



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



**Durham County Council
Final Report**

July 2014

Durham County Council

Walk-over Visual Inspections of Assets

Contents Amendment Record

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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.

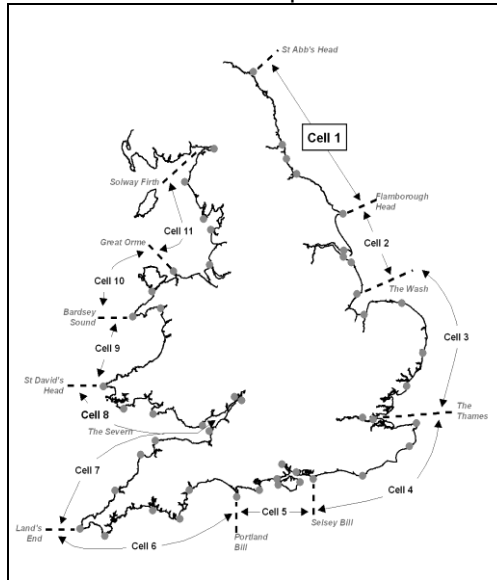


Figure 0-1 Sediment Cells in England and Wales

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 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 visual inspections

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 Durham County Council's frontage that were carried out in July 2014.

1. Introduction

1.1. Study Area

Durham County Council's frontage is approximately 17.5km in length and extends from Ryhope Dene at the boundary with Sunderland in the north to Crimdon Beck at the boundary with Hartlepool in the south, see Figure 1-1.

In accordance with previous coastal inspection surveys, this frontage is sub-divided into approximately 35 coastal assets, 27 of which are man-made assets while 8 are natural assets. Detailed maps showing the location of each of these coastal assets are presented in Appendix A.

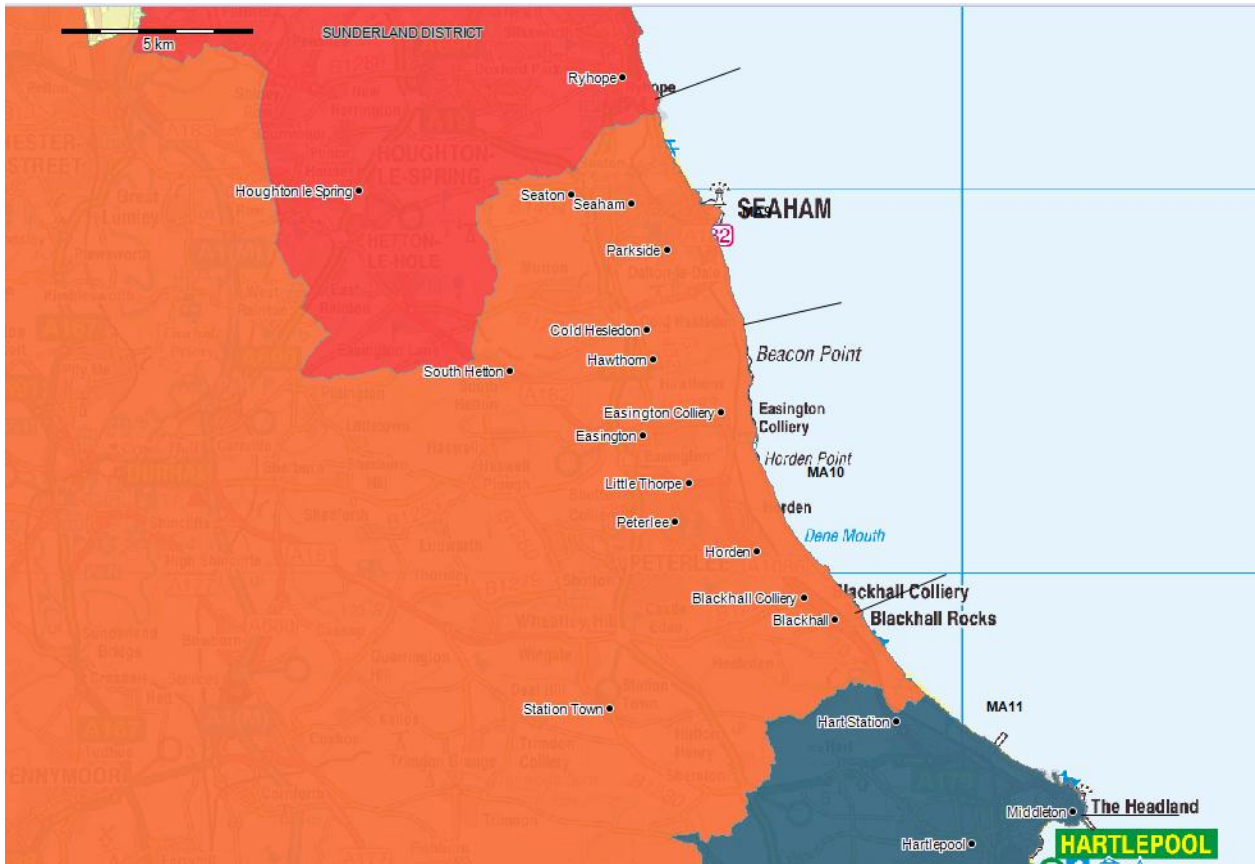


Figure 1-1: Durham County Council study area.

1.2. Methodology

This section presents the approach taken by the coastal asset inspectors for the Durham County 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 July to October 2014. The walkover inspections for the Durham County Council frontage were undertaken on the 11th July 2014.

The weather experienced during this time was dry with light winds. As with the previous inspections undertaken in 2010 and 2012, many of the quay walls and breakwaters within Seaham Harbour, were not inspected because they are not classified as coastal defence assets and they are located within privately owned areas not accessible to the public.

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 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 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 limited changes in the condition of both the natural and built defence assets along the Durham County frontage since the previous strategic monitoring inspections in October 2012. The following significant findings were observed during the 2014 inspections:

- There have been ongoing localised rock falls in the harder rock cliffs (including cracking, formation of caves and arches, and overhangs) and occasional slumps in the overlying till along undefended sections of cliff.
- The shingle and cobble beach levels along the northern Seaham frontage were generally much lower than in 2012.
- At the south end of the public beach at Seaham the low beach levels were exposing the remains of many derelict former groynes, which are a potential trip hazard and should be removed if confirmed redundant or repaired or replaced if considered necessary for coastal defence function.
- Seaham Harbour north basin marina has opened since the 2012 inspections allowing public access to the protected beach, new visitor centre and tourist facilities.
- The rock armour cliff toe protection south of Seaham harbour remains in good condition, although the cliffs behind continue to show evidence of slow erosion and signs of surface slips in the softer cliff material above.
- The colliery spoil from the foreshore of Chemical Beach, north of Nose's Point has been eroded and there are an increasing number of local slumps in the backing cliffs, particularly where the cliffs are blanketed in minewaste.
- There had been further erosion of the spoil in Blast Beach south of Nose's Point. There remains a sufficient width of beach to significantly protect the generally stable backing cliffs across much of the bay, but the narrowing ridge of spoil is now allowing wave overtopping to reach the cliffs, particularly in the south.
- The colliery spoil continues to erode on the foreshore, in the bays between Chourdon Point and Blackhall Rocks. Where sufficient spoil is present, such as at Horden Denes the backing cliffs are afforded protection and are relatively stable. Where spoil is absent, the cliffs are actively eroding. North of Blackhall rocks the eroding spoil beach had a cliff about 1.5 metres high, which makes access to and from the water's edge across the beach difficult.
- The main access steps to the beach from Crimdon Caravan Park have been closed as they have been damaged by cliff falls. Access is still available from the steps at the north end of the caravan park.
- The dunes north of Crimdon Beck were generally well vegetated although informal paths through the dunes are still resulting in localised erosion. There has been some toe erosion to the seaward face of the dunes, possibly related to the December 2013 storm surge. At Crimdon Beck the discharge deflects to the south resulting in erosion of the face of the dunes to the south, similarly to that found in previous inspections.

3. Condition Assessment

3.1 Pincushion Rocks to Chourdon Point (MA 09)

3.1.1 Ryhope Dene to Seaham

The most northern NFCDD asset length (121AB901B0804C01) within Durham County Council's jurisdiction extends along undefended sea cliffs from Ryhope Dene to the picnic site located at the north of Seaham, near Seaham Hall. The cliffs comprise a Magnesian Limestone base with overlying glacial till (below left). There is evidence of recent slumping in the till upper cliff along virtually the whole undefended length. There are frequent caves and arches formed in the limestone rock at the base of the cliffs caused by differential erosion by waves (below right).



Immediately adjacent to the access steps from the picnic site car park near Seaham Hall is a small stream that discharges to the foreshore. The 2008 report notes that this stream was in spate due to the heavy rainfall that preceded the inspection (below left). During the 2010 inspections, there was very little flow (below right). Despite heavy rain at the end of September 2012 there was little flow in the beck at the time of the inspection on 4th October 2012, below lower left. The beck was very low again in 2014 and the outflanking noted previously at the short length of blockwork wall immediately to the north of the stream still, appears unchanged since 2010, see photos below and overleaf.





Photo from 2012 report. (Asset ref. No. 121AB901B0804C01)



11/07/2014
Outflanking at north of steps unchanged from 2012. (Asset ref. No. 121AB901B0804C01)

Immediately south of the car park access steps is a short undefended length of cliff, followed by a short (approximately 10m) length of low-level wall at the tie in to the main Seaham seawall to the south. As during the 2010 inspections the beach levels at the wall were quite high, offering protection to the structure (below right). Backing the southern end of this low-level wall, and continuing behind the very northern end of the Seaham sea wall is a blockwork revetment on the backing slope which remains in fair condition.



04/10/2012
Wall at north end of Seaham.
Photo from 2012 report.



11/07/2014
Slightly lower beach levels, but little change since 2012.
(Asset ref. No. 121AB901B0804C01)

3.1.2 Seaham

The main Seaham sea wall, (asset ref. no. 121AC901C0102C01) is fronted by a shingle beach, which had been fairly high at the time of the 2012 inspection. The shingle levels were much lower in July 2014, exposing much more of the wall to wave action. The wall and promenade were in fair condition (below left). There was some vegetation growth in construction joints and cracks in the promenade, which should be removed and the joints sealed. Abrasion damage was evident to the wall in places particularly towards the south. Many of the plastic flap valves on the drainage outlets were missing. The low beach levels were exposing the remnants of many groynes which were not visible during the 2010 or 2012 inspections. The derelict groynes could be a health and safety hazard to people using the beach, so should be removed if confirmed redundant, or replaced / repaired to help stabilise the beach, see below lower right.



Cracks to promenade with vegetation growth.
Well vegetated cliff to rear.
(Asset ref. No. 121AC901C0102C01)



Scour channel at outfall from Seaham Dene.
(Asset ref. No. 121AC901C0102C01)



Minor abrasion damage to lower wall and
example of broken flap valve.
(Asset ref. No. 121AC901C0102C01)



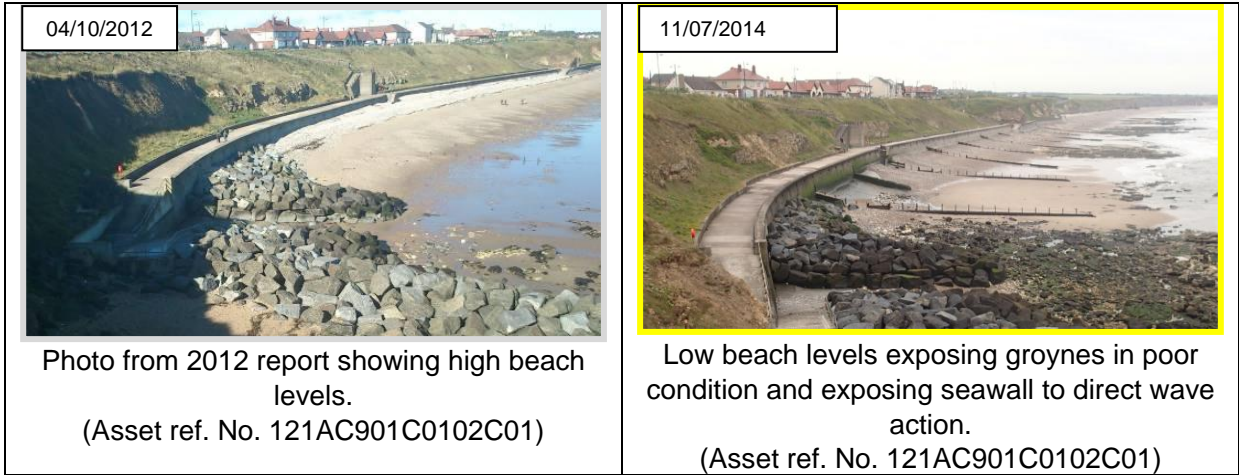
Damaged / derelict groynes on beach at south
end. Recommended to confirm redundant and
remove to reduce H&S risks or replace / repair.
(Asset ref. No. 121AC901C0102C01)



Low beach levels exposing toe of wall and
damaged groynes.
(Asset ref. No. 121AC901C0102C01)



Exposed concrete toe apron adjacent to start
of rock armour at south of defence.
(Asset ref. No. 121AC901C0102C01)



To the south of the seawall there is a rock armour berm providing toe protection to the cliffs around the headland adjacent to Featherbed rocks. As previously, the rock armour appeared in good condition although the cliffs to the rear show continue slow erosion and slumping of the upper till layers, see below right.



South of the headland, the rock armour protects a short length of concrete wall with a large outfall from the culverted Dawdon Dene, (below left), which is NFCDD asset 121AC901C0103C04. At the north and south of the wall there is some masonry placed to fill the previous slight outflanking at the tie-in to the limestone cliffs. This has been damaged at the south corner, see below right and needs a repair. The crest wall has vertical cracks which should be repaired.



Culverted outfall from Dawdon Dene.
(Asset Ref. No. 121AC901C0103C04)



Damage to masonry at south corner of wall.
(Asset Ref. No. 121AC901C0103C04)

The rock revetment extends around the small headland to south of the outfall. Although the rock armour is in good condition the limestone cliff is continuing to erode slowly through weathering, see below right, and this is putting the cliff top properties and boundary fence at imminent risk from erosion see below.



Rock armour protecting cliff toe, property sheds close to edge.
(Asset Ref. No. 121AC901C0103C02)



Ongoing erosion of cliff behind rock armour.
(Asset Ref. No. 121AC901C0103C02)

The rock armour starts to taper out with progression south (below right), and asset ref. 121AC901C0103C06 forms a transition from the armour to undefended, see below left and right. There was evidence of a significant surface slumps in the cliff face between the end of the rock armour and the beach access ramp.



Beach remains high at cliff toe but has steepened since 2012.
(Asset Ref. No. 121AC901C0103C06)



Slumping in cliff between end of rock armour and beach access steps.
(Asset Ref. No. 121AC901C0103C06)

The beach access ramp and steps are supported by a vertical concrete retaining wall, below left that has a large diagonal crack through the full height. The crack is also present on the photographs from 2010 and 2012 so the situation does not seem to have significantly worsened. There was also minor cracking to retaining wall at toe of slope to rear of ramp, below lower left.



Cracking in the retaining wall to the beach access ramp.
(Asset Ref. No. 121AC901C0103C07)



Beach access ramp and steps.
(Asset Ref. No. 121AC901C0103C07)



Cracking in the retaining wall to rear of beach access ramp.
(Asset Ref. No. 121AC901C0103C07)



Undefended length south of beach ramp.
(Asset Ref. No. 121AC901C0103C05)

The cobble beach running from north of the access steps through the bay to the northern extent of Seaham Harbour was high, similar to the situation in 2012, at the crest but appeared to have narrowed and steepened. There was evidence of former movement at several locations in the cliff vegetation, but the cliff was vegetated and appeared stable at the time of the inspection.

At the south end of the bay there is a rock armour revetment, asset 121AC901C0104C02, which is in good condition, see photos below. This defence forms the link to the root of the North Pier of Seaham Harbour and in a protected location where there had previously been outflanking of the North Pier.

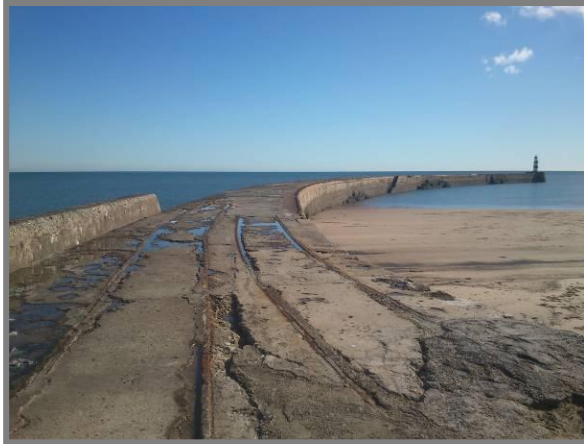


3.1.3 Seaham Harbour

Seaham Harbour is privately-owned by the Seaham Harbour Dock Company, with most areas not being publicly-accessible. The 2010 and 2012 inspection reports notes that, construction work was ongoing as part of the Council-supported £3M North Dock Regeneration Project, which will include a new floating pontoon, lock gates and dock-side facilities. The facilities opened in early 2013 and public access is now possible to parts of the North Dock. Due to the restricted access due to port related activity the South Dock site was not entered and structures were only inspected where possible from a distance, as with the 2010 and 2012 inspections.

Access to the North Pier is restricted by a locked access gate at the landward end and the photographs below left and right are taken through the gate. The concrete deck shows significant damage and weathering and has worsened since 2012, compare photos below, although the massive structure still clearly provides an effective coast protection function and is therefore assumed to be in fair overall condition. The inner face was inspected from the beach at low tide, see below lower photos.

It is recommended that, if not already in place, more detailed inspections, including vessel based and underwater inspection are undertaken by the Dock Company and if not already in progress a maintenance programme should be put in place.



View of North Pier in 2012.
(Asset Ref. No. 121AC901C0104C03)



View of North Pier in 2014 showing increased damage to deck.
(Asset Ref. No. 121AC901C0104C03)



Toe erosion damage where North Pier ties into rock outcrops.
(Asset Ref. No. 121AC901C0104C03)



Missing section of inner coping to North Pier.
(Asset Ref. No. 121AC901C0104C03)

The wall at the back of the beach in the outer harbour, asset 121AC901C0104C05 consists of two parts, the first being a vertical wall at the car park, which ties into North Pier, and the second a dressed masonry sloping revetment that ties into the breakwater to the south of the beach. Both parts appeared to be in fair condition see below left and right, but there was missing mortar and open joints in both sections that need repairing before the damage worsens.

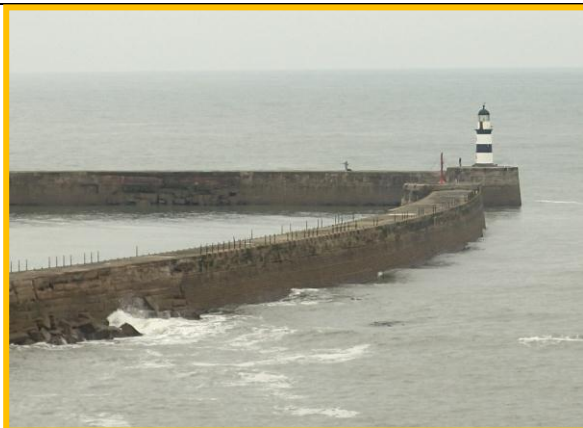


Low masonry wall at back of beach.
(Asset Ref. No. 121AC901C0104C05)



Gaps and missing grout in masonry revetment adjacent to new marina building.
(Asset Ref. No. 121AC901C0104C05)

The South Pier was only inspected from a distance as it is within the port operational area, see photos below. The main pier appeared to have significant damage to sections of the crest, and outer face, see photos below left and right. At the root of the pier rock armour has been placed at the tie in to the coast, below right as part of a previous phase of regeneration. There is an area of tipped rubble in front of the rock armour, see below, lower left. The armour continues to the south protecting the port access road and appeared to be in good condition.



View of South Pier showing damaged crest.
(Asset Ref. No. 121AC901C0104C17)



General view of South Pier.
(Asset Ref. No. 121AC901C0104C17)



Rock armour at root of South Pier.
(Asset Ref. No. 121AC901C0104C01)

3.1.4 Dawdon

The frontage between Seaham Harbour South Pier and Seaham Fleet Rock is protected by a continuation of the rock armour revetment extending southwards from the South Pier. In most places the armour is against the cliff toe, but where there is evidence of a former vertical wall (below right), it is placed as a bund slightly seaward of the cliff. The rock armour is in good condition. There was some evidence of localised surface slumping in the vegetated slopes between the rock armour and the road.



Rock armour south of port.
(Asset Ref. No. 121AC901C0105C01)



Rock armour bund seaward of cliff.
(Asset Ref. No. 121AC901C0105C01)

South of the revetment between Seaham Fleet Rock and Nose's Point, the unprotected cliffs were previously fronted by a colliery spoil beach (known as Chemical Beach) but this has now been virtually completely eroded and there are an increasing number of local slumps in the backing cliffs, some of which consists of colliery waste. Debris exposed by the eroding beach should be removed routinely.



Colliery spoil has been eroded from Chemical Beach.
(Asset Ref. No. 121AC901C0106C01)



View north from Noses Point.
(Asset Ref. No. 121AC901C0106C01)

3.1.5 Nose's Point and Blast Beach

At Nose's Point headland, the cliffs characteristically have caves and arches formed at their base (below left). The headland appears relatively stable and exerts a control on both the Dawdon Chemical Beach frontage to its north and Blast Beach to the south.



Caves and arches at Nose's Point from 2012 report. (Asset Ref. No. 121AC901C0107C01)



Cliffs with caves at Nose's Point. (Asset Ref. No. 121AC901C0107C01)



Photo of Blast beach from 2012 report. (Asset Ref. No. 121AC901C0107C01)



Eroding colliery Spoil at Blast beach. (Asset Ref. No. 121AC901C0107C01)

To the south of Nose's Point is the bay of Blast Beach, above left and right and below. The near vertical cliff line at the rear of the bay has been relict for many years as it is protected by an artificial beach formed of colliery spoil. The colliery waste is continuing to erode and has been almost totally lost at the south where it meets Chourdon Point, see below. From mid-way along the beach there was evidence of wave overtopping the beach ridge with water collecting in pools at the toe of the cliffs. In future the limestone cliffs will become active again.



Eroding spoil at north end of Blast beach. Photo from 2012 report



Eroding spoil at north end of Blast beach. (Asset Ref. No. 121AC901C0107C01)



Eroding spoil at north end of Blast beach.
(Asset Ref. No. 121AC901C0107C01)



Eroding spoil beach adjacent to pill box located south of the footpath steps down to the beach.
(Asset Ref. No. 121AC901C0107C01)

3.2 Chourdon Point to Blackhall Rocks (MA 10)

3.2.1 Chourdon Point

Unlike the cliffs to the north and south, Chourdon Point (asset ref. no. 121AC901C0107C02) has no protection from the colliery spoil and so similarly to Nose's Point there are caves, overhangs and arch formations at the base of the cliffs due to the weathering and erosion process.



View of Chourdon Point looking south from Blast Beach.
(Asset Ref. No. 121AC901C107C02)



Eroding till mantle above limestone cliffs at Chourdon Point.
(Asset Ref. No. 121AC901C0107C02)

3.2.2 Hawthorne Hive, Shippersea Bay and Easington Colliery

The coast between Chourdon Point in the north and Horden Point in the South consists of a single NFCDD asset reference 121AC901C0201C01. This unit has been classed as “locally active” and includes the bays of Hawthorne Hive and Shippersea, which both contain artificial beaches of eroding colliery spoil at the base of the natural cliffs. Further south the artificial beach is narrow or almost completely eroded.

The condition of the cliffs and beaches on this undefended frontage was broadly similar to the findings of the 2010 and 2012 inspections. Where there is no colliery waste beach the cliffs are subject to cave and arch formation at their base, with local rockfalls occasionally occurring and slumping in the upper till layers.



Eroding spoil beach in Hawthorne Hive Bay.
(Asset Ref. No. 121AC901C0201C01)



View of cliffs at Easington Colliery, looking north from Fox Holes.
(Asset Ref. No. 121AC901C0201C01)

3.2.3 Horden Denes

Between Horden Point and Blackhall Rocks there is a long uninterrupted length of colliery spoil beach, which is NFCDD asset 121AC901C0201C02. This protects the backing cliffs from marine action, enabling them to become relatively stable and vegetated. However, despite the protection afforded by the foreshore and spoil beach, there remains occasional local slumping in the backing slopes.

In many locations there is debris on the beach such as old pipes and metalwork that is being exposed as the spoil erodes. This should be removed routinely to reduce health and safety hazards.

The 2012 inspection report notes that the eroding face of the colliery spoil had formed a low cliff on the beach between 0.5m and 1m in height, see below. At the time of the July 2014 inspection the eroding face was higher, of the order of 1.5m at Horden beach near the Limekiln Gill access. There appeared to have been some erosion of the wedge of large cobbles wedge at the back of the inter-tidal beach. The high cliff in the beach material makes access to the waters edge difficult and is a health and safety hazard to beach users. It was noted that the upper beach is used by a number of recreational 4x4 vehicles. This should be discouraged as the cliff at the edge of the eroding waste forms a significant hazard that can change on a daily basis.

 <p>2012</p> <p>Eroding edge of colliery spoil at Horden Beach (photo from 2012 report) (Asset Ref. No. 121AC901C0201C02)</p>	 <p>Eroding edge of colliery spoil at Horden Beach (Asset Ref. No. 121AC901C0201C02)</p>
 <p>2012</p> <p>View of artificial beach looking north from Blackhall Nature Reserve (Asset Ref. No. 121AC901C0201C02)</p>	 <p>View of artificial beach looking north from Blackhall Nature Reserve (Asset Ref. No. 121AC901C0201C02)</p>

3.3 Blackhall Rocks to Heugh Breakwater (MA 11)

3.3.1 Blackhall Rocks and Crimdon Park Caravan Site

At Blackhall Rocks there is an extensive rocky outcrop on the foreshore (below left), and the backing cliffs have extensive cave formations at their base.



The frontage south of Blackhall Rocks is protected by the rock scar outcrops on the foreshore, below left and right. The cliffs are formed from softer material overlying a near vertical hard rock base. As in the previous inspections there were signs of the softer material slumping throughout although the extensive vegetation coverage indicates a relatively slow rate of erosion. Rock falls from over-steepened/overhanging sections are evident locally. Fractures are visible in the rock indicating potential failure locations in the future.

Near the north end of the caravan park, between the steep gill at the north of Crimdon Dene caravan park and the beach access steps within the park there are extensive cliff slumps and cliff failures. The access steps have been closed due to cliff falls, see photo overleaf. The fence appears to have been relocated landward in the region of the slip that was noted in the 2010 report. As the cliff is expected to continue to erode the fence should be regularly relocated as required.



 <p>July 2014</p> <p>Vegetated cliffs south of Blackhall Rocks. (Asset Ref. No. 121AC901C0301C01)</p>	 <p>Slumping in cliffs to north of caravan park. (Asset Ref. No. 121AC901C0301C01)</p>
 <p>Caravan park access steps closed due to cliff falls. (Asset Ref. No. 121AC901C0301C01)</p>	 <p>Vegetated cliff slopes adjacent to caravan park. (Asset Ref. No. 121AC901C0301C01)</p>

3.3.2 Crimdon Park Caravan Site to Crimdon Beck

From Crimdon Park Caravan Site to the southern limit of the Durham coast at the boundary with Hartlepool at Crimdon Beck, the frontage comprises of extensive dunes (below left and right). There is a wide sandy beach that has formed in the bay controlled by the resistant rocks of Hartlepool headland to the south. This has encouraged the growth of the dune system, which before development was continuous through to the headland.

Between the Caravan Park and Crimdon beck the dunes are criss-crossed by a network of informal of informal paths from pedestrians accessing the beach from the car park. It has been noted in previous inspections that in places this has led to loss of vegetation and localised erosion of the dunes. Chestnut paling fences to stabilise the dunes, reduce trampling and limit access have been used in places and it is recommended this should be continued to restore or reduce damage to the dunes which form the natural coastal defence.

At the north of the dunes they tie in to the well vegetated slope at the south of the caravan park. Further south, the crest level falls and the dunes widen into a dune field. The seaward dunes have experienced some toe erosion along a significant length, see photo below, lower left, particularly to the south of the asset length. It is apparent that the erosion took place some months before the inspection and may have been associated with the December 2013 storm surge.



North end of dune system near caravan park.
(Asset Ref. No. 121AC901C0301C02)



View of dune system looking south from caravan park. Paths through dunes in distance.
(Asset Ref. No. 121AC901C0301C02)

Oct 2012



Sand dunes north of Crimdon Beck.
(Asset Ref. No. 121AC901C0301C02)

Jul 2014



Sand dunes at Crimdon Beck (Asset Ref. No. 121AC901C0301C02)



Evidence of erosion of front face of dunes.
(Asset Ref. No. 121AC901C0301C02)



Erosion of dune face immediately south of Crimdon Beck.
(Asset Ref. No. 121AC901C0301C02)

There was limited flow in Crimdon Beck at the time of the inspection. The beck diverts to the south as it enters the beach and this is causing erosion of the front face of the dunes within Hartlepool BC's area, see photo above right.

4. Comparison with Previous Assessments

Previous formal assessments across the whole study frontage were undertaken in November 2008, July 2010 and October 2012. Comparative photographs have been included in the main text for a number of key locations.

The July 2014 inspections found the condition of the hard defences along the frontage appears to be very similar to that found in the previous inspections. Beaches were generally lower than observed during the 2012 inspections. There has been further erosion of the artificial beaches formed from colliery waste that protect the relict cliffs in many of the bays south of Seaham.

5. Problems Encountered and Uncertainty in Analysis

All assets were inspected at suitable stages of the tide and therefore there were no problems encountered. As in previous years the privately owned assets within Seaham Harbour were not inspected. However, as the marina area at the north of the harbour is now open to the public inspection of more assets was possible than in previous years.

The inspections took place in July 2014. The preceding 2013/14 Winter periods was exceptionally stormy and included a significant storm surge in early December 2013 that caused notable damage to beaches and defence further south in Cell 1. Further assessment of the beach erosion particularly for the eroding artificial beaches south of Seaham will be addressed in the 2014 Full Measures report.

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.

In the majority of locations the ongoing erosion of undefended sea cliffs does not appear to be causing significant increase in risk to people, property or infrastructure. There are a number of locations where cliff toe protection is reducing the rate of erosion, but assets on the cliff top are still at risk related to weathering and continued erosion of partly protected cliffs.

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

Appendices

Appendix A

Asset Locations

442000

443000

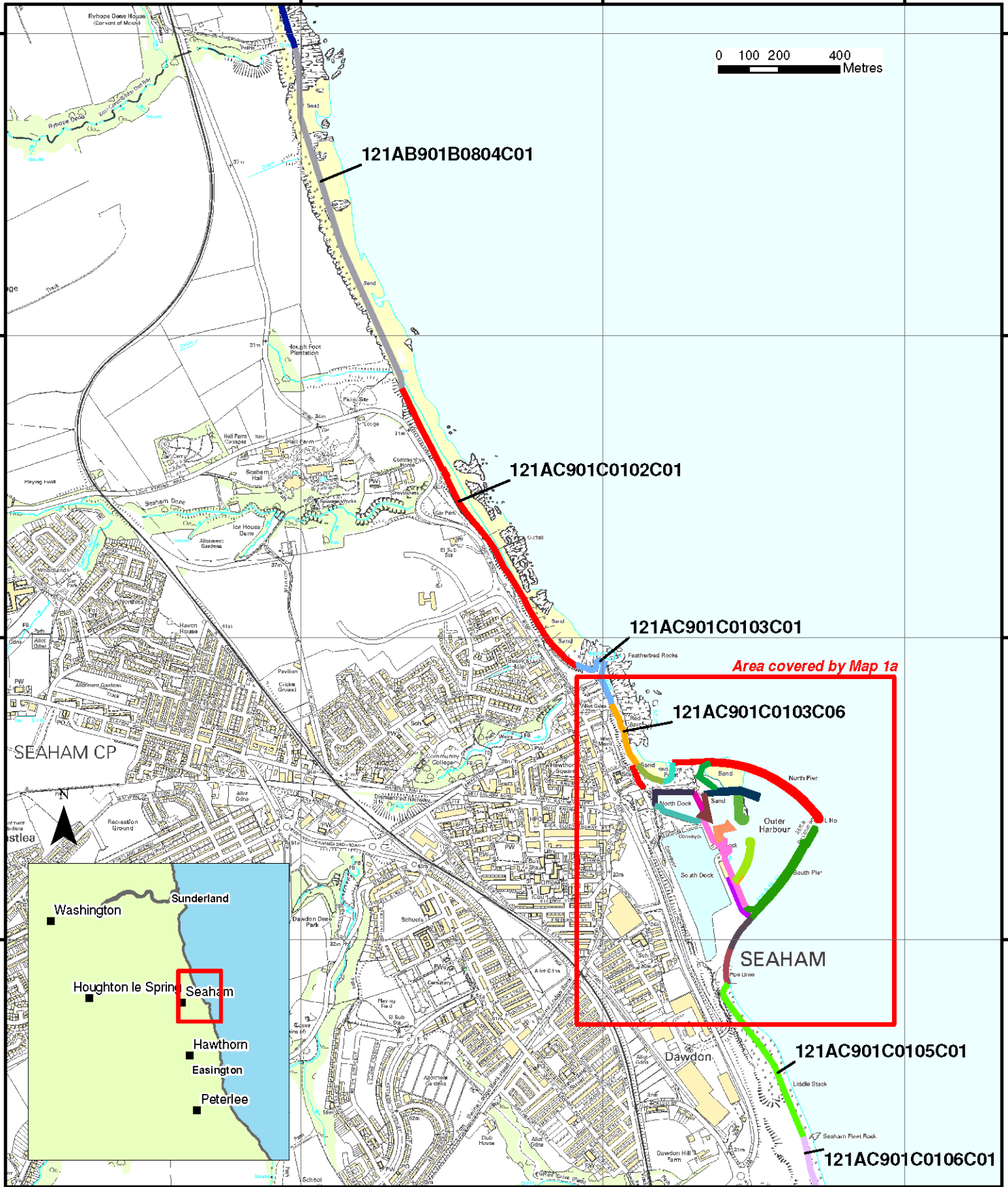
444000

552000

551000

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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 1
 Durham County Council
 Frontage**

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

Halcrow Group Limited

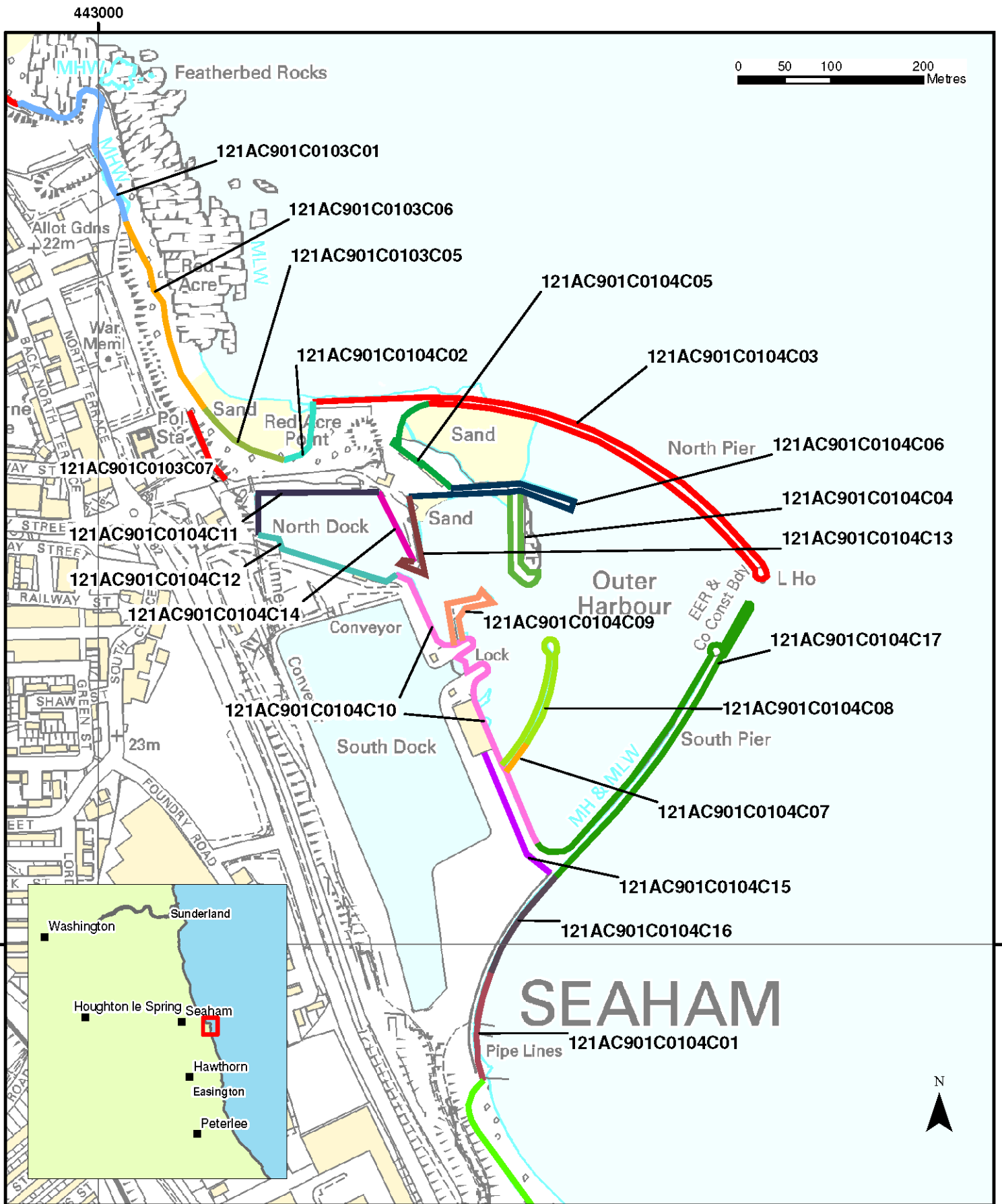
Burderop Park
 Swindon
 Wiltshire
 SN4 0QD

+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 1a
Durham County Council
Frontage

Coastal Walkover
 Inspection Report

Drawing Scale 1:15,000 at A4

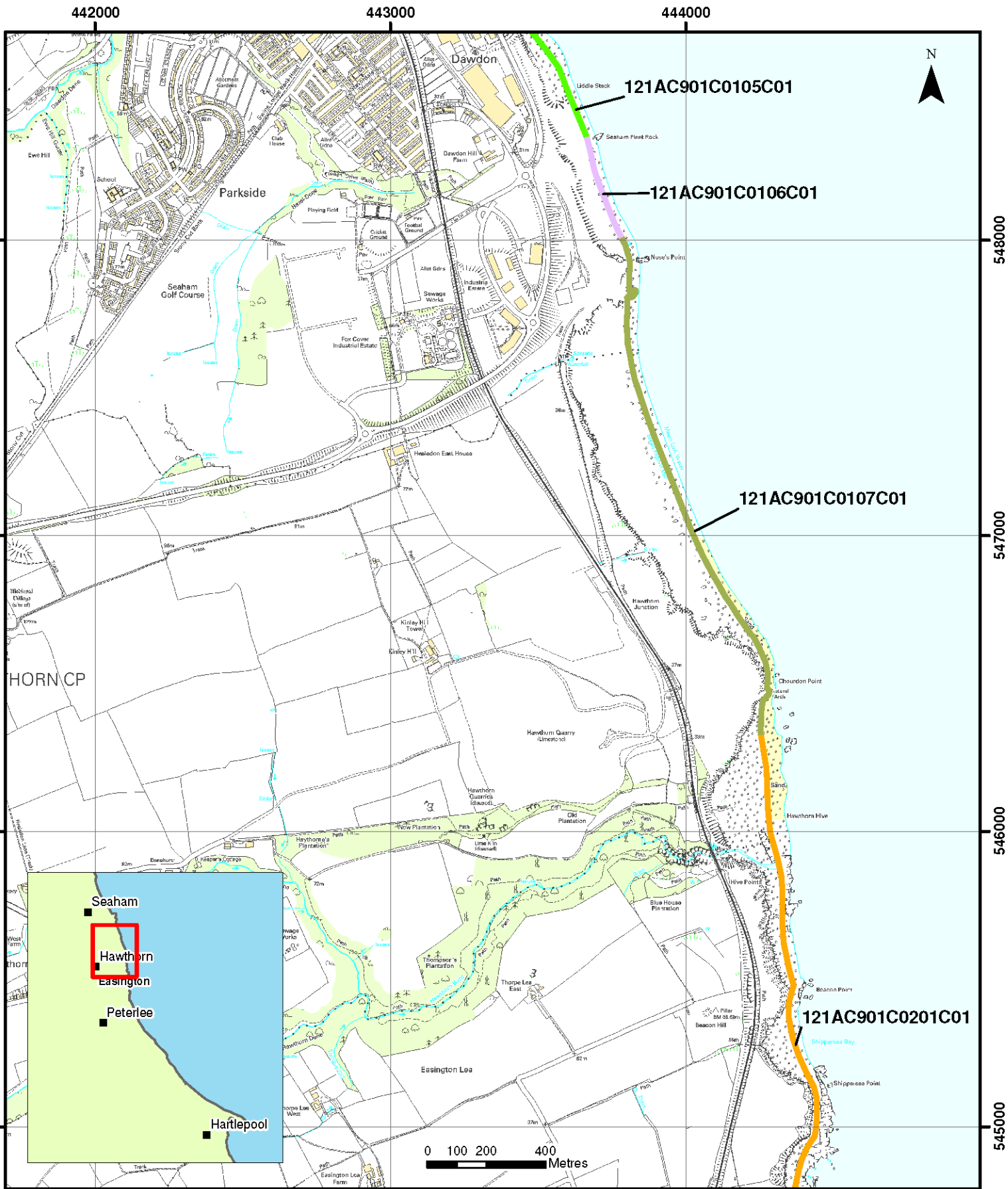
Halcrow Group Limited
 Burderop Park
 Swindon
 Wiltshire
 SN4 0QD

+44 (0)1793 812479

Halcrow
 A CH2M HILL COMPANY

Notes:

All maps taken from 2010 Asset 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 2
Durham County Council
Frontage

Coastal Walkover
 Inspection Report

Drawing Scale 1:15,000 at A4

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 Swindon
 Wiltshire
 SN4 0QD

+44 (0)1793 812479

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Notes:

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

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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
 Durham County Council
 Frontage**

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

Halcrow Group Limited

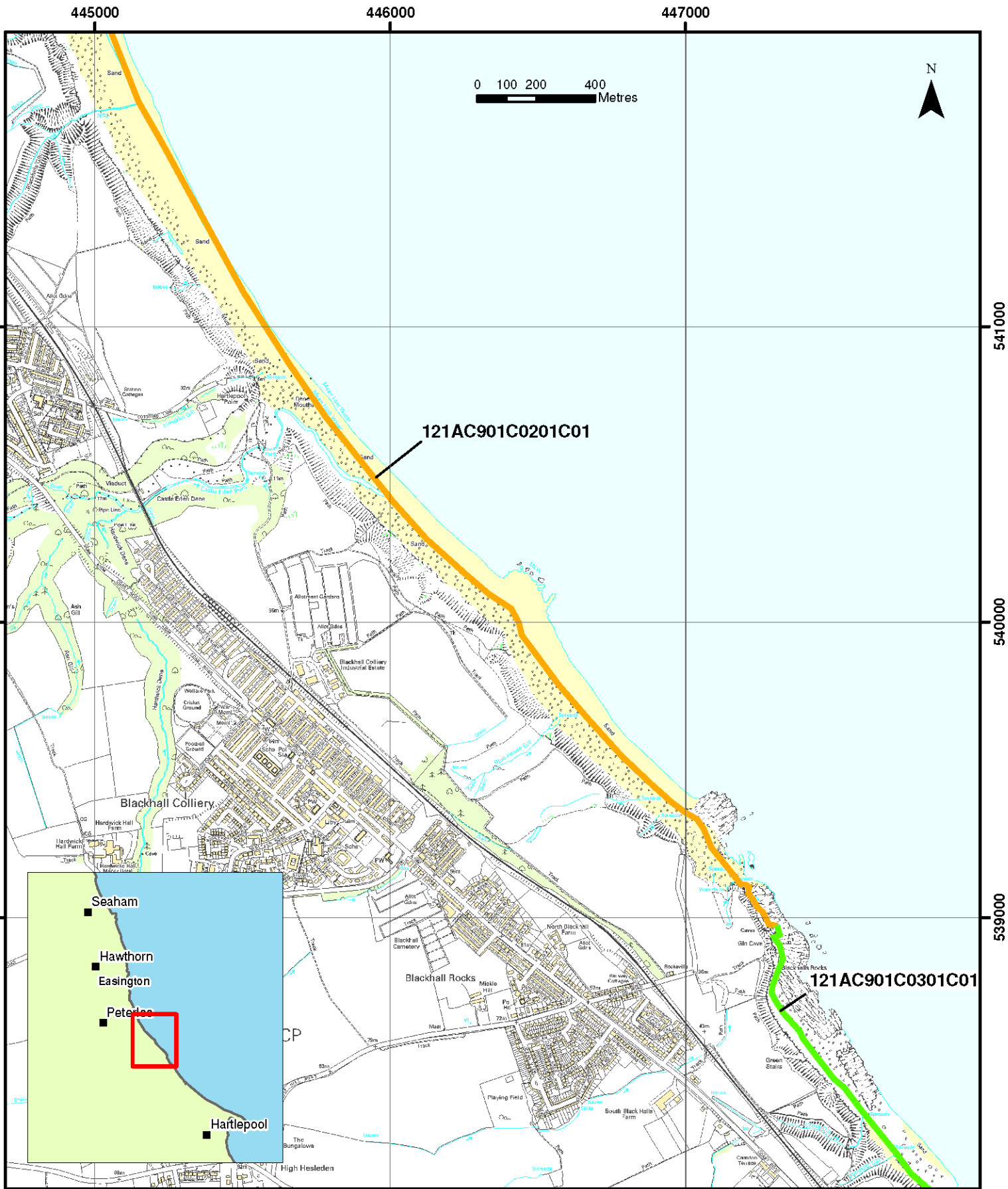
Burderop Park
 Swindon
 Wiltshire
 SN4 0QD

+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 4
 Durham County Council
 Frontage**

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

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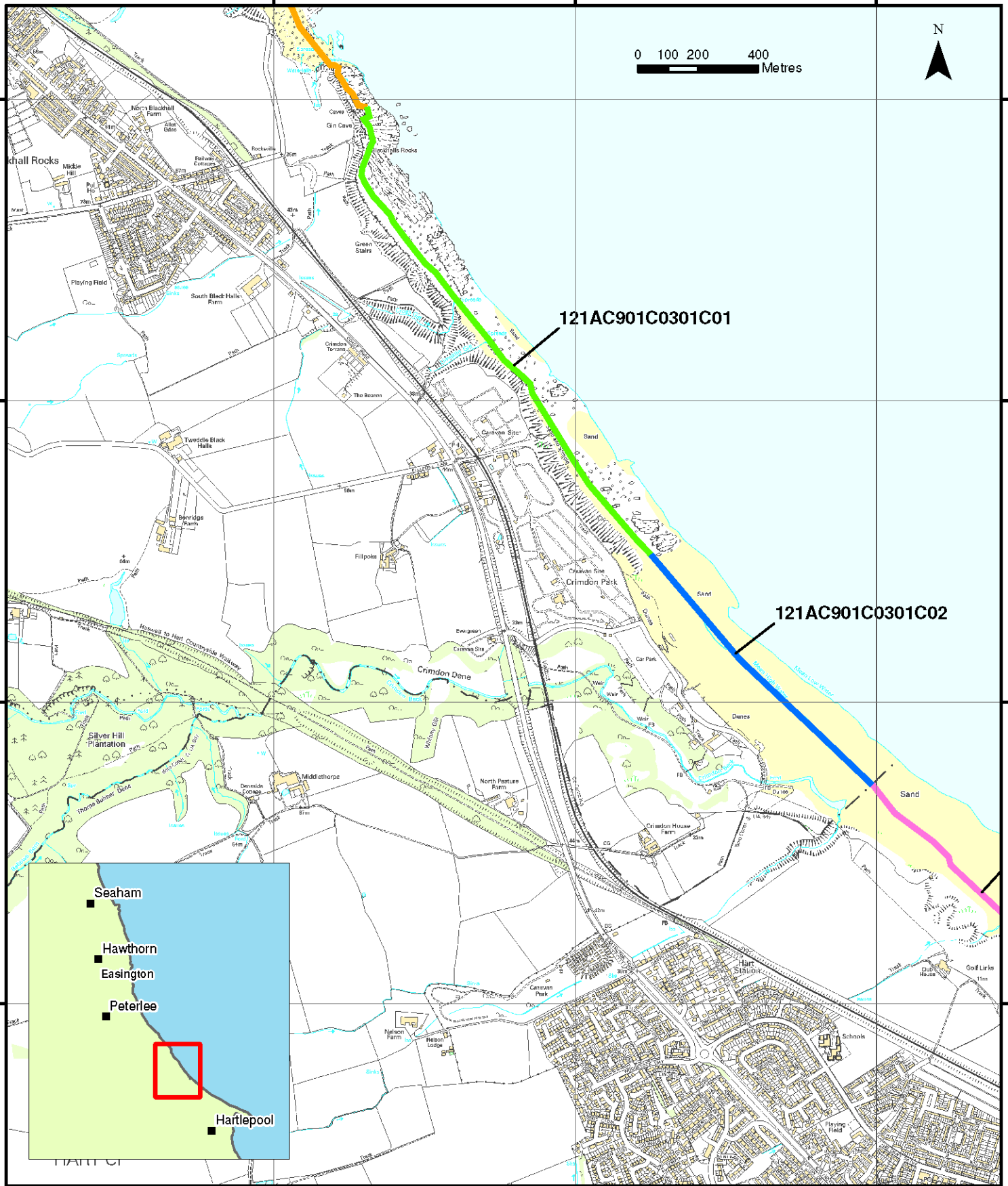
Notes:

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



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449000



Legend

-  Asset location
-  NFCDD Asset Number

Lead Authority: Scarborough Borough Council
 Project: Cell 1 Regional Coastal Monitoring Programme

**Figure 1 - Map 5
 Durham County Council
 Frontage**

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

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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	Inspect 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 overlies the solid geology base. Occasional caves and arches formed at the base of the cliffs. Many recent mudslides / slips of upper cliff onto beach.	4	2	>20	Continue monitoring.	no repairs
121AC901C0102C01	CPSE-220/6802/02	680202 Three individual lengths of sheet steel pile toe to main wall. Buried under beach no visual inspection.	Toe Piling	NZ42914990, NZ42335082	1097.7	11/07/2014	Seawall in fair condition. Abrasion damage evident in places. Beach levels low, many deficit groynes visible. Groyne piling on lower beach appears redundant (S end) poss H&S hazard. Visible parts of groynes v poor.	3	3	>20	Review need for groynes and refurb or remove redundant groyne piling.	routine
121AC901C0103C01	CPSE-220/6803/01	680301	Cliff / Scarp	NZ42914990, NZ42984992	93.5	11/07/2014	As 2012: Rock armour berm/revetment extends around Featherbed Rocks south. Armour in good condition. Some continued erosion of sea cliffs to south where berm is seaward of cliff toe. Some outflanking between concrete platform/cliffs to south of headland.	2	2	>20	Monitor.	no repairs
121AC901C0103C02	CPSE-220/6806/01	680601 Concrete wall to base of eroding cliff. Rock protection scheme under study.	Wall	NZ43024978, NZ43004984	72.6	11/07/2014	Rock armour revetment in good condition, but erosion of cliff edge continues due to weathering. Fence and shed at cliff edge at high erosion risk.	2	2	>20	Monitor.	no repairs
121AC901C0103C03	CPSE-220/6804/01	680401 Concrete wall to base of eroding cliff. Very poor condition. Collapsed slab behind. Rock protection scheme under study.: Emergency rock armour repairs to breach	Wall	NZ42994986, NZ42984992	78.6	11/07/2014	Rock armour revetment constructed in front of cliff toe. Ongoing slow erosion of cliff behind through weathering.	2	3	11 - 20	Monitor cliff behind armour	no repairs
121AC901C0103C04	CPSE-220/6805/03	680503 Gunned rock toe to wall. Rock protection scheme under study.	Apron	NZ43004984, NZ42994986	22.6	11/07/2014	Rock armour protecting short length of wall with large outfall. Wall in fair condition, armour good. Damage to wall at S corner where returns toward eroding rock outcrop. Large cracks in wall face at N end.	3	3	11 - 20	Monitor for outflanking. Repair cracks in crest wall.	routine
121AC901C0103C05	CPSE-220/6808/01	680801 Slipping cliff. To path and police station.	Cliff / Scarp	NZ43114957, NZ43204952	103.9	11/07/2014	As previous survey. High levels of pebble beach berm protecting cliff toe. Upper beach remains high but has steepened. Large slip in the cliff between steps and start of rock armour.	2	2	>20		no repairs
121AC901C0103C06	CPSE-220/6807	undefended	Cliff / Scarp. Limestone	NZ43114957, NZ43024978	223.3	11/07/2014	As 2012. Partly undefended, but is a 'transition zone' from rock armour to north to undefended bay. Cliffs in south well vegetated, but with signs of continued slumping. Erosion and slumping continue in north, with sheds / fence close to edge.	3	4	>20	Public safety needs monitoring - access to cliff top controlled by fencing.	routine
121AC901C0103C07	CPSE-220/6808/01	680801 Slipping cliff. To path and police station.	Cliff / Scarp	NZ43134950, NZ43094957	84.1	11/07/2014	Diagonal cracking to seaward face of wall retaining access ramp/steps. Beach levels high. Minor cracking to retaining wall at toe of slope to rear of ramp. However, minimal change since 2012.	3	4	11 - 20	Repairs to cracks.	routine
121AC901C0104C01	CPSE-220/6812/02	681202 Recurved splash wall set back from main wall. Protection against overtopping into South dock.	Splash Wall	NZ43414885, NZ43424897	190.7	11/07/2014	Only viewed from cliff due to access restrictions to port. Rock armour revetment appears to still be in good condition.	2	2	>20	2-yearly inspections.	routine
121AC901C0104C02	CPSE-220/6809/01	680901 Rock armour slope to rear of harbour area reclaiming land.	Armour	NZ43204952, NZ43234958	80.7	11/07/2014	Again no change from prev surveys. Substantial rock armour sizes and stable profile of works. Some erosion of land at root, but not worsened since 2008.	2	2	>20	Monitor.	no repairs
121AC901C0104C03	CPSE-220/6810/02	681002 Crest wall to river end of North Pier. Overtopping protection to pier and reclaimed land.	Wall	NZ43234958, NZ43724939	986.3	11/07/2014	Seaward face and crest not accessible. Inner face fair, evidence of repairs, which are holding. Some missing mortar and voids between masonry blocks. Structure is heavily overtopped at high tide.	3	3	>20	Detailed inspection	routine
121AC901C0104C04	CPSE-220/6817/02	681702 Masonry toe on seaward side only.	Apron	NZ43464938, NZ43454949	231	11/07/2014	Only viewed from Marina side due to access restrictions. Appears fair overall. Some missing mortar between masonry blocks.	3	4	>20	Detailed inspection	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	Inspect Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
121AC901C0104C05	CPSE-220/6815/01	681501 Dressed masonry revetment slope in harbour.	Revetment	NZ43384949, NZ43354958	146.5	11/07/2014	Low vertical wall between beach and car park good. Sloping dressed masonry revetment has missing mortar between blocks.	3	3	>20	Grout gaps between blocks in revetment.	routine
121AC901C0104C06	CPSE-220/6816/01	681601 Massive masonry breakwater. Verticle sided on southern side at landward end only.	Breakwater	NZ43334948, NZ43514947	323.8	11/07/2014	Only inspected from north side due to access restrictions. Missing blockwork and damage to seaward end. north side fair, some missing grout between masonry blocks.	3	5	>20	Deatiled inspection	routine
121AC901C0104C07	CPSE-220/6822/01	682201 Breakwater is pierced by regular holes at high tide level.	Breakwater	NZ43444918, NZ43464921	37.5	01/09/2008	Not inspected.	0	0	>20	Detailed inspection.	routine
121AC901C0104C08	CPSE-220/6822/01	682201 Breakwater is pierced by regular holes at high tide level.	Breakwater	NZ43434919, NZ43484932	277.6	11/07/2014	Not inspected.			>20	Detailed inspection.	routine
121AC901C0104C09	CPSE-220/6821/01	682101 Breakwater side slopes vary along length. Damage in parts. Some concrete bagwork repairs.	Breakwater	NZ43384932, NZ43414938	172.6	01/09/2008	Not inspected.			>20	Detailed inspection.	routine
121AC901C0104C10	CPSE-220/6820/01	682001 Breakwater between seaham south harbour and outer breakwater.	Wall	NZ43474911, NZ43324939	412.9	11/07/2014	Not inspected - private no public access.			>20	Detailed inspection.	routine
121AC901C0104C11	CPSE-220/6818/02	681802 Masonry retaining wall to high ground inshore.	Wall	NZ43174948, NZ43304948	175	01/09/2008	Only inspected from a distance due to access restrictions. Some vegetation growths in joints.			>20	Detailed inspection.	routine
121AC901C0104C12	CPSE-220/6818/02	681802 Masonry retaining wall to high ground inshore.	Wall	NZ43174944, NZ43324939	164.2	01/09/2008	Not inspected.			>20	Detailed inspection.	routine
121AC901C0104C13	CPSE-220/6819/01	681901 Breakwater between north dock and outer harbour.	Breakwater	NZ43354939, NZ43334948	132.8	11/07/2014	Void in blockwork and signs of previous repairs. New surfacing and handrails.	4	4	>20	Grout voids and gaps between blocks.	routine
121AC901C0104C14	CPSE-220/6818/02	681802 Masonry retaining wall to high ground inshore.	Wall	NZ43344941, NZ43304948	84.2	11/07/2014	Overall fair. Wasll inside new locked marina, not a coastal defence asset.	3		>20	Detailed inspection	routine
121AC901C0104C15	CPSE-220/6820/01	682001 Breakwater between seaham south harbour and outer breakwater.	Wall	NZ43484907, NZ43414920	150.6	01/09/2008	Not Inspected.			>20	Detailed inspection.	routine
121AC901C0104C16	CPSE-220/6812/02	681202 Recurved splash wall set back from main wall. Protection against overtopping into South dock.	Splash Wall	NZ43424897, NZ43494907	126.2	11/07/2014	Only inspected from cliff due to access restrictions. Fronted by areas where rubble has been tipped on seaward side.	3		>20	Detailed inspection by Seaham Harbour Dock company.	routine
121AC901C0104C17	CPSE-220/6811/01	681101 South Pier to Harbour acting as protection to internal frontages.	Breakwater	NZ43494907, NZ43704936	746.7	11/07/2014	Not inspected due to access restrictions. Photo from cliff only.	3	4	>20	Detailed inspection.	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	Inspect Date	Inspection Comments for 2014	Overall Condition	Worst Condition	Residual Life	Recommendations	Urgency
121AC901C0105C01	CPSE-220/6813/01	681301 Eroding cliff to South of harbour within Dock Co. property. Derelict industrial land above.	Cliff / Scarp	NZ43534863, NZ43414885	575	11/07/2014	Rock armour still in very good condition. In the north armour is against the toe, further south there is also a bund set forward of cliffs at former wall remnants. Cliffs to rear are protected but still evidence of surface movement and slow erosion.	1	1	>20	2-yearly inspections. Monitor for outflanking at S end.	no repairs
121AC901C0106C01	CPSE-220/6814/01	681401 Colliery waste tip eroding fast. Review of importance as sediment supply is currently being undertaken.	Recharge	NZ43784801, NZ43594853	554.7	11/07/2014	Colliery waste has now gone. Slowly eroding near vertical cliffs with little vegetation and occasional slumps in upper till.	4	4	11 - 20	Clear-up of debris as spoil erodes.	routine
121AC901C0107C01		undefended	Cliff / Scarp	NZ44254632, NZ43784801	1847.9	11/07/2014	Cliffing in colliery waste as it erodes back. Some local slumps and cracking in backing cliff. Colliery waste becoming narrow, esp at ends of bay. Erosion edge close to pill box on beach at S of access steps.	3	3	>20	Monitor rate of erosion of colliery spoil.	no repairs
121AC901C0107C02		Hard rock cliff with overlying till. Rock platform subject to chemical weathering.	Cliff - Chourdon Point	NZ44234664, NZ44254632	327.8	11/07/2014	Weathering of rock platform and slow erosion of cliffs, forming caves and arches. Unstable sections with caves and arches. Rockfalls at 'point' have left notable overhangs.	3	3	>20		no repairs
121AC901C0201C01		undefended	Cliff / Scarp	NZ47313897, NZ44254632	8397.6	11/07/2014	Generally localised slumping in softer material with arch/cave formation in base of harder rock. In some of the bays there is eroding colliery waste protecting the cliffs although in some locations only a narrow band remains.	3		>20	Monitor using aerial survey data	routine
121AC901C0201C02		Colliery spoil protecting backing cliffs.	Recharge - Horden Point to Blackhalls Rock	NZ44564307, NZ44254632	4913.4	11/07/2014	Long uninterrupted length of eroding colliery spoil beach backed by cliffs. Occasional slumps in cliffs but good protection afforded by spoil beach except at headlands. Cliff in eroding beach about 1.5m high N of Blackhall, beach ridge at S end.	3	3	>20	Monitor, remove debris (wire, pipes etc) from mine spoil as exposed.	no repairs
121AC901C0301C01		undefended	Cliff / Scarp	NZ48983672, NZ47313897	2901.5	11/07/2014	Slumps in upper till evident along parts of caravan park frontage seaward of fence. Main steps path to beach closed due to cliff falls. Steps at north end in fair condition..	3	3	>20	Monitor.	no repairs
121AC901C0301C02		undefended	Dunes fronted by sandy beach - south of Crimdon Caravan Park	NZ48263750, NZ47313897	1055.9	04/07/2014	Dunes and beach in front of and protecting cliffs. Dunes appear relatively stable and well vegetated, although some past storm toe erosion evident in places, growing to south. Network of formal and informal footpaths crossing dunes.	2	2	>20	Monitor changes to dunes.	no repairs

 condition worse than in 2012
 condition better than in 2012

