



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



**Sunderland City Council
Final Report**

May 2013

Sunderland City Council

Walk-over Visual Inspections of Assets

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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.

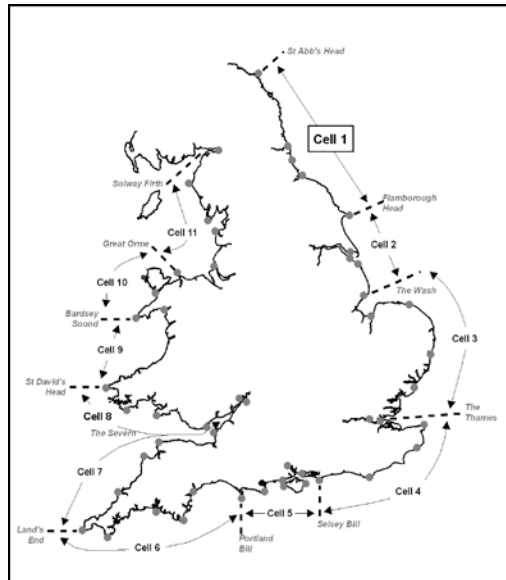


Figure 0-1: Sediment Cells in England and Wales

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 Sunderland City Council's frontage that were carried out in October 2012 and May 2013.

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 0-1**.

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.

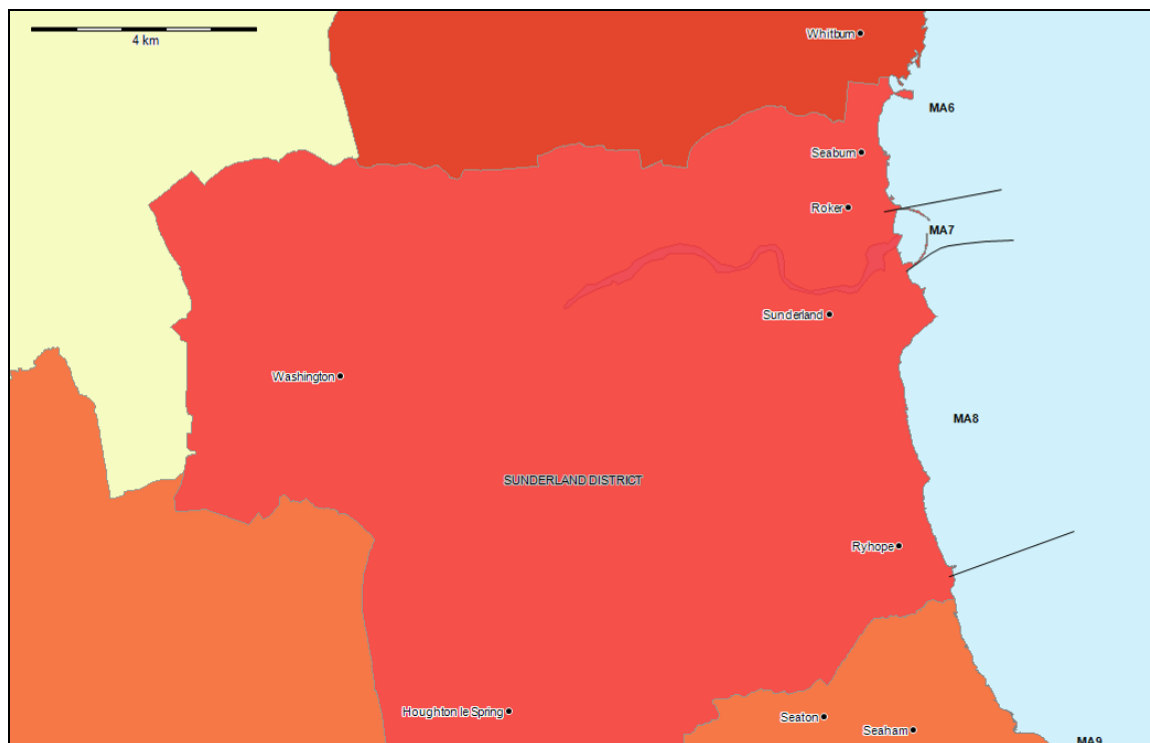


Figure 0-1: Sunderland City Council study area.

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 2.6km 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 by the slope and asset inspectors 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 September to November 2012 and May 2013. The walkover inspections for the Sunderland City Council frontage were undertaken on the 28th September 2012 (north of River Wear and south of Port of Sunderland) and 16th May 2013 (within the Port of Sunderland). 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) which is maintained by the Environment Agency (EA). All maritime Local Authorities that act as Coastal Protection Authorities have a duty to report findings from walkover inspections into the NFCDD. However, at the time of writing the NFCDD is in the process of being replaced, the form of the new database has yet to be agreed.

The walk over inspections covered both built defences assets and natural defence assets such as cliffs, slopes and dunes. All assets were visually inspected, 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 0-1. 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 0-1: 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 0-2. 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 0-2: 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 December 2010.

The following findings were observed during the 2012/13 inspections:

- **The Bents** – there appeared to have been natural accretion of sand levels in the lee of the Whitburn Steel rock outcrop following the late September 2012 storm.
- **Seaburn** – Low beach levels in May 2013 were exposing the toe of the wall at the south end of the beach (Asset ref. no. 121AB901B0603C03), which is locally undercut. Cracks between the seawall and concrete outfall structures noted in 2010 still need attention.
- **Roker Cliff Park** – (Asset ref. No. 121AB901B0604C02), voids in the grouted masonry embankment identified in 2008 and 2010 have expanded with further loss of fill material. The set of steps down to the high level natural rock are highly abraded and need extending.
- **Roker** – Above the waterline the structure appeared in good overall condition. An underwater inspection of **Roker Pier**, recommended in previous reports is understood to be taking place in early 2013. There appeared to be missing armour blocks at the north end of the rock armour adjacent to the slipway at the south end of Roker beach (Asset ref. no. 121AB901B0702C02).
- **Port of Sunderland (north)** – There has been significant wave overtopping damage to the crest and rear embankment at the north side of New South Pier. The masonry seawall to the south of New South Pier appears to have had further repairs but extension of the rock armour further north is recommended.
- **New South Pier** – repairs to defects in the deck noted in the 2010 inspections had been completed. A repair to coping sections lost over the winter near the seaward end remains to be completed.
- **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 Banks Barrier** – repairs have taken place to the missing precast concrete coping units identified in 2008 and 2010. The highest priority section of defence for urgent works in the Port area is 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). A section of the rear crest wall on the most southerly defence in the Port (121AB901B0802C01) had failed, raising concern about the integrity of adjacent sections.
- **Cliffs between Hendon and Ryhope Dene** – The heavy rain in the autumn of 2012 initiated multiple failures in the upper till slopes. 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 to have accreted slightly since 2010. There was evidence of recent sand deposition within the dune toe vegetation following the storms at the end of September 2012. The northern part of this asset switches to an eroding clay cliff north of the district boundary, see lower photos below. There is an outfall structure with failed scour protection apron located close to / north of the boundary, lower right.



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 2012 appeared to be similar to the 2008 inspection (below left) and the shingle that had been present up against the seawall in 2010 was only visible at a lower level where there had been scour of the sand surface, see below lower right. The concrete section of wall at the north end was in fair condition. The masonry wall fronting the remainder of the asset was generally in overall good condition but

with local vertical and horizontal cracks and some missing pointing that needs attention. There were also a number of cracks at joints in the promenade surfacing that should be resealed.

 <p>Dec 2008</p> <p>Sandy upper beach surface during first inspection under programme in 2008 (Asset ref. No. 121AB901B0603C01)</p>	 <p>Jul 2010</p> <p>Shingle upper beach present in July 2010 (Asset ref. No. 121AB901B0603C01)</p>
 <p>Sep 2012</p> <p>Beach in similar condition to 2008 inspection (Asset ref. No. 121AB901B0603C01)</p>	 <p>Area of lower beach adjacent to outfall exposing shingle below sand veneer. (Asset ref. No. 121AB901B0603C01)</p>

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). As noted in the 2010 inspection the masonry appeared in good condition with minor loss of mortar locally and evidence of infilling of previous cracking. The concrete coping was also in fair condition, with minor spalling evident throughout, particularly along the seaward edge. There are two concrete outfall structures located immediately seaward of the seawall (below right). There are cracks were present at the construction joints around the outfall structures suggesting that minor settlement may have occurred. This was also noted in the 2010 report, and 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.



North end of seawall adjacent to Dykelands Road
(Asset ref. No. 121AB901B0603C02)



Outfall structures with cracks adjacent to wall.
(Asset ref. No. 121AB901B0603C02)

The wall between Dykelands Road and the roundabout at Seaburn Terrace (Asset ref. No. 121AB901B0603C03) was in fair overall condition. The promenade and rear revetment have been rebuilt since the 2010 inspections, see below right. The crest wall has a stepped profile on the landward side which is used to support benches, which have also been replaced since the 2010 inspections. Rust staining was present throughout the crest wall although this maybe from the fixings for the previous benches. There was extensive cracking to sections of the wall (example below left). The seaward face of the masonry wall was in fair condition and beach levels were high on the initial inspection in September 2012. However, when the area was revisited in May 2013 the beach levels had dropped, exposing 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 with rust staining at fixings from previous seats and cracks
(Asset ref. No. 121AB901B0603C03)



New promenade surfacing and rear revetment structures
(Asset ref. No. 121AB901B0603C03)



Sep 2012

High beach level in September 2012
(Asset ref. No. 121AB901B0603C03)



May 2013

Low beach level in May 2013 exposing seawall toe which is undercut in places and previous concrete bagwork repairs
(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 photos below. 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.



Sep 2012

Seawall adjacent to Seaburn Park, showing chloride staining on surface of concrete encasement (Asset ref. No. 121AB901B0604C01)



May 2013

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



Sep 2012

View of asset from south
(Asset ref. No. 121AB901B0604C01)



May 2013

Abrasion of steps visible at low beach levels
(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, 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.



The masonry seawall backing Parson's Rocks is in fair to good condition (below left). The masonry structure ties in with the elevated rock outcrop. The limestone natural rocks are abrading and eroding in places, for example at the access steps just north of the point and at the disused set of steps (below right) and maintenance repairs are required 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)



Undercut toe apron at disused set of steps
(Asset ref. No. 121AB901B0604C02)



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



Promenade surface joints need resealing at
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 was in generally good condition (below left) with local minor loss of mortar and spalling noted (below right). The natural cliff above appeared to be relatively stable.



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



Localised abrasion / impact damage at toe of
high masonry wall
(Asset ref. No. 121AB901B0605C01)

The low level concrete wall fronting Marine Walk was in good condition (below left). Vertical cracks in the encasing concrete were noted in one location, see below, lower right. At the north end the handrails are heavily corroded, although some sections appeared to have been recently repaired / replaced further south. Some of the handrails had also recently been replaced at the steps coming down the cliff to the north end of the promenade and there were signs announcing that sections would be closed while work was undertaken to replace further handrails as part of the seafront regeneration scheme. Work was underway to resurface sections of the promenade adjacent to Marine Walk at the time of the inspection (28th September 2012).



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



Corroded handrails adjacent to ramp at north which has cracks as reported in 2010.
(Asset ref. No. 121AB901B0605C02)

Repairs appear to have been undertaken to the coping stones that were noted to have lifted in the 2010 report, see below left.



Resurfacing of section of promenade underway
(Asset ref. No. 121AB901B0605C02)



Minor vertical cracking in low concrete wall.
(Asset ref. No. 121AB901B0605C02)

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

3.2.1 Roker Pier

Roker Pier appeared to be in good condition above the waterline, with no significant changes from the 2008 or 2010 inspections. Some cracking was evident to the concrete deck along with signs of frequent repairs. There was a damaged section of handrail on north side near the landward end of the structure that should be replaced. Some missing pointing below the capping was also noted near the root. It is understood that an underwater inspection is being arranged in early 2013 that will give a better picture of the overall condition.



Inside face of Roker Pier appears in good condition (Asset ref. No. 121AB901B0702C04)



Missing section of handrail with temporary fence in place on north side of Roker Pier (Asset ref. No. 121AB901B0702C04)

3.2.2 Roker beach

South of Roker Pier the masonry and concrete seawall, 121AB901B0702C01 is in fair overall condition with evidence of previous patch repairs and multiple horizontal cracks in the concrete sections, see below left. The level of the fronting beach appeared slightly lower than in the 2008 and 2010, see photo of steps below right.



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



Undercutting at steps to Roker beach (Asset ref. No. 121AB901B0702C01)

There was a significant amount of debris washed up on the beach from the storms at the end of September, see below left.



The rock armour revetment to the south of the public car park was in 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 rock armour was in generally good condition, but it appeared as though some blocks were missing / had been removed adjacent to the slipway at the north end, see below right. The armour should be topped up and re-profiled to ensure good interlock.



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 2008 and 2010 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 Wear it was clear that there are significant voids in the masonry wall and apron to south side.



Old North Pier closed to public due to unsafe condition. (Asset ref. No. 121AB901B0702C03)

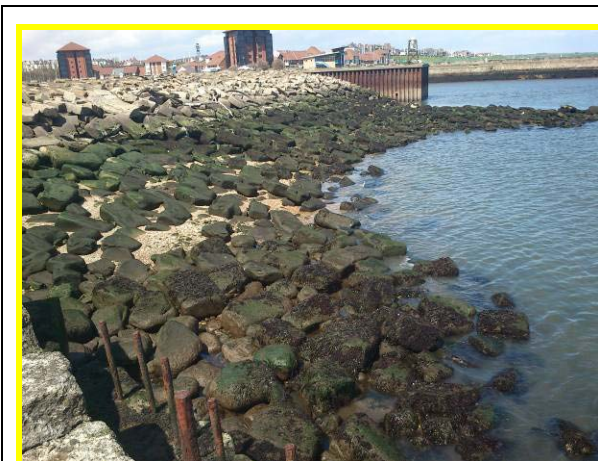


Voids in apron and undercutting of Old North Pier (Asset ref. No. 121AB901B0702C03)

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.



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



View of revetment from north, showing grouted concrete crest and secondary wall set back to rear. (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 2013 looks very similar to the photographs from 2010. The concrete apron to the rear of the wall (south part only) has experienced a significant deterioration due to overtopping with sections missing. The rubble embankment landward of the seawall has been eroded on the seaward face by wave overtopping. It is recommended that the surfacing to the rear is repaired / replaced and voids in the rubble surface immediately behind the wall are filled in order to avoid wave overtopping causing further erosion and pooling behind the wall destabilising the structure.



3.2.5 New South Pier

The 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. 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.

Repairs that were underway in 2010 to the pier deck with insitu concrete slabs have been completed. There was noted to be minor damage to the edge of one of the slabs about midway along the pier. Some coping sections had been lost over the winter and were in the process of being repaired, see below right. There were also some fairly recently replaced / reset coping stones on the inner face of the upper crest wall.

There are a number of large blocks missing at the seaward end of the pier, although photos from previous reports shows that 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.



New South Pier in good overall condition. Deck slabs repaired since 2010
(Asset ref. No. 121AB901B0703C01)



Missing section of coping near seaward end
(Asset ref. No. 121AB901B0703C01)



Missing section at head of New South Pier
(Asset ref. No. 121AB901B0703C01)



Internal access chamber cover has been repaired since 2010.
(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, 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 2012, 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 16.05.2013
(Asset ref. No. 121AB901B0801C03)



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

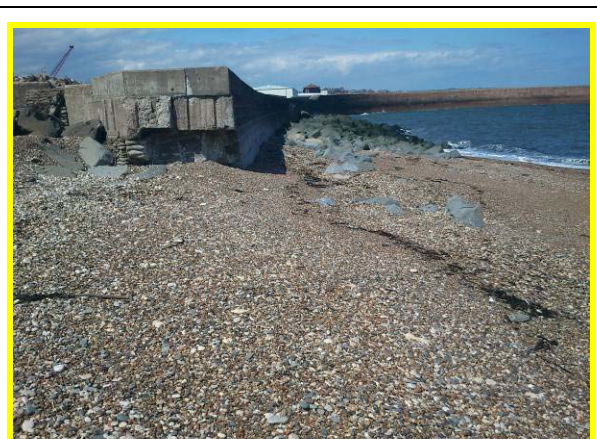


Slight lifting of deck slab
(Asset ref. No. 121AB901B0801C03)

At the south end of the wall the rock armour was in good condition. The shingle beach level was high at the time of the inspection, covering some of the rock armour and affording additional protection to the wall, see below right.



South end of wall protected by rock armour –
photo from July 2010
(Asset ref. No. 121AB901B0801C03)



High beach level in May 2013 covering rock
armour. (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)



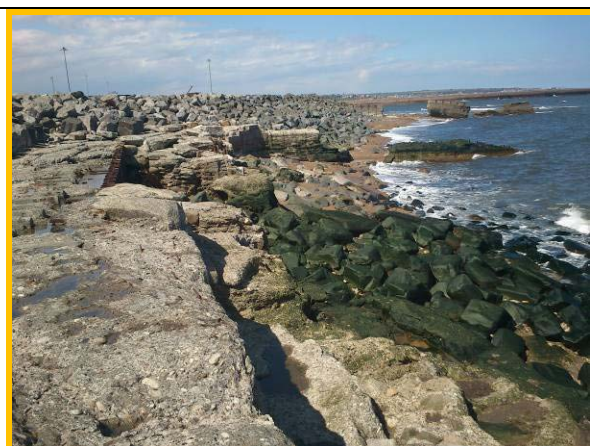
Remains of derelict concrete groyne from north
(Asset ref. No. 121AB901B0801C01)

The groyne appeared in a similar condition to that reported in 2008 and 2010, 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, 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 appeared to have experienced further degradation since the 2010 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 2010 report, monitoring should continue, to ensure that the protection provided is sufficient for the needs of the Port and 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.

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 limited rock and concrete armour
(Asset ref. No. 121AB901B0801C05)



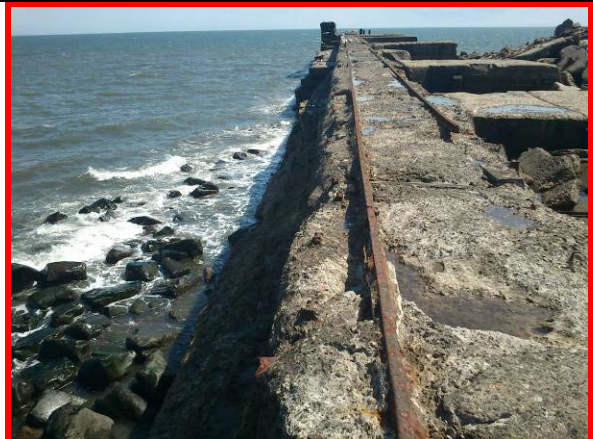
Stacked bund of rock armour at crest. (Asset ref. No. 121AB901B0801C05)

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 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 that further loss of material from the end of the breakwater has occurred.



July 2010

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



North East Pier crest, photo 16.05.2013
(Asset ref. No. 121AB901B0801C04)



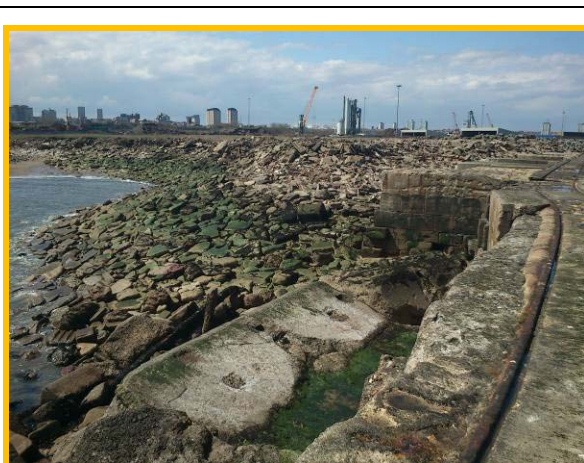
July 2010

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



North East Pier roundhead has lost further material since 2010, photo 16.05.2013
(Asset ref. No. 121AB901B0801C04)

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



Inner face of landward end of North East Pier
(Asset ref. No. 121AB901B0801C07)



Random demolition rubble tipped into old dock to fill in front of buried quay
(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, 121AB901B0802C07 and 121AB901B0802C06.

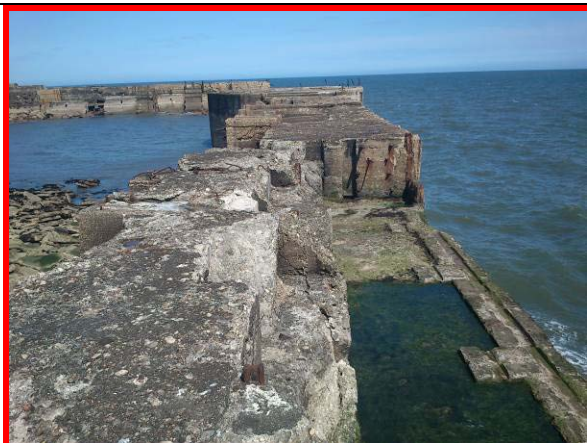


Looking seawards from South Outlet
(Asset ref. No. 121AB901B0801C07)

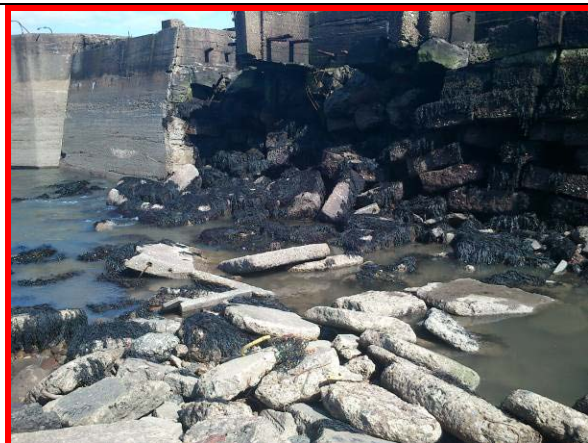


Random demolition rubble tipped into old dock
to rear of South West breakwater
(Asset ref. No. 121AB901B0802C06)

The South West Breakwater has experienced further degradation and 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)

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. At mid-length of the wall there is an access point that has missing flood boards, compromising the flood protection from wave overtopping locally, see below right.



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

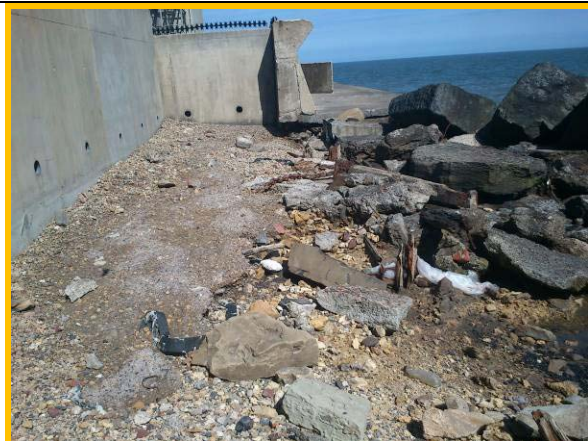


Gap in crest wall with missing flood boards
(Asset ref. No. 121AB901B0802C04)

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 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. It is recommended that a capital improvement scheme is considered for this section due to the high value infrastructure located to the rear.

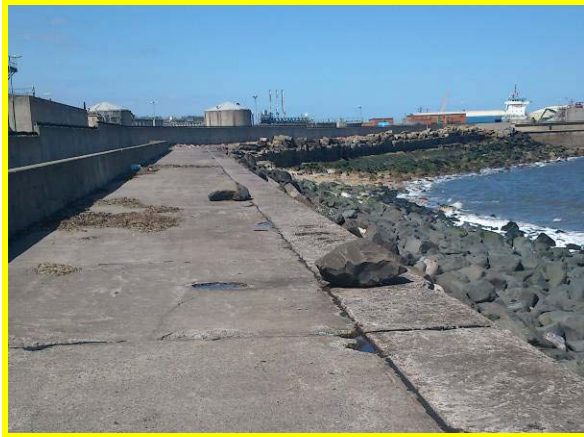


Loosely stacked rock armour on crest and at toe provides limited protection
(Asset ref. No. 121AB901B0802C03)



Eroded crest from wave overtopping at intersection with defence to north.
(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 two small pieces of rock armour on the crest slab. It is recommended that the armour is reprofiled and topped up with larger armour and better interlock. There was evidence of repairs to crest slab around drainage holes and construction joints but further work is required. 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 is recommended.



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



Damaged masonry and sheet piles require attention. (Asset ref. No. 121AB901B0802C01)

The most southerly defence within the port area is asset 121AB901B0802C01, which was in fair overall condition. The 2010 report noted that there were sections of missing coping along the front crest of the wall. These appear to have been replaced. However, it was noted that a single section of the rear flood wall has failed, presumably during storm wave impact, see photos below. The reinforcement was corroded but appeared to be only lightweight mesh. It was apparent that other sections of the wall had been replaced previously, indicating previous failures and a generally weak structure, possibly designed as a boundary wall rather than sea defence. It is recommended that the remaining sections of original rear wall are strengthened to reduce the risk of failure during storms.



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



Close up of base of failed section of crest wall.
attention. (Asset ref. No. 121AB901B0802C01)



Toe piling to southern section crest wall.
(Asset ref. No. 121AB901B0802C01)



Cracking to crest slab with previous repairs and previously replaced sections of rear 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, and 2010 with no further movement apparent, suggesting that the structure was reasonably stable. In NFCDD this structure forms part of the asset length to the south, 121AB901B0803C02. Immediately to the north of the breakwater there is a small wedge of rock armour at the toe of the seawall, in front of some steel sheet piling, see above left.. The rocks appear small and may be causing added abrasion damage to the piles.

Aug 2010



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.
Photo taken 28.09.2012
(Asset ref. No. 121AB901B0803C02)

3.3.4 Port of Sunderland to Grangetown

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.

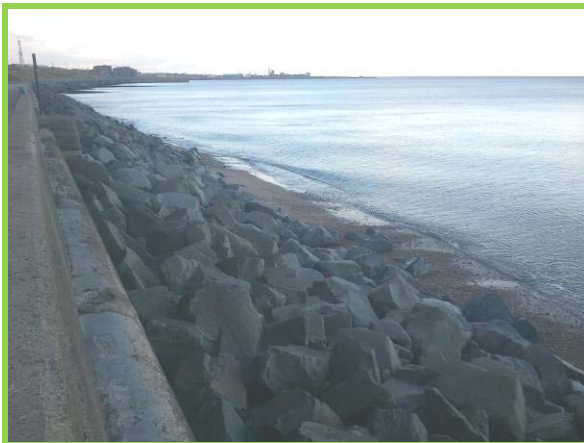


Concrete groynes on foreshore at Hendon
(Asset ref. No. 121AB901B0803C02)



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)

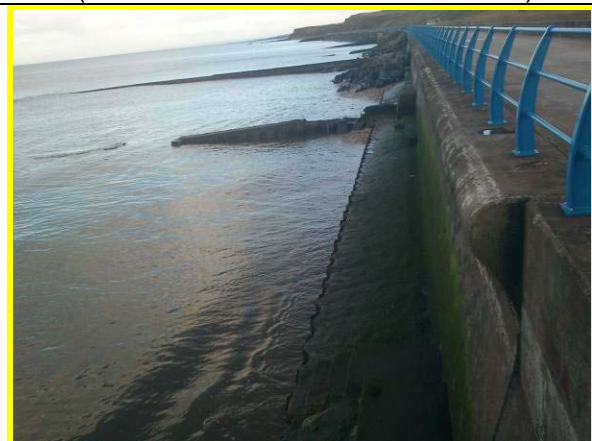


Localised displacement of rock armour at toe.

(Asset ref. No. 121AB901B0803C02)



Crest wall with enlarged drainage holes
towards southern end of defence.
(Asset ref. No. 121AB901B0803C02)



Wall and handrails in good condition, apart
from 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 site inspections were undertaken at the end of September 2012, after a period of heavy rainfall and there were many local failures of the upper cliff slopes along this frontage, and these were more continuous further south, around Haliwell Banks, which is classed as “locally active”, whilst the two units to the north are “inactive”.



Rock armour at south end of Hendon Seawall with inactive cliffs in background.
(Asset ref. No. 121AB901B0803C01)



Cliffs south of Hendon are afforded a degree of natural protection by rubble 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 and undercut/overhanging in some areas with ongoing mudslides after the heavy September 2012 rain.



Multiple local mud slides in upper till slopes and arch formation south of Ryhope Nook.
(Asset ref. No. 121AB901B0804C03)



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

The southernmost extent of the Sunderland frontage is the steep-sided Ryhope Dene. The Beck was flowing on the day of inspection although had clearly been much higher a day or two before as there was evidence of erosion across the foreshore from the discharge, see below left.



Erosion of beach crest by flow from beck at Ryhope Dene. (Locally active)
(Asset ref. No. 121AB901B0804C02)



Formation of stacks at Pincushion (Locally Active)
(Asset ref. No. 121AB901B0804C02)

The 2010 report 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 at the time of the 2012 inspections. The proximity of the retreating cliff edge to the footpath is therefore an ongoing public health and safety concern.



4. Comparison with Previous Assessment

The previous formal assessment across the whole study frontage was undertaken in July and August 2010. Comparative photographs have been included in the main text for a number of key locations.

The condition of the hard defences along the frontage appears to be very similar to that found in the 2008 and 2010 inspections. There are a limited number of assets for which the overall condition grading has deteriorated from fair to poor, or poor to very poor and these are mostly located within the Port of Sunderland. 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 at the wall at the north of the sewage treatment works, where wave overtopping damage to the unprotected crest is threatening the adjacent flood wall. The failure of crest wall units on the wall at the south of the port area is also a cause for concern as if other sections are similarly weak there could be failure of significant lengths during a storm.

Less significant changes have also been identified at Roker Cliff Park (growth of voids in the revetment) and the Port of Sunderland (general deterioration of North East Pier and South West Breakwater at South Outlet).

5. Problems Encountered and Uncertainty in Analysis

The assets were inspected at suitable stages of the tide and there were no problems encountered. 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.

Most of the inspections took place in September 2012, but the defences inside the port were inspected in May 2013. An area of the seawall near Roker Cliff Park was also revisited in May 2013 and this showed that there had been significant beach lowering exposing damage at the toe of the wall which had not been visible on the original inspections and so an additional inspection was recorded in the database. The high beach levels may have obscured defects on other defences.

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.

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. The missing concrete rear crest wall unit on the seawall at the southern extent of the Port should be replaced and further investigation of other original units should be undertaken to confirm if strengthening works are required.

There is also the need for actions with respect to public safety, especially in areas where cliffs are susceptible to local collapse in close proximity to a 'former' 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

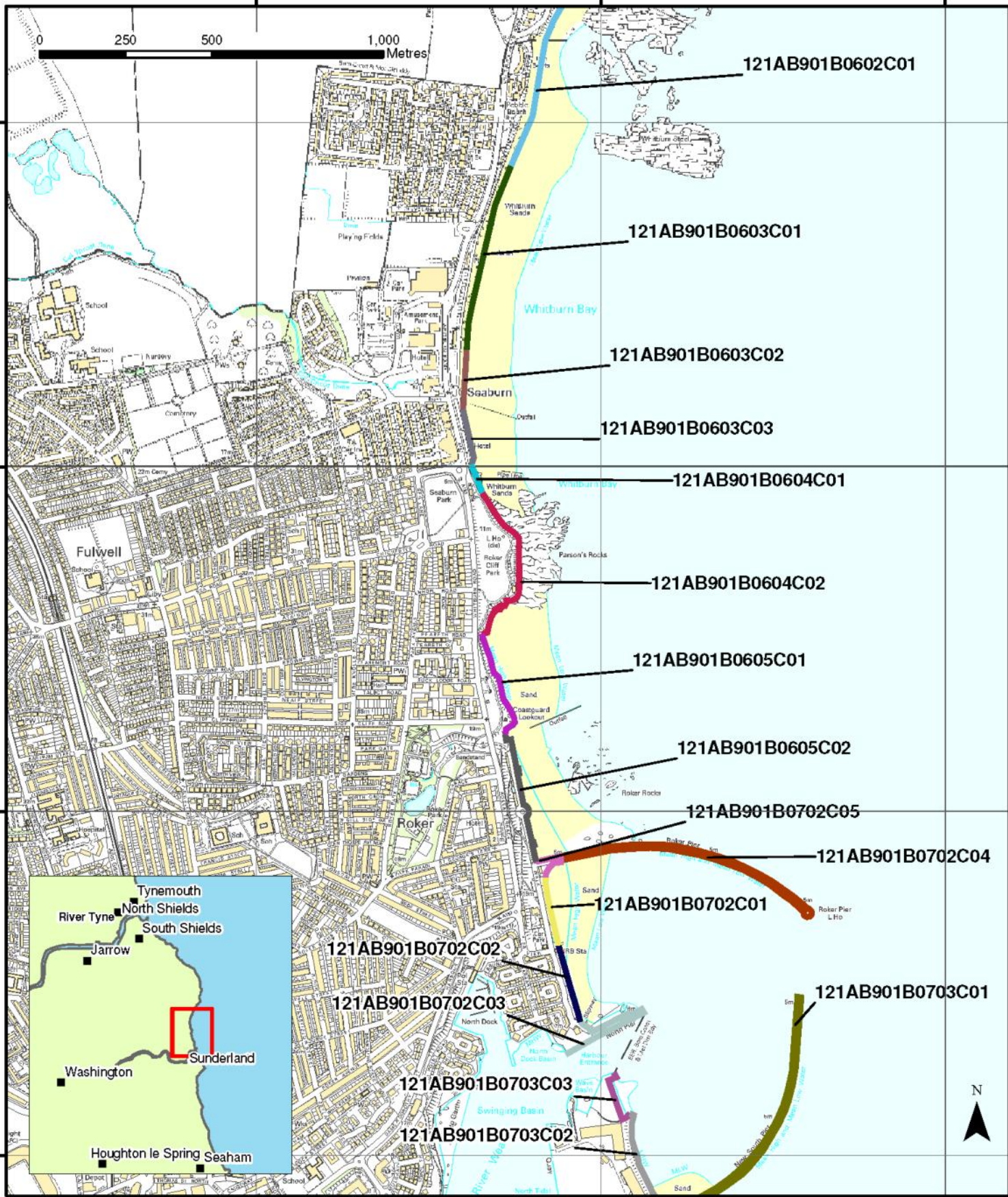
Appendix A Asset Locations

440000

441000

442000

0 250 500 1,000 Metres





561000

560000

559000

558000

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

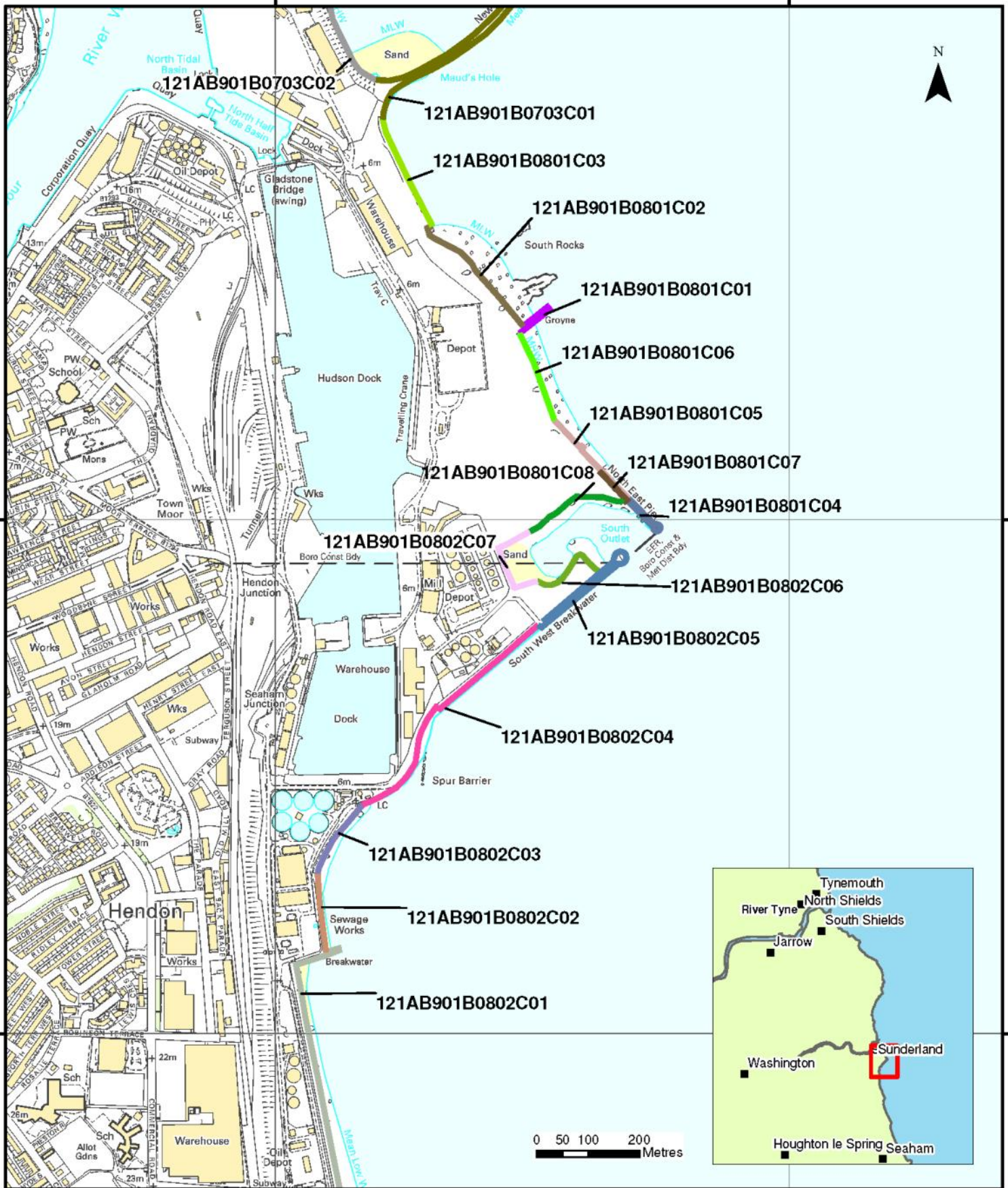


Notes:



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

441000

442000



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

Halcrow Group Limited

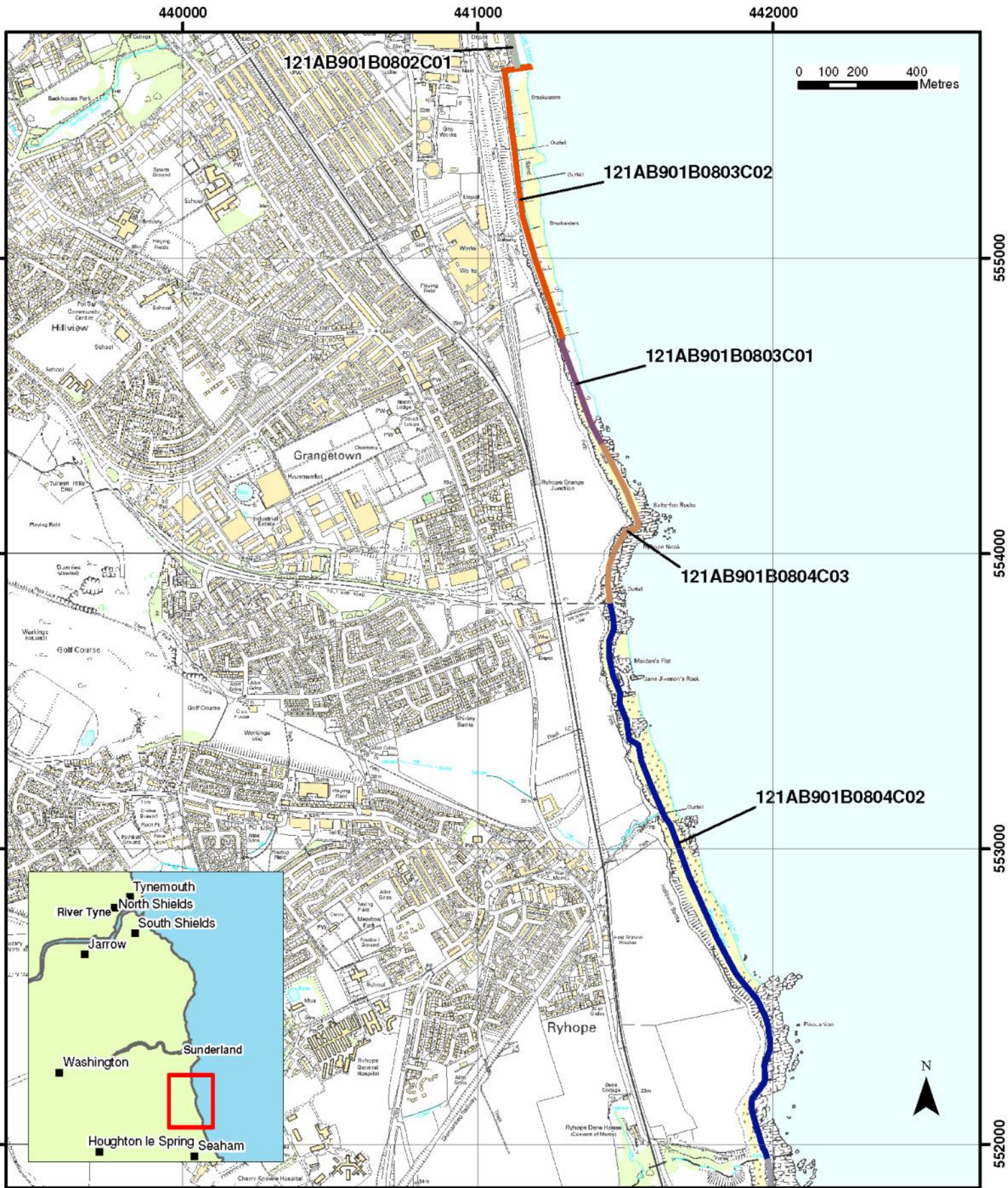
Burderop Park
 Swindon
 Wiltshire
 SN4 0QD

+44 (0)1793 812479





Notes:

All maps taken from
 2010 Asset Inspection 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 3
 Sunderland City Council
 Frontage**

Coastal Walkover
 Inspection Report
 Drawing Scale 1:15,000 at A4

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 Swindon
 Wiltshire
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+44 (0)1793 812479



Notes:

All maps taken from
 2010 Asset Inspection 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	Inspection Date	Inspection Comments for 2012	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
121AB901B0602C01		Undefended Frontage	Undefended Frontage	NZ40736087, NZ40976141	609.3	28/09/2012	Beach backed by dunes, which appear stable / accreting in front of coastal slope. Switches to eroding cliff at N boundary. Outfall at district boundary has failed scour protection	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	28/09/2012	Concrete wall (N end) in fair condition. Masonry wall gen in good condition with concrete crest similar, some missing pointing. High beach material - wall fronted by sand veneer over cobbles in places. Sand accreting at N end	3		3 11 - 20	Repair cracks to concrete & spalling on face of conc wall	routine
121AB901B0603C02	CPSE-220/6902/01	690201 Masonry wall badly cracked over 30m section, possible settlement on undermining.	Wall	NZ40606016, NZ40616033	172.4	28/09/2012	High beach level - piles not visible. Previous repairs holding well. Cracking/open jointing around outfall structures and below coping. Local damage to crest coping.	2		3 11 - 20	Infill cracks & repoint masonry	routine
121AB901B0603C03	CPSE-220/6903/02	Masonry wall, recurve concrete coping and parapet wall.	Wall	NZ40626000, NZ40606016	164	16/05/2013	Additional inspection of toe at lower beach level. Bagwork toe protection exposed, Toe undercut in places.	3		4 11 - 20	Infill cracks/spalling and replace missing mortar. Additional toe protection reqd.	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	28/09/2012	Concrete encasement showing signs of chloride attack and staining. Minor damage to upper edge in places. Retaining wall to rear of prom 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	16/05/2013	Seawall in fair condition. Grouted rubble revetment to rear of promenade contains voids, worsened over winter. Some damage to crest coping. Undercut apron at disused set of steps. Eroded lower steps where tie into natural rock.	3		3 >20	Infill voids in 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	28/09/2012	Mortar / pointing between blocks missing in several locations. Several blocks cracked, and some local abrasion damage.	2		3 >20	Infill cracks and repoint	routine
121AB901B0605C02	CPSE-220/6907/01	Concrete encasement of seawall. Masonry wall at southern extent.	Wall	NZ40815885, NZ40725922	418	28/09/2012	Concrete wall in overall good condition. Local minor defects including cacking and corrosion to guard rail. Repairs have been made at some handrail stanchions where parts of guardrail replaced. Some cracking in concrete encased sections noted.	2		2 >20	Local repairs to cracks and joints and handrail when nec.	routine
121AB901B0702C01	CPSE-220/6910/02	Intermittant concrete splash wall.	Wall	NZ40875860, NZ40845880	201.8	28/09/2012	Concrete wall. In generally fair condition. Some patchwork repairs to crest holding well. Horizontal cracks in many locations, some spalling between cracks. Undermining of toe of steps.	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	28/09/2012	Concrete wall capping in good condition. Front face covered with rock armour so not inspected. Rock armour in gen good condition, appears some blocks missing or out of position adjacent to slipway.	2		2 >20	reprofile rocks at N end adjacent to slipway.	routine
121AB901B0702C03		Masonry and concrete pier structure. Access prohibited.	Breakwater	NZ40895829, NZ41125841	480.8	28/09/2012	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
121AB901B0702C04	CPSE-220/6909/01	Roker Pier: masonry and concrete structure protects harbour and retains beach to north.	Breakwater	NZ40885886, NZ41615870	1579	28/09/2012	No significant change observed. Some cracking to concrete deck, with signs of frequent repairs. Damaged section of handrail on N side near root. Some missing pointing below capping near root.	2		2 >20	Consider future dive survey to check toe condition. Repair handrail. Grout voids	routine
121AB901B0702C05	CPSE-220/6908/01	Masonry wall with concrete coping running into Roker Pier.	Wall	NZ40815885, NZ40885885	161.9	28/09/2012	No significant change since previous survey. Masonry wall with concrete coping in very good condition. Local damage/spalling to seaward edge of concrete coping.	1		1 >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	16/05/2013	Damage to copings towards seawards end requires repair. Seaward end / roundhead missing many large blocks. Deck has been repaired since 2010 inspections, minor damage to joints in slabs noted near mid length.	2		3 11 - 20	Full survey/ underwater inspection. Repair damage to deck slabs joints.	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	Inspection Date	Inspection Comments for 2012	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
121AB901B0703C02	CPSE-220/6913/01	Masonry quay wall. Development land to rear and crest wall above.	Wall	NZ41195785, NZ41085812	307.8	16/05/2013	Overtopping damage to unprotected crest in middle / south requires repair. In south crest slabs damaged. Beach levels increase moving southwards. Condition of wall deteriorates towards north.	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	16/05/2013	Overall fair condition, rock armour loosely placed with some gaps towards toe and lacking interlock. 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	16/05/2013	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	16/05/2013	Shingle beach levels appear to have increased towards north. Fairly consistent armour thickness and profile, fair overall condition.	3		3 11 - 20		no repairs
121AB901B0801C03	CPSE-220/6915/01	Masonry wall undermined in poor condition. Docks behind.	Wall	NZ41305757, NZ41205777	229.4	16/05/2013	Fair overall condition. Shingle level has increased at south end. Void near base in centre reported in 2010 not visible, may have been repaired. However the deck slabs appear to have lifted slightly suggesting uplift from wave pressure in voids.	3		4 >20	Infill voids. Extend rock armour further north.	routine
121AB901B0801C04	CPSE-220/6918/02	Rock toe to old harbour wall.	Apron	NZ41685703, NZ41755698	184.5	16/05/2013	Derelict structure in very poor condition. Roundhead failed. Extensive spalling and cracking of concrete. Exposed reinforcement. Dislocated masonry blocks. Backed by demolition waste rubble.	5		5 6 - 10	Survey and significant repair works/replace?	urgent
121AB901B0801C05		Rubble revetment	Revetment	NZ41685704, NZ41545719	217.5	16/05/2013	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	Add extra rock armour and place with appropriate interlock.	routine
121AB901B0801C06	CPSE-220/6917/02	Rubble revetment.	Revetment	NZ41545719, NZ41475736	181.9	16/05/2013	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	Redistribute armour/provide additional armour to fill gaps	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	16/05/2013	Inner face of North East Pier. In poor condition. Extensive cracking and spalling of concrete. Exposed reinforcement. Rubble mound of demolition waste to rear affords protection.	4		5 6 - 10	Full survey. Significant repair works (replace?)	urgent
121AB901B0801C08	CPSE-220/6926/01	Random rubble tipped into old dock to fill in front of buried quays.	Revetment	NZ41495697, NZ41675703	205.1	16/05/2013	Mainly demolition rubble, broken concrete slabs. Fair condition although some displacement due to wave overtopping of old North East Pier.	3		3 11 - 20	Reprofile rubble, top up with rock.	no repairs
121AB901B0802C01	CPSE-220/6922/03		Splash Wall	NZ41135564, NZ41125616	616.9	16/05/2013	Newly failed section of concrete crest wall. Damage to slab around drain outlets, although evidence of repair at some. Some sections of crest wall have been previously replaced. Limited rock armour at toe to north and south end linked to toe abrasion?	3		3 >20	Replace failed crest unit. Structural survey/ replace other crest units as reqd.	routine
121AB901B0802C02	CPSE-220/6921/02	Splash wall with crest to 7.35mODN.	Splash Wall	NZ41095615, NZ41085631	152.9	16/05/2013	Fair overall, but some of the rock armour is small sized and inadequately interlocked, causing damage to concrete wall during storms. Evidence of repairs to crest slab around drainage holes and construction joints but further work required.	3		3 >20	Top up rock armour. Repair damage to crest slab.	routine
121AB901B0802C03	CPSE-220/6920/04	Rubble placed to top of seawall.	Bank	NZ41085631, NZ41175644	163.4	16/05/2013	Seawall in poor condition. Rock armour loosely stacked on crest and toe. New concrete boundary wall to rear around STW. Demolition rubble backfill deck at toe of rear wall inadequate and has been badly eroded at north end.	4		4 11 - 20	Add rock armour to inc standard of defence. Construct new concrete deck.	routine
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	16/05/2013	Toe piles only viewed from above - look corroded. Sealant renewed since 2010 inspection, but more required. Rust staining and minor surface deterioration to splash wall. Missing flood boards in access through rear wall. Cracking to lower wall and apron.	3		4 11 - 20	Inspect piles from boat / diver. Replace missing flood boards. Replace sealant.	no repairs

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	Inspection Date	Inspection Comments for 2012	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
121AB901B0802C05	CPSE-220/6929/03		Breakwater	NZ41515679, NZ41685692	449.2	16/05/2013	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 - 10	Full survey. Local repair to badly damaged sections (North side)	urgent
121AB901B0802C06	CPSE-220/6928/01	Partial rubble infilling of old dock. Slope variable.	Revetment	NZ41515688, NZ41635689	166.6	16/05/2013	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	16/05/2013	Demolition waste rubble backfill to old dock basin area by piling. Sandy foreshore with demolition waste.	3		3 >20	Consider within overall strategy for south outlet defences.	routine
121AB901B0803C01		Undefended Frontage	Undefended Frontage	NZ41415437, NZ41285473	383.2	28/09/2012	Local slope failures in upper cliff.	2		3 >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	28/09/2012	As last inspection concrete wall along the crest to south is cracked in places with spalling exposing reinforcement, typically around drainage holes. Groyne at northern extent 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
121AB901B0804C01	CPSE-220/6801/01	Eroding cliff to agricultural land.	Cliff - south of Ryhope Dene	NZ42335082, NZ41985195	1193.4	04/10/2012	Small-scale but regular ongoing slumping in soft material that overlays the solid geology base. Occasional caves and arches formed at the base of the cliffs. Outflanking of wall by car park access steps at southern end. Many recent mudslides / slips	3		2 >20	Continue monitoring.	no repairs
121AB901B0804C02		Undefended Frontage	Undefended Frontage	NZ41985195, NZ41445383	2040.3	28/09/2012	Many local slope failures in upper cliff and mud slides due to recent storms.	3		3 >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	28/09/2012	Many recent mud slides and slips in upper cliff following recent storms.	2		3 >20	Monitor slope failure with regards to cliff top footpath.	routine

