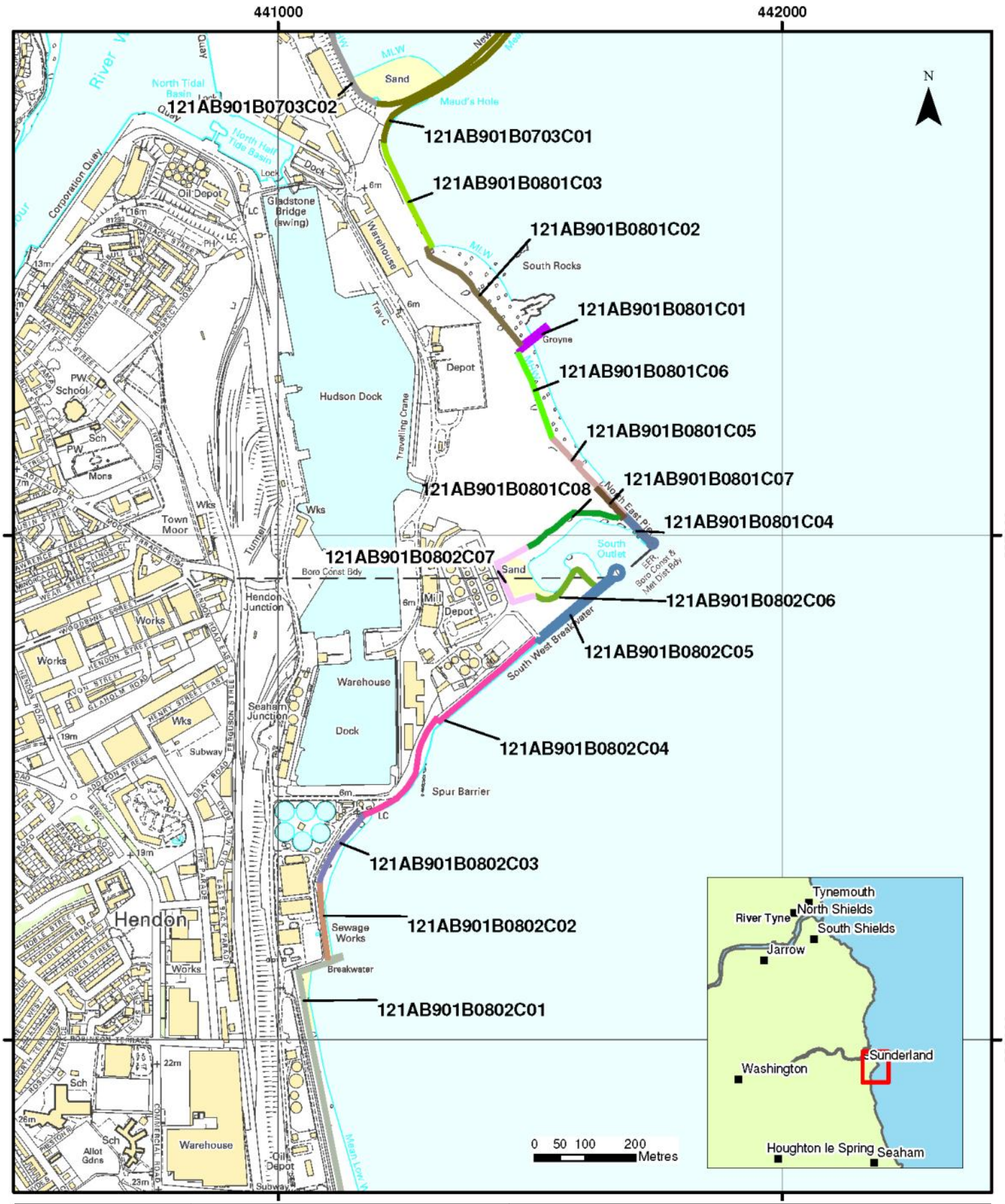
Halcrow Group Limited
Burderop Park
Swindon
Wiltshire
SN4 0QD

+44 (0)1793 812479

Halcrow
A CH2M HILL COMPANY

Notes:

All maps taken from 2010 Asset Inpsection Reports and updated where necessary



Legend

Asset location

NFCDD Asset Number

Lead Authority: Scarborough Borough Council

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 1 - Map 2
Sunderland City Council Frontage

Coastal Walkover Inspection Report

Drawing Scale 1:15,000 at A4

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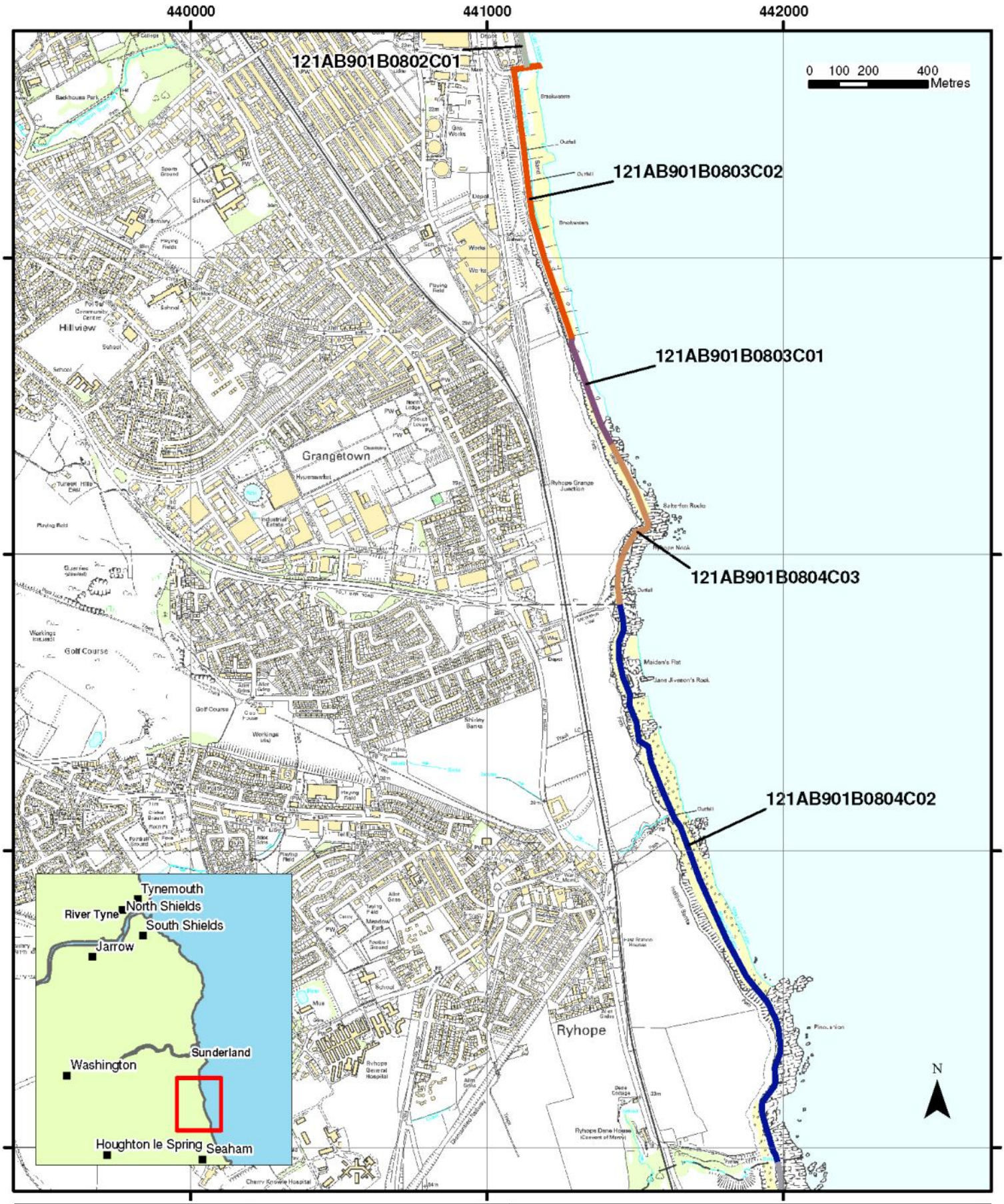

Legend

Asset location

NFCDD Asset Number

Lead Authority: Scarborough Borough Council

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 1 - Map 3
Sunderland City Council Frontage

Coastal Walkover Inspection Report

Drawing Scale 1:15,000 at A4

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Wiltshire
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Halcrow
A CH2M HILL COMPANY

Notes:

All maps taken from 2010 Asset Inpsection Reports and updated where necessary

Appendix B Asset Condition & Recommendations Table

Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspection Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
121AB901B0602C01		Undefended Frontage	Undefended Frontage	NZ40736087, NZ40976141	609.3	11/09/2014	As 2012: Beach backed by dunes in north, which appear stable / accreting in front of coastal slope. Switches to eroding cliff at N boundary. Cliffs eroding in adjacent unit north of outfall at district boundary.	2	2	>20	continue to monitor	routine
121AB901B0603C01	CPSE-220/6901/01	Concrete wall to promenade and to main coast road.	Wall	NZ40616033, NZ40736087	551.6	11/09/2014	Coping of masonry wall has failed and prom damaged in S. Conc wall in N in fair condition, but cracking along sig lengths below concrete crest. Promenade in good condition. Rear revetment has some damage. Fronted by cobbles at top of sand beach in N.	4	5	1 - 5	Repair coping and prom. Repair cracks & spalling on face of conc wall	urgent
121AB901B0603C02	CPSE-220/6902/01	690201 Masonry wall badly cracked over 30m section, possible settlement on undermining.	Wall	NZ40606016, NZ40616033	172.4	11/09/2014	High beach level - piles not visible. Coping along southern has been displaced seawards in storm damage. Area is fenced off. Towards south the coping completely removed along with railing.	5	5	11 - 20	Repair failed coping and blockwork & reinstate prom.	routine
121AB901B0603C03	CPSE-220/6903/02	Masonry wall, recurve concrete coping and parapet wall.	Wall	NZ40626000, NZ40606016	164	11/09/2014	Beach higher than in 2012, toe not visible. Some open joints between masonry blocks. Cracking in bullnose section in many places. Cracking in crest wall, partic at south end. Heavily corroded hand	3	4	11 - 20	Infill cracks/spalling and replace missing mortar.	routine
121AB901B0604C01	CPSE-220/6904/01	Concrete encasement to old wall in good condition. Highly reflective wall effecting beach levels to North.	Wall	NZ40655992, NZ40626000	88.6	11/09/2014	Concrete encasement showing signs of chloride attack and staining. Minor damage to upper edge in places. Retaining wall to rear of prom & prom surfacing in good condition. Abrasion to lower part of steps.	3	3	>20	Repairs to spalling.	routine
121AB901B0604C02	CPSE-220/6905/03	Masonry wall with concrete coping. Concrete splash wall/grouted rubble revetment/natural slopes to rear.	Wall	NZ40655951, NZ40655992	528.1	11/09/2014	Seawall in fair condition. Some erosion of limestone where ties into wall risk of undermining. Rear revetment has deteriorated further. Prom mostly good, but cracking and abrasion near cope.	3	3	>20	Repair rear revetment. Repair damaged coping.	routine
121AB901B0605C01	CPSE-220/6906/01	Concrete block wall above masonry wall cladding high cliff. Crest of wall 12.4mODN. Some blocks cracked.	Wall	NZ40725922, NZ40655951	323.7	11/09/2014	Mortar / pointing between blocks missing in several more exposed locations. One block has been plucked out on southern promontory. Several blocks cracked, and some local abrasion damage. Beach appears high.	3	3	>20	Replace missing block. Infill cracks and repoint	routine
121AB901B0605C02	CPSE-220/6907/01	Concrete encasement of seawall. Masonry wall at southern extent.	Wall	NZ40815885, NZ40725922	418	11/09/2014	Concrete wall in overall good condition. Wall was encased in concrete 2 or 3 years ago. Some cracking in concrete encased sections noted. Some corrosion to handrails at fixings.	2	2	>20	Monitor & local repairs to cracks and joints and handrail when necessary	routine
121AB901B0702C01	CPSE-220/6910/02	Intermittent concrete splash wall.	Wall	NZ40875860, NZ40845880	201.8	11/09/2014	Beach higher than 2013 inspection. Wall in generally fair condition, but spalling and abrasion to coping and front face.. Horizontal cracks in many locations, some spalling between cracks.	3	4	11 - 20	Infill cracks as necessary	routine
121AB901B0702C02	CPSE-220/6911/03	New splash wall behind car park except over short central section where wall is advanced. Rock armour revetment fronting concrete seawall.	Wall	NZ40945838, NZ40875860	228.4	11/09/2014	Concrete wall capping in good condition. Front face covered with rock armour so not inspected. Rock armour in gen good condition.	2	2	>20	Monitor.	routine
121AB901B0702C03		Masonry and concrete pier structure. Access prohibited.	Breakwater	NZ40895829, NZ41125841	480.8	11/09/2014	As 2013: Old North Pier. Access prohibited due to unsafe structure. Inspection based on view from landward end of structure and from south side of river. Major voids in masonry wall and apron to south side.	4	4	11 - 20	Full inspection/survey of structure / confirm future strategy.	routine

Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspection Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
121AB901B0702C04	CPSE-220/6909/01	Roker Pier: masonry and concrete structure protects harbour and retains beach to north.	Breakwater	NZ40885886, NZ41615870	1579	11/09/2014	Not inspected as pier closed as refurbishment work including under water repairs and new deck surfacing underway, since June 2012.	2	2	>20	Complete ongoing restoration work	routine
121AB901B0702C05	CPSE-220/6908/01	Masonry wall with concrete coping running into Roker Pier.	Wall	NZ40815885, NZ40885885	161.9	11/09/2014	Masonry walls at root of Roker Pier in good condition. Local damage/spalling to seaward edge of concrete coping.	2	2	>20	Minor repointing to masonry wall as required	routine
121AB901B0703C01	CPSE-220/6914/01	New South Pier, precast concrete and concrete bed footing founded to rock. Inspection and maintenance on a regular basis.	Breakwater	NZ41205777, NZ41575846	1625.7	11/09/2014	Seaward end / roundhead missing many large blocks as in prev years. There are several areas of damage to upper slabs and open joints along the top of the upper wall crest.	2	3	11 - 20	Full survey/ underwater inspection. Repair damage to crest wall slabs..	routine
121AB901B0703C02	CPSE-220/6913/01	Masonry quay wall. Development land to rear and crest wall above.	Wall	NZ41195785, NZ41085812	307.8	11/09/2014	As 2013: Overtopping damage to unprotected crest in middle / south requires repair. Beach levels increase moving southwards. Condition of	3	4	11 - 20	Repair crest slabs, infill eroded crest section. Grout gaps in masonry.	urgent
121AB901B0703C03	CPSE-220/6912/02	Armoured toe to grouted revetment.	Armour	NZ41065810, NZ41035824	187.8	11/09/2014	Rock armour loosely placed with some gaps towards toe and lacking interlock, slab shaped. Crest section of rock grouted with concrete in good condition.	3	3	>20	Consider topping up and reprofiling rock in longer term.	routine
121AB901B0801C01	CPSE-220/6917/01	Concrete groyne in state of collapse.	Wall	NZ41475736, NZ41535740	141.5	11/09/2014	As 2013: Structure has collapsed. Remnants still present. Landward section integrated with rock armour. Seaward section will have a limited impact on waves and sediment.	5	5	<1	Confirm asset as redundant.	no repairs
121AB901B0801C02	CPSE-220/6916/01	Rock and rubble armour in good condition.	Armour	NZ41485737, NZ41305757	282.6	11/09/2014	Shingle beach lower than in 2013. Rock armour in fair overall condition, decent coverage, but has demolition waste and debris mixed in.	3	3	11 - 20	monitor	no repairs
121AB901B0801C03	CPSE-220/6915/01	Masonry wall undermined in poor condition. Docks behind.	Wall	NZ41305757, NZ41205777	229.4	11/09/2014	The deck slabs appears to have lifted slightly and / or wall has rotated - possible suggesting uplift from wave pressure in voids. No crest slab at south end and no drainage for wave overtopping.	3	4	11 - 20	Repair crest slab. Provide drainage through wall from overtopping. Extend armour	routine
121AB901B0801C04	CPSE-220/6918/02	Rock toe to old harbour wall.	Apron	NZ41685703, NZ41755698	184.5	11/09/2014	As 2012: Derelict structure in very poor condition. Roundhead failed. Extensive spalling and cracking of concrete. Exposed reinforcement. Dislocated	5	5	6 - 10	Strategic review of S Outlet defence alignments	urgent
121AB901B0801C05		Rubble revetment	Revetment	NZ41685704, NZ41545719	217.5	11/09/2014	As 2012: Stacked bund of rock armour at crest, backing various concrete/masonry/sheet piles derelict structures with scattered blocks of concrete and armourstone.	4	4	>20	Review defence requirements for any new developments.	routine
121AB901B0801C06	CPSE-220/6917/02	Rubble revetment.	Revetment	NZ41545719, NZ41475736	181.9	11/09/2014	As 2013: Rock armour in good condition to north, but south of southern derelict groyne many gaps in armour layer exposing failed concrete structure, failed gabions and sheet piles.	3	4	>20	Reprofile armour when necessary to fill gaps and get good interlock	routine
121AB901B0801C07	CPSE-220/6925/01	Derelict breakwater made irregularly from masonry blocks, concrete, bagwork and rubble. Section and type varies greatly along length.	Breakwater	NZ41675703, NZ41635709	86	11/09/2014	Inner face defence at landward end of North East Pier. Poor condition. Extensive cracking and spalling of concrete. Exposed reinforcement. Rubble mound of demolition waste to rear affords	4	5	1 - 5	Full survey. Significant repair works (replace?)	urgent

Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspection Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
121AB901B0801C08	CPSE-220/6926/01	Random rubble tipped into old dock to fill in front of buried quays.	Revetment	NZ41495697, NZ41675703	205.1	11/09/2014	Mainly demolition rubble, broken concrete slabs. Fair condition although some displacement due to wave overtopping of old North East Pier.	3	3	11 - 20	Strategic review of alignment then construct formal revetment.	no repairs
121AB901B0802C01	CPSE-220/6922/03		Splash Wall	NZ41135564, NZ41125616	616.9	11/09/2014	Damage to crest slab around drain outlets. Wave wall has been repaired. Toe piles are corroded and abraded with holes. A length of coping beam has been lost; further south more has been displaced. Also cracking between crest slab and cope.	4	4	>20	Consider rock armour in front of wall.	routine
121AB901B0802C02	CPSE-220/6921/02	Splash wall with crest to 7.35mODN.	Splash Wall	NZ41095615, NZ41085631	152.9	11/09/2014	Fair to poor overall. Some of rock armour is too small and placed too steeply / has been displaced, causing damage to concrete wall during storms. Needs more rock and re-profiling. Damage to crest, esp. at south, with cracks and gaps between slabs..	4	4	6 - 10	Top up rock armour. Repair damage to crest slab.	urgent
121AB901B0802C03	CPSE-220/6920/04	Rubble placed to top of seawall.	Bank	NZ41085631, NZ41175644	163.4	11/09/2014	Seawall in failed condition. Rock armour loosely stacked on crest and toe. New concrete boundary wall to rear around STW. Demolition rubble backfill crest at toe of rear wall inadequate and	4	4	11 - 20	Add rock armour to inc standard of defence. Construct new concrete crest	urgent
121AB901B0802C04	CPSE-220/6919/03	Splash wall set back from main crest and with a crest of 8.0 mODN.	Splash Wall	NZ41175644, NZ41515679	511.2	11/09/2014	Missing flood boards in rear wall have been replaced. Toe piles only viewed from above - look corroded. Rust staining and cracking to crest wall. Cracking to lower wall and apron .Open joints and chipping in crest slab.	3	4	11 - 20	Inspect piles from boat / diver. Replace sealant between slabs.	no repairs
121AB901B0802C05	CPSE-220/6929/03		Breakwater	NZ41515679, NZ41685692	449.2	11/09/2014	As 2013: SW Breakwater. Unable to inspect seaward side. Structure in derelict condition. North side v poor with displaced core blocks. Significant damage/loss of deck. Missing sections of concrete blockwork and mass concrete.	5	5	6 - 10	Strategic review - consider realignment landward replace with revetment.	urgent
121AB901B0802C06	CPSE-220/6928/01	Partial rubble infilling of old dock. Slope variable.	Revetment	NZ41515688, NZ41635689	166.6	11/09/2014	No change since 2013: Rubble infill to former dock, consisting mainly of demolition waste - broken concrete slabs.	3	4	11 - 20	Consider within strategy for South Outlet defences.	no repairs
121AB901B0802C07	CPSE-220/6927/02	Random brick rubble tipped to slope above piling.	Revetment	NZ41465686, NZ41495697	199.3	11/09/2014	Piles are corroded through and v poor. However, rubble embankment to rear and demolition waste rubble backfill to old dock basin area seaward of piling. Sandy foreshore between piles and rubble.	3	3	6 - 10	Consider within overall strategy for south outlet defences.	routine
121AB901B0803C01		Undefended Frontage	Undefended Frontage	NZ41415437, NZ41285473	383.2	11/09/2014	Rock cliff falls evident, and undercutting / cave formation at toe ongoing. Local slope failures in upper cliff.	3	4	>20	Monitor slope failure with regards to cliff top footpath.	routine
121AB901B0803C02	CPSE-220/6923/08	Concrete seawall with rock armour at toe.	Seawall	NZ41285473, NZ41175565	1056.9	11/09/2014	Concrete wall along the crest to south is cracked in places with spalling exposing reinforcement. Repairs to some areas of prom holding, but more needed Groyne at port boundary has collapsed at nose. Toe piles abraded & corroded. Gaps in concrete groynes	3	4	11 - 20	Concrete repairs, consider rock armour in gaps along seawall.	routine

Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspection Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
121AB901B0804C01	CPSE-220/6801/01	Eroding cliff to agricultural land.	Cliff - south of Ryhope Dene	NZ42335082, NZ41985195	1193.4	11/07/2014	Small-scale but regular ongoing slumping in soft material that overlays the solid geology base. Occasional caves and arches formed a the base of the cliffs. Many recent mudslides / slips of upper cliff onto beach.	4	4	>20	Continue monitoring.	no repairs
121AB901B0804C02		Undefended Frontage	Undefended Frontage	NZ41985195, NZ41445383	2040.3	11/09/2014	Continuous slope failures in upper cliff and mud slides evident. Lower rock cliff eroding although some protection from cobble beach..	4	4	>20	Monitor slope failure with regards to cliff top footpath.	routine
121AB901B0804C03	CPSE-220/6924/01	Eroding cliff over full length but only 0.6Km reported to be in need of work.	Undefended frontage	NZ41445383, NZ41415437	614.9	11/09/2014	Active erosion along length upper cliff not vegetated. Ongoing erosion at Ryhope Nook footpath - steps have been rebuilt...	4	4	>20	Monitor slope failure with regards to cliff top footpath.	routine

= condition worse than in 2012

= condition improved since 2012