Cell 1 Regional Coastal Monitoring Programme
Walkover Inspection Surveys 2016

Hartlepool Borough Council

September 2016

Hartlepool Borough Council

Walkover Inspection Surveys 2016

Contents Amendment Record

This report has been issued and amended as follows:

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Contents

Appendices

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Preamble

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

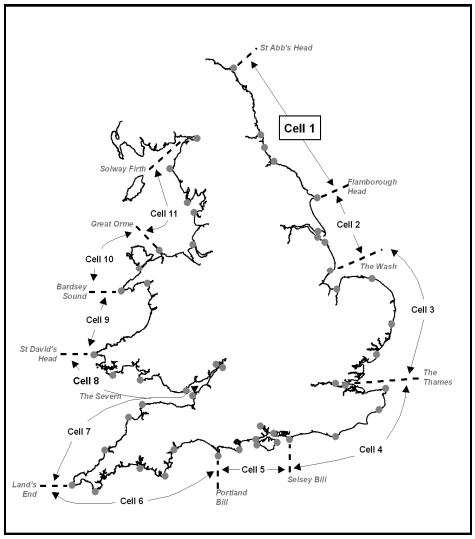


Figure 0-1 - Sediment Cells in England and Wales

The work commenced with a three-year monitoring programme in 2008 that was managed by Scarborough Borough Council on behalf of the North East Coastal Group. This initial phase was followed by a five-year programme which started in 2011 and the current five-year programme which started in 2016. The programme funded by the Environment Agency, working in partnership with the following organisations.

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
- walkover inspection surveys

Royal HaskoningDHV has been appointed to provide Analytical Services in relation to the Cell 1 Regional Coastal Monitoring Programme 2016 - 2021.

The present report is **Walkover Inspection Surveys 2016** and provides a summary of the main findings from the walkover inspections of Hartlepool Borough Council's frontage that are undertaken once every 2 years.

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

1. Introduction

1.1 Study Area

Hartlepool Borough Council's frontage is approximately 12.5km in length, extending from Crimdon Beck in the north to the North Gare Breakwater at the mouth of the Tees estuary in the south, shown in **Figure 1-1**. It comprises natural dunes, towns defended by sea walls and revetments, and key maritime structures such as port and harbour breakwaters. The quay walls within Victoria Harbour and Hartlepool Marina were not inspected as they are not classified as coastal defence assets and they are located within privately owned areas. The frontage includes approximately 40 coastal assets, 37 of which are man-made assets while 3 are natural assets. Detailed maps showing the location of each of these assets are presented in **Appendix A**.

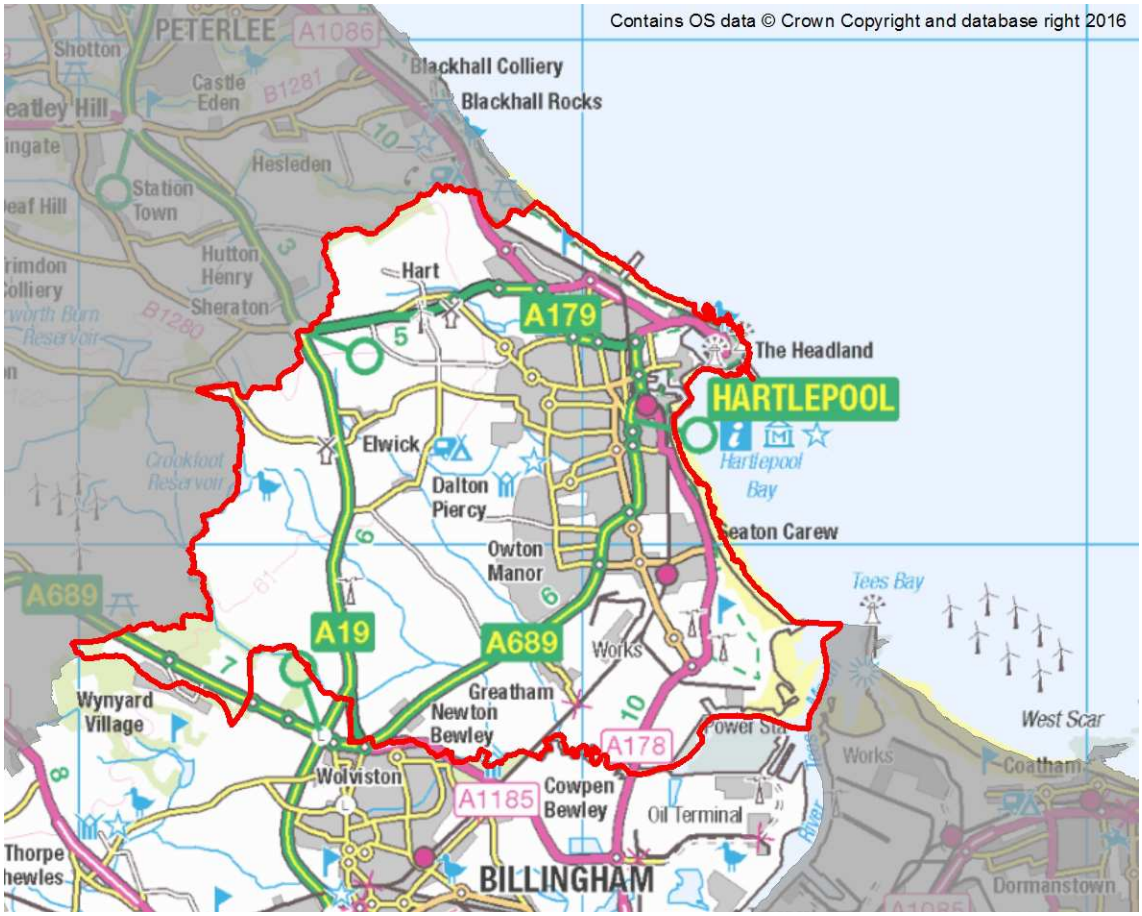


Figure 1-1: Hartlepool Borough Council study area

1.2 Methodology

This section presents the approach taken by the asset inspectors for the Hartlepool Borough Council coastal frontage.

The walkover inspection surveys for the Hartlepool Borough Council frontage were undertaken on 24th June and 18th July 2016. The weather experienced during the inspections was warm and fine with no access or visibility problems caused by adverse weather.

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

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

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

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

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

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

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

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

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

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

2. Overview

The walkover inspection identified limited changes in the condition of the built and natural defence assets along the Hartlepool frontage since the previous formal inspections in July 2014. A summary of the main differences is provided below

- **North Sands** – redistribution of bricks continues following removal of failing gabion basket structure south of Spion Kop cemetery. The remaining gabion baskets have continued to deteriorate and, due to local erosion, now present a health and safety hazard due to the unstable structure.

- **Marine Drive and Hartlepool Headland** –construction works were ongoing to provide new coastal defences at the Headland. High beach levels prevented inspection of lower courses of seawall in which defects were previously identified.

- **Fish Sands / Old Pier** - cracking between the deck and crest wall of Old Pier appears to be of a broadly similar nature to previous inspections but remains a notable defect.

- **Town Wall** – the concrete apron at the toe and previous groyne repairs remain in good condition, but the crest wall (part of a Scheduled Monument) has deteriorated and is in poor condition locally, particularly on the landward side. Construction works are ongoing to build a new outfall structure and masonry retaining wall/footway to rear.

- **West Harbour** – defects remain to the North Pier. Undercutting of the slipway, access steps and seawall at the Tees and Hartlepool Yacht Club appear to have worsened slightly.

- **Seaton Carew** – recently constructed walls remain in ‘as new’ condition.

- **North Gare** – there are ongoing/forthcoming concrete repair works, as indicated by a construction site compound and fencing on the deck.

3. Condition Assessment

3.1 Blackhall Rocks to Heugh Breakwater (MA11)

3.1.1 North Sands

The northernmost defence asset within Hartlepool Borough Council's coastal frontage starts at the dunes at the Hart Warren Nature Reserve. The undefended frontage then extends approximately 3.1km, to approximately the southern boundary of Spion Kop cemetery.

The dunes fronting Hartlepool Golf Course remained high and steep with sparse vegetation coverage at the northern extent and increasing vegetation coverage towards the south. The profiles of the dunes remained similar to that of 2014 suggesting these remain relatively inactive with evidence of small-scale local erosion, particularly evident at the toe of the slope adjacent to Crimdon Dene. A wide sandy beach was present along North Sands.

View on dunes looking south (/C0301C01)

Local erosion adjacent to Crimdon Dene (/C0301C01)

There was evidence of local lowering of the dune crest and lack of vegetation caused by trampling at informal access points, such as that fronting Spion Kop cemetery. The dunes at the landward end of the historic pier were lower than adjacent dunes, with erosion here likely exacerbated through access and scour around the timber elements. Embryo dunes were present with initial establishment of vegetation. The backing slope formed from made-ground along the former Steetley industrial site remained largely clear of vegetation.

Informal access at Spion Kop cemetery (/C0302C01)

Informal access at Spion Kop cemetery (/C0302C01)

Dunes lowered with less vegetation around historic pier structure (/C0302C02)

View on dunes looking north (/C0302C02)

To the south of Spion Kop cemetery, the demolition/site clearance works at the former industrial site appeared to be complete. At the north of this site, several gabion baskets from the previously demolished retaining structure remained, however these were failing and could present a health and safety risk due to the unsupported mass of bricks/unstable structure. The remaining structure should be demolished as a matter of urgency. The bricks spilling from the previous structure had been spread along the foreshore, particularly visible within the cobbles/shingle of the upper beach to the north. The coastal slope to the rear appeared to be largely comprised of made ground/bricks/rubble with evidence of ongoing erosion/instability to the south of the former gabion structure.

Potentially unstable remains of former gabion structure (/C0302C02)

Erosion of made ground slope to south of former gabion structure (/C0302C02)

The embankment to the north of Marine Drive appears to comprise made ground /slag /rubble. Local undercutting and overhanging was observed, with this being more prevalent towards the southern extent of the asset. However, the slopes were generally vegetated. Large pieces of slag material previously poured to form a protective apron had continued to break up although the material is likely to remain *in situ*. Rock armour revetment (also incorporating several concrete tank blocks) at the interface with Marine Drive sea wall appeared in fair condition.

View looking north from Marine Drive (/C0302C03)

Rock armour revetment at Marine Drive seawall (/C0302C03)

Local slope failure (/C0302C03)

3.1.2 Marine Drive and Hartlepool Headland

The concrete repair works undertaken at the northern end of Marine Drive in 2012 remain in good condition. A short (approximately 30m) length of rock armour remains towards the northern end of the wall.

The beach level fronting the seawall was generally higher than observed during the 2014 inspections and the undercutting and toe defects previously identified were not visible. The ramp at Arabella Street was observed to be undermined in 2014, however this was not visible during the current inspection. Where rock outcrops were exposed, no voiding/undercutting was evident. On this basis, the condition grading remains as fair.

Evidence of local repairs to the masonry and concrete coping are generally holding up well. Local spalling, minor cracking and displacement of the concrete coping and minor mortar loss from the masonry were evident and require attention.

Foot of access ramp (Arabella Street) previously undercut (/C0303C01)

Local damage to wall crest (/C0303C01)

View looking south towards central access steps (/C0303C01)

From the access ramp at Sea View Terrace, the wall construction changes to larger concrete blocks. Spalling of the concrete is evident throughout but is generally more significant toward the southern, more exposed length of seawall. Beach levels were higher than during the 2014 inspections, obscuring some of the defects identified at that time.

More recent construction comprising pre-cast concrete blocks at the toe of the seawall was in good condition. Toe sections which had not previously benefitted from concrete protection were damaged locally, with displaced sections of concrete visible on the foreshore. Longitudinal cracking was observed in the access ramp at Broad Field Road and should be monitored.

Damage to toe protection (/C0303C02)

Spalling of concrete face (/C0303C02)

Abrasion of concrete toe protection. Displaced concrete on foreshore (/C0303C02)

More recent concrete toe protection (/C0303C02)

The section of wall reported to contain the most significant defects in the 2014 inspection was not accessed due to ongoing construction (by Hall Construction) which was underway along the seawall, preventing access to approximately 600m length of the promenade and foreshore, from the access ramp at Broad Field Road to the access ramp at Cliff Terrace. The works appeared to have progresses significantly and comprised construction of pre-cast seawall and coping units with fronting rock armour revetment. At the time of inspection, activities were ongoing at the north of the site, with armour rock delivery and offload and work to temporary access ramp.

Longitudinal crack in Broad Field Road access ramp (/C0303C02)

Rock armour forming temporary construction access south of Broad Field Road access ramp (/C0303C02)

Recent/ongoing construction works viewed looking north from apex of Headland (/C0303C02)

To the south of the apex of the headland, it appeared that further work was to take place to tie-in the newly constructed defences into the existing seawall (temporary works were still in place).

Southern extent of ongoing construction works. (/C0303C02)

View on masonry wall looking south (/C0303C02)

Armour rock was observed on the foreshore, however this was assumed to be a temporary stockpile associated with the ongoing construction work to the north.

Approximately half of this asset length has undergone construction work since the 2014 inspection. This length of defence (most notably the former buttresses) that was previously identified as containing significant defects has now been addressed by the new seawall and as a result the overall condition of the asset was deemed to be fair. The existing masonry seawall (not fronted by new concrete works) has undergone numerous local repairs and was generally in fair condition. Small voids were evident at the toe of the wall to the south of the access ramp and locally in the upper wall (birds were observed flying in and out of these voids, possibly nesting). The lower courses of blockwork wall showed evidence of abrasion throughout in addition to minor loss of mortar/open joints locally.

3.1.3 Heugh Breakwater

The privately owned Heugh Breakwater is not accessible to the public beyond halfway along its length, enforced with fencing and signage present. It is understood the seaward end of this structure has been in failing condition for many years. The landward section of the structure generally appeared to be in fair condition when inspected from the foreshore, with mortar loss/open joints and minor abrasion locally. Numerous previous repairs were visible on the deck of the structure.

Heugh Breakwater - North aspect (/C0401C01)

Heugh Breakwater – South aspect (/C0401C01)

3.2 Heugh Breakwater to Little Scar (MA12)

3.2.1 Bock Sands

Beach levels appeared slightly higher than 2014 levels immediately in the lee of Heugh Breakwater although appeared to be lower than 2014 levels to the south, in the vicinity of the access steps and at the bend (interface between the two asset lengths). Beach levels were further reduced locally by scour beneath a running outfall. Where beach levels were low, the toe of the concrete wall was exposed with evidence of undercutting/void formation locally although this was largely obscured by marine growth. Local cracking and spalling was observed to the recurve concrete cope and appeared to be similar to that observed in 2014.

The rear masonry wall was generally in fair condition throughout, with minor voids/loss of mortar observed locally. A cobble beach with good vegetation cover was present where the seawall is offered protection by the rocky outcrop.

View looking south from Heugh Breakwater (/C0401C04)

Low beach levels at access steps (/C0401C04)

Undercutting – partially obscured by vegetation (/C0401C04)

Local scour in front of outfall (/C0401C05)

Damage to recurve concrete cope (/C0401C05)

Cracks were observed in the masonry wall and access steps above the historic public conveniences. Undercutting of the wall was observed close to the interface with Old Pier. A large crack extended the full height of the wall, potentially suggesting a global movement of the structure; however no distress was evident in the promenade immediately above this section of wall. This should be monitored with consideration given to infilling/repairing the existing undercutting/voids.

Former public conveniences. High beach with vegetation in foreground (/C0401C05)

Cracking in former public convenience building (/C0401C05)

Undercutting and significant crack suggesting settlement. Old Pier to left of image (/C0401C05)

3.2.2 Old Pier

The masonry and concrete structure generally appeared to be in fair condition. The accropode armour units at the head of the structure appeared to maintain a good profile with appropriate voids and interlock. As recorded in previous inspections, cracking was present through the concrete parapet wall and in the deck adjacent to the wall in several locations. This cracking may indicate settlement of the structure rather than local damage to the parapet.

Outer face of North Pier (/C0401C34)

Inner face of North Pier – note potential settlement of masonry blocks (/C0401C06)

Cracking in concrete parapet wall and deck (/C0401C34)

Cracking in concrete parapet wall and deck. Gaps between 'buttresses' and wall (/C0401C34)

Cracks were present in the deck, running parallel to the parapet wall, including around the roundhead. The parapet wall appeared to be leaning seaward along much of the length, most notably at the roundhead. Previous repairs to cracks in the parapet wall have subsequently reopened, suggesting continued movement. These defects were noted in the 2014 survey and do not appear to have worsened significantly. The cracks should be filled and consideration given to a more detailed survey/monitoring of the structure. The inner face of the structure seemed to show settlement in the masonry blockwork but this does not appear to have worsened since previous inspections. At the time of the inspections, Seymour Civil Engineering had established a site compound on the breakwater for the ongoing construction works along the Town Wall, to the west.

3.2.3 Town Wall and Fish Sands

The beach level at Fish Sands appeared healthy and similar to that observed in 2014. Significant abrasion (largely obscured by marine vegetation growth) and voiding beneath the concrete deck was observed in the access ramp adjacent to Old Pier.

Voids beneath concrete deck of slipway (/C0401C35)

The masonry wall was generally in fair condition with some loss of mortar and open joints in the lower courses which would benefit from repointing. The concrete apron at the toe of the wall was in good condition.

The crest wall is in poor condition locally on the landward side, with evidence of previous repairs which appear not to have been appropriate given the nature of the existing masonry. Loss of mortar and open jointing is evident throughout, with missing masonry locally.

Construction works were ongoing to create a new outfall (twin HDPE pipes awaiting reinforced concrete surround) and build a new masonry retaining wall and footway/promenade to the rear of the seawall.

Concrete section of wall, ongoing construction of outfall. Significant corrosion/rust staining previously observed (/C0401C35)

Open jointing in lower masonry courses. Local undermining of concrete buttress (/C0401C35)

Missing masonry at crest (/C0401C35)

Previous repairs. Mortar used in repointing appears to be stronger than masonry and now stands proud of the stone (/C0401C35)

The steps at the former passenger ferry landing marking the southern extent of the asset are generally in poor condition with loose and displaced masonry and heavily corroded steel ties. Public access to this structure is prevented by a masonry wall and signage.

Recently completed masonry wall and walkway to rear of seawall along Northgate. Works continue in background. (/C0401C35)

Damage to steps at former passenger ferry landing (/C0401C35)

The masonry and concrete groynes were in good to fair condition. Beach levels increased moving to the west with a sudden change at the westernmost groyne, in the lee of which the beach level drops by approximately 2 to 3m with this level then consistent to the western extent of the Town Wall.

3.2.4 Middleton

It was not possible to inspect the toe of the jetty structure as this was submerged at low tide. The concrete accropode armour units displayed good interlock with a consistent slope/profile throughout and there was no evidence on the crest to suggest global movement or distress. Wind-blown sand had accumulated at the landward end, with vegetation growth.

Middleton Jetty north aspect (/C0401C16)

Middleton Jetty south aspect (/C0401C16)

Beach levels were higher than during the 2014 inspection, with embryo dunes now obscuring the majority of the gabion wall.

The stacked gabion wall to the south of Middleton Jetty appeared in very similar condition to that observed in the 2012 and 2014 inspections. Local settlement of the wall was evident although the gabion baskets remained intact. Consideration should be given to extending the existing larger rock armour revetment from the south to provide additional protection to the settled section.

High beach levels and embryo dunes (/C0401C17)

Settlement in stacked gabion wall (/C0401C17)

The short length of undefended frontage comprises an informal beach access ramp. The condition remains unchanged from the 2014 survey in that the southern side of the ramp is steeper and less stable than that to the north.

Informal access ramp (/C0401C18)

As observed in previous surveys, the profile of the concrete blockwork wall was not consistent, with bulges of various sizes visible along the full length. Numerous concrete coping units were missing. Opening joints were evident, suggesting global movement of the structure. Further blocks were missing, evidence that the defects had worsened and minor scour / local lowering of beach levels was observed.

July 2014

Missing blocks at interface between two walls (/C0401C19)

July 2016

Missing blocks at interface between two walls. Local scour at toe (/C0401C19)

The large blockwork wall was significantly spalled with abrasion to the lower courses especially at the seaward bend cracking to the concrete coping. Several cracks extended through the parapet wall and through the full height of the seawall. These should be monitored.

Spalling/abrasion of concrete blocks (/C0401C19)

Vertical crack through parapet and seawall (/C0401C19)

3.2.5 West Harbour

West Harbour provides access to Hartlepool Marina via a lock and is sheltered by North Pier and South Pier.

3.2.6 North Pier

Public access to the North Pier and its inner arm should be prevented by security fencing and signage, however on the day of survey all of the security gates were open. In addition access could be gained from the foreshore to the north at low tide. This may be considered a health and safety issue.

The landward end of the structure was viewed from the foreshore. As identified in previous surveys, the masonry structure appeared in fair condition, however the low beach levels exposed timber piles and a masonry apron with open jointing and local voiding which should be addressed urgently to prevent further deterioration.

North face of North Pier (/C0401C22)

Void in apron of North Pier (/C0401C22)

The seaward ends of the inner and outer arms of the North Pier were inspected from a distance (Middle Pier and South Pier). The structure appeared in fair to poor condition overall with defects including missing mortar, open joints, missing masonry, significant areas of damaged masonry and concrete. It was difficult to identify any significant deterioration since the 2014 survey, however it is a reasonable assumption that any defects will further worsen over time. The concrete head of the inner arm appeared to be in fair condition.

Consideration should be given to undertaking a more detailed survey of the structure, including a boat/dive survey to inspect the permanently submerged seaward ends.

Head of inner arm of North Pier (/C0401C21)

South face of North Pier (/C0401C22)

The concrete structures forming the lock entrance were in good condition with marine growth obscuring the lower sections. The masonry elements to both north and south sides were in fair condition, with evidence of various local repairs which appeared to be performing well and the more recent parapet wall constructed as part of Navigation Point development was in good condition throughout. The toe apron to the south of the entrance was completely obscured by marine growth, although the consistent profile suggested fair condition. The concrete wall to the rear of the apron was in good condition.

Masonry seawall to north of harbour entrance (/C0401C24)

Concrete blockwork revetment obscured by vegetation (/C0401C25)

The concrete blockwork revetment to the south is generally in fair condition and the settlement of the concrete blocks noted on inspections since 2008 did not appear to have worsened significantly. Minor movement is suspected (slightly larger area of affected blocks and slightly greater displacement of central blocks). The settlement is indicative of a local loss of fill material below the concrete blocks and should continue to be monitored as further loss could reduce the integrity of the asset.

Local settlement of concrete blocks (/C0401C26)

Local settlement of concrete blocks (/C0401C26)

Undercutting of steps, slipway and seawall fronting Tees and Hartlepool Yacht Club was evident (although often obscured by marine growth) and appeared to be similar in extent to that observed in the 2014 inspections. It is recommended that voids are repaired locally with additional rock armour placed to avoid further scour damage. A gap was present between the concrete ramp and the precast concrete blocks forming the seawall. Voiding was evident beneath the ramp and the precast blocks were not supported on the landward side. This should be monitored to ensure the asset does not 'unravel' from this weak point.

Undercutting of access steps (/C0401C27)

Void behind concrete wall units and beneath concrete ramp (/C0401C27)

Undercutting of slipway (/C0401C27)

Although significantly obscured by marine vegetation, the masonry structure of Middle Pier appeared in fair condition with minor mortar loss locally. Significant vegetation growth was evident in the construction joints on the deck which should be removed and joints repointed. The rock armour placed to the toe of the inside face and around the head of the structure appeared to maintain a consistent profile with good coverage and interlock between units.

Inner face of Middle Pier (/C0401C28)

Outer face of Middle Pier – note vegetation growth on deck (/C0401C28)

Terrestrial vegetation growth along the top of the revetment to the inner face of the structure (reported in the 2014 inspection) should be removed to prevent roots causing damage to revetment or concrete.

South Pier was in good condition. The rock armour placed to the inner face maintained a consistent profile and good interlock. Vegetation growth was observed at the crest of the rock armour, including several more mature shrubs which should be removed to prevent the root network damaging the concrete structure or rock revetment.

The concrete accropode units maintained a consistent crest height and profile with good interlock between units. The roundhead was viewed from Middle Pier, however due to the nature of the structure, inspection of the lowest parts of the outer face was not possible and a boat survey at low tide should be considered. There were no signs of global distress so this is not urgent.

Inner face of South Pier – mature vegetation to be removed (/C0401C32)

Outer face of South Pier (/C0401C32)

3.2.7 Carr House Sands

To the south of South Pier, the accropode revetment ties into a rock armour revetment with a concrete crest wall which runs for approximately 2.3km to Little Scar at the north of Seaton Carew. The defences along this section remain in good overall condition with minor local defects that will require attention. The flexible sealant used in construction joints of the concrete seawall was beginning to harden and pull away from the concrete faces and was also damaged or absent in places. Observations suggest that the sealant has previously been replaced locally, however the issue remains. Minor local spalling and cracking of the concrete access steps was evident, however these were generally in good to fair condition.

There was evidence of some potential local displacement of rock armour adjacent to the existing outfall structure in proximity to Newburn Bridge, where rock armour was visible slightly seaward of the general (visible) toe line. This was reported in 2014 inspection and should be monitored.

Rock armour revetment and concrete seawall (/C0401C33)

Possible displacement of rock (/C0401C33)

Displaced rock armour and damaged guardrail at northern access ramp (/C0401C33)

Loss of flexible joint sealant (/C0401C33)

In the region of the Little Scar access ramp, beach levels were slightly lower than observed in the 2014 inspection – note the greater exposure of rock armour berm, however they remained higher than those observed in 2012 and 2010 (prior to reconfiguration of the berm). Cracks were observed in the concrete seawall at the access ramp and appeared to be associated with the fixings for the handrail. Local repairs should be undertaken and monitored to ensure this is not a more significant issue.

Exposed rock armour berm at Little Scar access ramp (/C0401C33)

Little Scar access ramp *(/C0401C33)*

Cracks in concrete seawall at Little Scar access ramp (/C0401C33)

3.3 Little Scar to Coatham Sands (MA13)

3.3.1 Seaton Carew

The defences along the Seaton Carew frontage consist of a various concrete and masonry seawall and access structures with rock armour toe protection. Beach levels remained similar to those observed in 2014. Work undertaken in 2012 remained in good condition.

Coverage and interlock between the rock armour units was good, however several rock armour units appeared to be slightly seaward of the (visible) toe. This may be an indication of displacement and a loss of interlock between units and therefore should be monitored.

Minor defects were observed locally, several of which have previously undergone repairs, and these will require attention.

Northern access steps (/C0501C05)

View looking south (/C0501C05)

Local spalling of concrete (/C0501C05)

Crack in concrete cope. Note previous repair/fill now failing (/C0501C05)

To the south of the beach access point at Church Lane, the seawall remains in very good condition over approximately 600m, to the landward return at the sewerage pumping station. The paved promenade to the rear of the wall was also in very good condition. A wide healthy beach was present throughout.

The three previous defence asset references covering the section have been reconfigured in the SANDS database to align with the new structures.

Vegetation growing in joints – should be removed (/C0501C04)

Promenade at pumping station (/C0501C02)

Southern extent of seawall (/C0501C02)

Ridge of wind-blown sand. Note partially buried access ramp (/C0501C03)

3.3.2 Seaton Sands

To the south of the sewage pumping station, the frontage is undefended over approximately 1 kilometre and comprises a relatively stable dune system (which includes the Seaton Dunes Nature Reserve) and a wide, healthy beach. The dunes were well established and had a good coverage of vegetation. Erosion was evident locally due to trampling from members of the public walking amongst the dunes, with dune crest heights lowered locally on the most heavily trafficked routes. As in previous inspections, local cliffing is evident towards the south of the frontage, in close proximity to the North Gare breakwater.

Mature dunes viewed from North Gare (/C0502C01)

Cliffing at southern extent of dunes (/C0502C01)

3.3.3 North Gare Breakwater

The southern extent of the Hartlepool coastal frontage is marked by the privately owned North Gare Breakwater. The structure protects the entrance to the Tees estuary mouth, stabilises the shoreline to the north, retaining the beach and dune system and also provides shelter to the beach located in the lee to the south where a stable dune field has developed.

Security fencing was present to prevent unauthorised access along the deck; however the fencing appeared to be easily bypassed, particularly to the south. On the date of survey, a small site compound (Southbay Civil Engineering) including temporary cabins and material storage was present on the deck of the breakwater with suggestion of ongoing/upcoming concrete works to the north face of the structure.

The concrete and masonry structure incorporates a multitude of ad-hoc repairs. As reported in 2008, 2010, 2012 and 2014 the structure remains in poor condition. Defects include cracking, spalling, undercutting, void formation, loss of masonry, loss of concrete render, evidenced of settlement/displacement of previous concrete infill repairs and displaced/damaged slabs.

North face of North Gare Breakwater (/C0503C01)

South face of North Gare Breakwater. Dune field in lee of structure (/C0503C01)

4. Comparison with Previous Assessment

The previous formal assessment across the whole study frontage was undertaken in July 2014.

The condition of many of the hard defences along the frontage is very similar to the 2014 inspections.

Defects identified in the current inspection were generally those observed in previous surveys which have remained or experienced further deteriorated in the interim period.

Defects were predominantly local defects which would not adversely affect the overall performance of assets.

Ongoing construction work at the Headland Headland and along Town Wall restricted access during the survey. However when these works are complete, the condition of the relevant assets will be significantly improved.

5. Problems Encountered and Uncertainty in Analysis

All assets were inspected at suitable stages of the tide and therefore no problems were encountered.

The seaward extent of structures such as the Heugh Breakwater, North Pier, South Pier, Middle Pier, Victoria Harbour entrance and North Gare Breakwater are permanently submerged and were therefore not inspected.

The quay walls within Victoria Harbour and Hartlepool Marina were not inspected as they are not classified as coastal defence assets and they are located within privately owned areas.

The Heugh Breakwater, North Pier and North Gare Breakwater are not accessible to the public and therefore inspection of these structures was limited.

Ongoing construction works by Hall Construction at the seawall around the Headland and by Seymour Civil Engineering at the Town Wall prevented access to these sections of the study frontage.

6. Conclusions and Recommended Actions

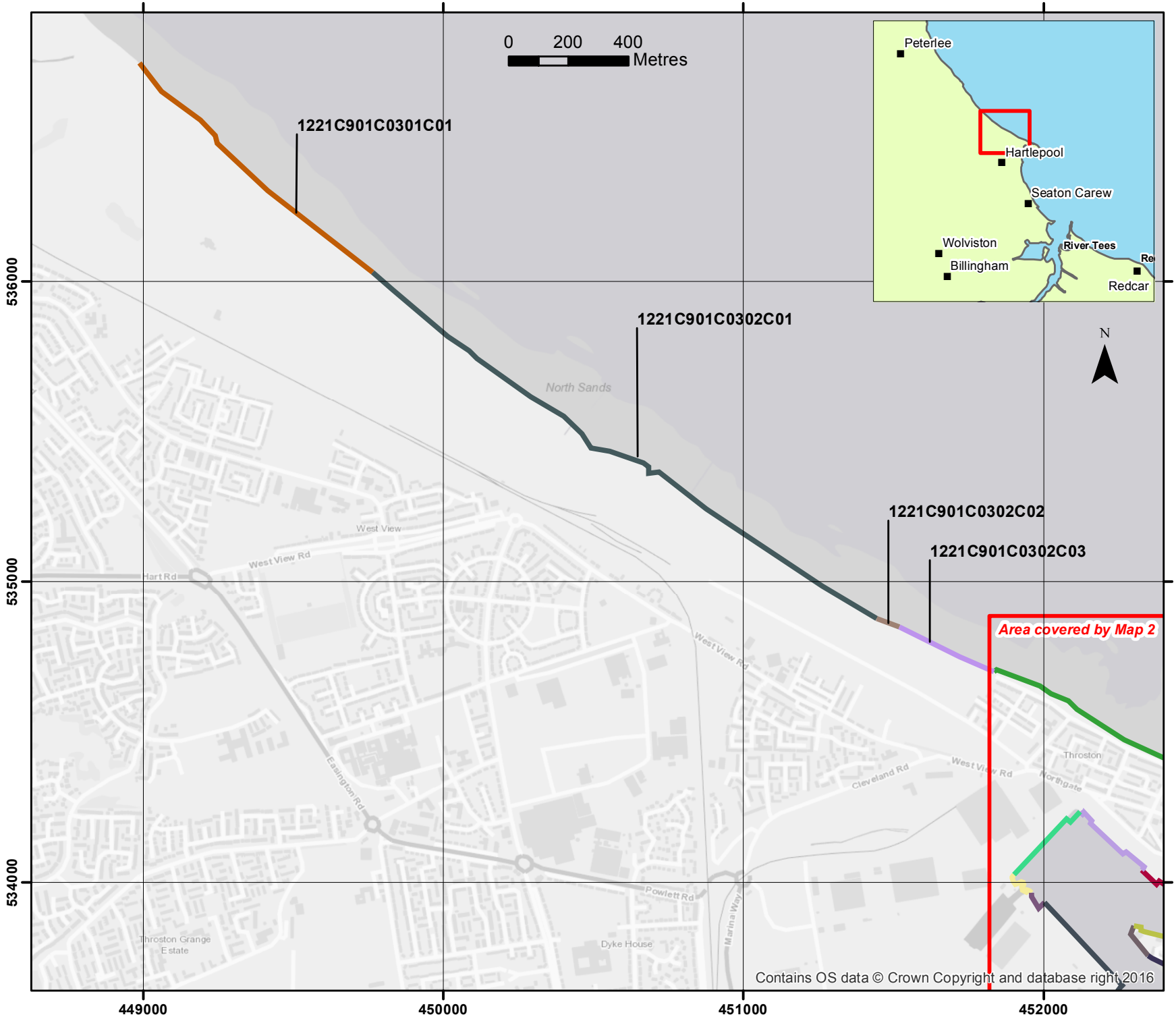
Further to the visual inspection of all assets, specific conclusions and recommendations for individual assets are given in **Appendix B**. The main urgent recommendations are:

- North Sands – remove failing gabions (public health and safety issue)
- North Pier – infill/repair voids in masonry apron to north face. Address public access (health and safety issue)
- North Gare Breakwater – repairs required to maintain integrity of structure

All condition assessment data and selected photographs have been uploaded to SANDS (Shoreline And Nearshore Database System). This includes all data and photographs from the previous inspections since 2002 that were originally held on an MS Access Databases that had become obsolete.

Appendices

Appendix A
Asset Location Maps



Legend

Asset location

NFCDD Asset Number

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 1 - Map 1

Hartlepool Council Frontage

Asset Inspection Report

Drawing Scale 1:17,000 at A4

WATER
Royal HaskoningDHV
Marlborough House
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Newcastle upon Tyne
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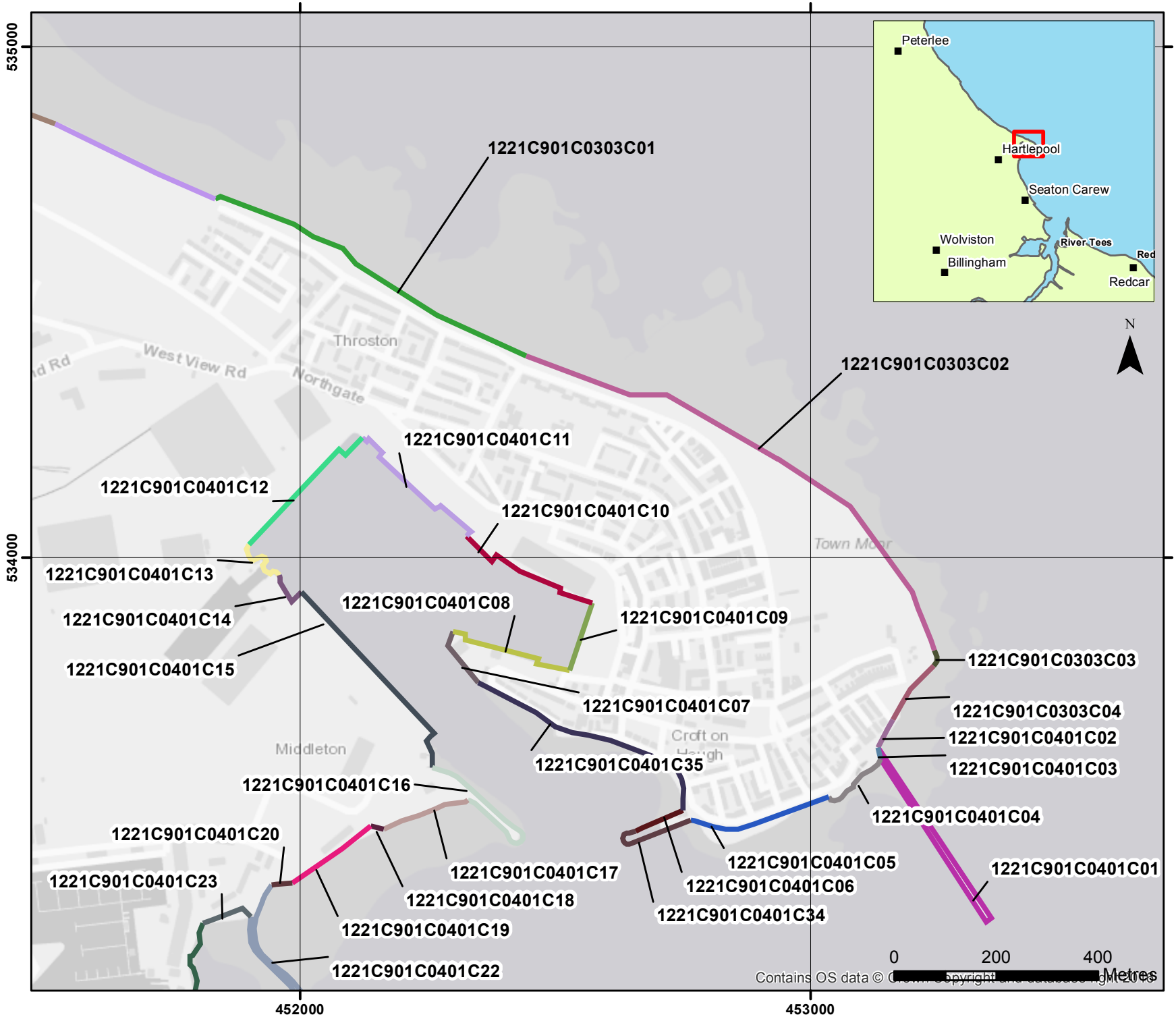

Legend

Asset location

NFCDD Asset Number

Client: North East Coastal Group

Project: Cell 1 Regional Coastal Monitoring Programme

Figure 1 - Map 2

Hartlepool Council Frontage

Asset Inspection Report

Drawing Scale 1:10,000 at A4

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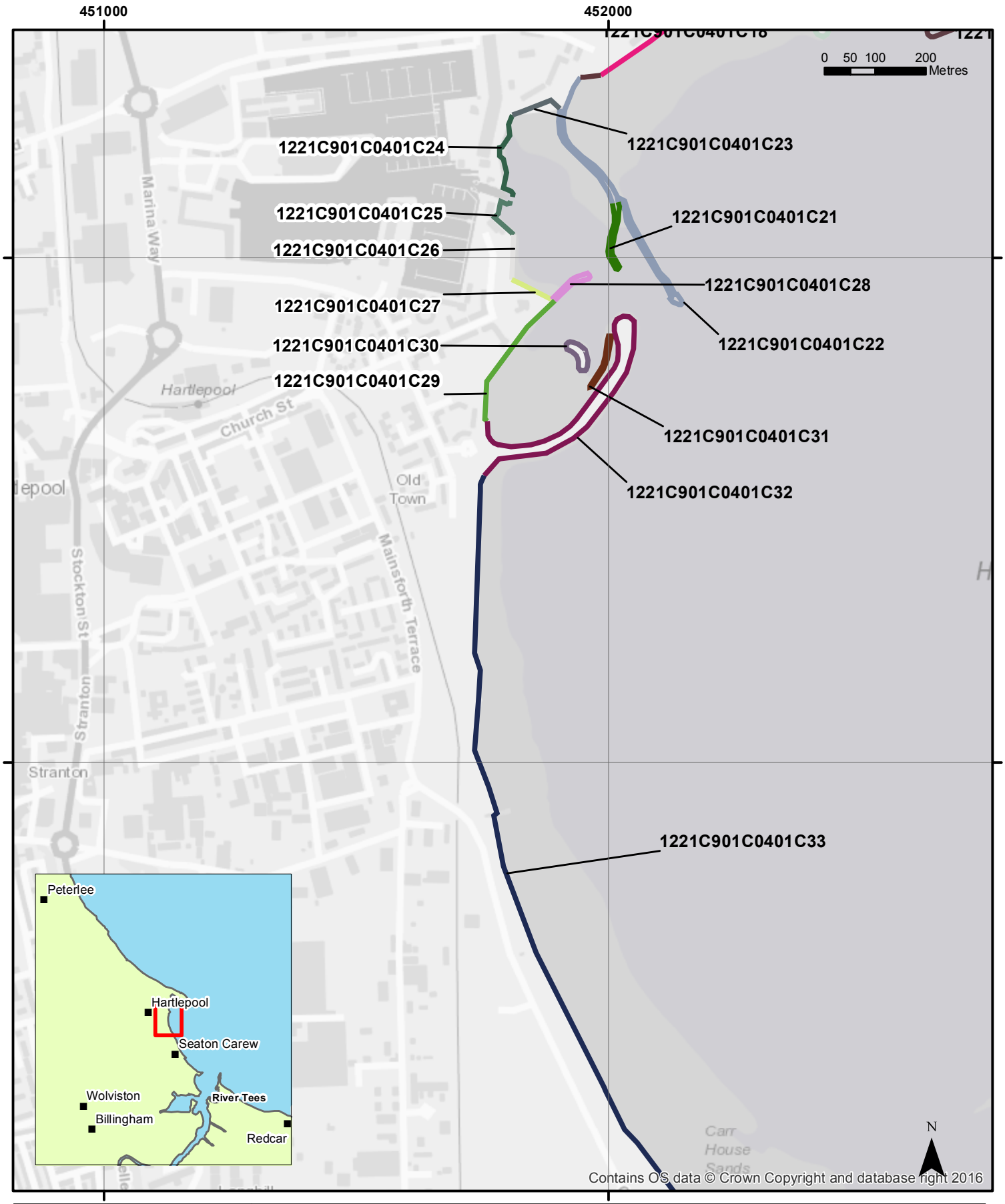

Legend

Asset location

NFCDD Asset Number

Figure 1 - Map 3

Hartlepool Council Frontage

Asset Inspection Report

Drawing Scale 1:10,000 at A4

Client:
North East Coastal Group

Project:
Cell 1 Regional Coastal Monitoring Programme

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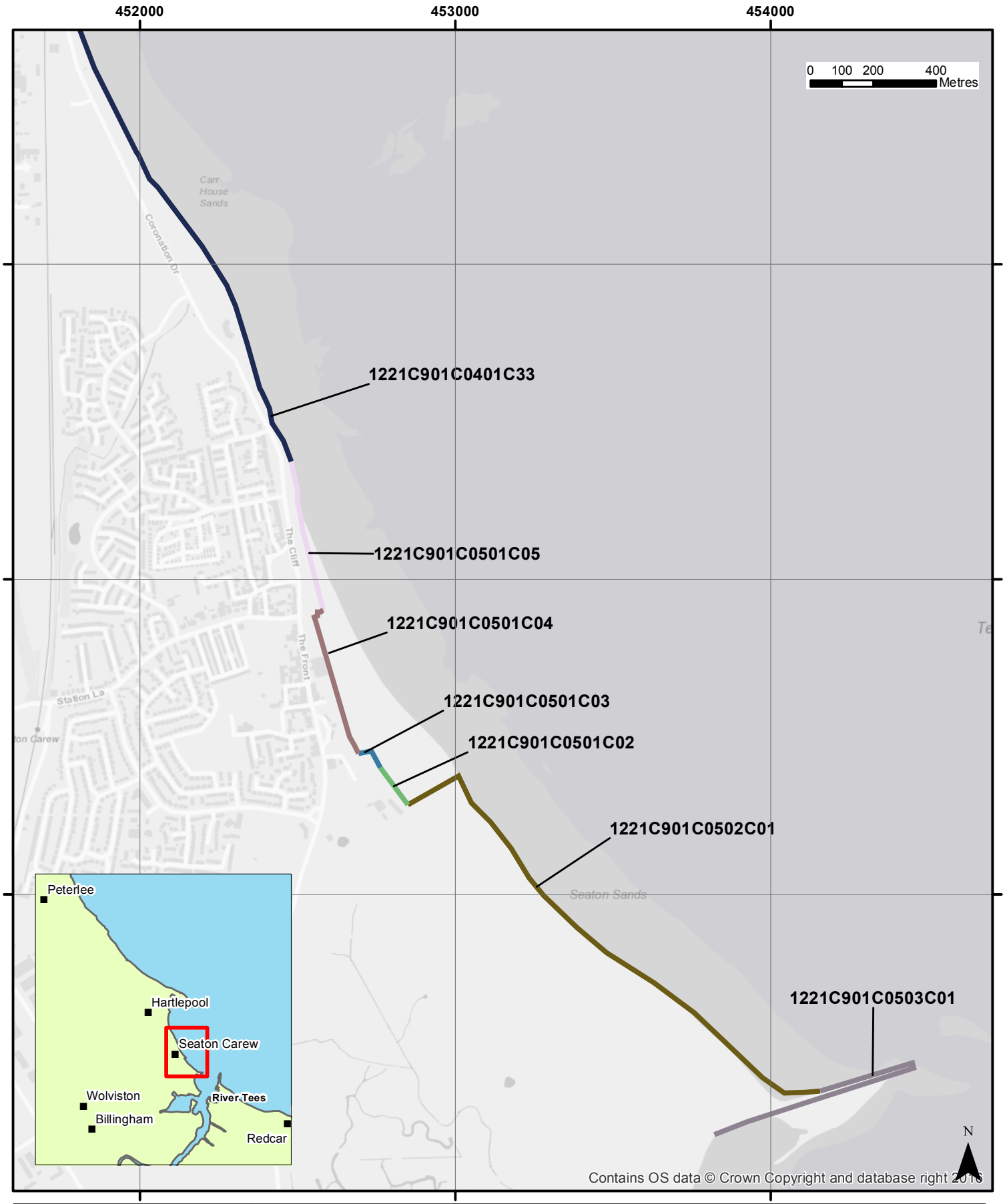

Legend

Asset location

NFCDD Asset Number

Figure 1 - Map 4

Hartlepool Council Frontage

Asset Inspection Report

Drawing Scale 1:16,000 at A4

Client:
North East Coastal Group

Project:
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Appendix B
Asset Condition & Recommendations

Asset Name	Description	Type	Sort by N	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0301C01	Undefended	Undefended	536720	1052	25/05/2016	Royal HaskoningDHV	As 2014. Local erosion, particularly at south of Crimdon Beck. Vegetation cover increases progressing south. Wide, healthy beach.	2	>20	Continue to monitor.	no repairs
1221C901C0302C01	Undefended	Undefended	536030	2070	25/05/2016	Royal HaskoningDHV	Dunes appear to be accreting. Lack of vegetation local to historic pier and locally at informal access points. Wide, healthy beach.	2	11 - 20	Continue to monitor.	routine
1221C901C0302C02	670101 Brick filled welded mesh gabions with rubble above. Gabions in very poor condition.	Gabions	534870	81.9	25/05/2016	Royal HaskoningDHV	Remaining gabion baskets failing - unstable structure. Erosion of made ground to south. Bricks spread along foreshore esp to north.	5	1 - 5	Remove/make safe remaining failing gabion baskets. Monitor erosion.	urgent
1221C901C0302C03	Slag waste embankment with poured slag apron to toe.	Embankment	534840	345.5	25/05/2016	Royal HaskoningDHV	Local undercutting and slope failure. Slopes generally vegetated. Rock armour revetment at tie in with seawall.	4	1 - 5	Continue to monitor.	no repairs
1221C901C0303C01	Upper revetment in need of repairs.	Seawall	534700	691	25/05/2016	Royal HaskoningDHV	Rock armour fronting seawall towards northern extent. Local repairs evident. Local spalling/cracking of concrete coping. High beach levels potentially obscuring defects at toe (as reported in 2014). Repairs undertaken to upper concrete revetment and promenade.	3	>20	Continue to monitor. Local repairs to concrete coping.	routine
1221C901C0303C02	Concrete block wall voiding to joints and spalling.	Wall	534390	1038	25/05/2016	Royal HaskoningDHV	Many local repairs. Spalling to face of concrete blocks. Generally more evident to south.	3	11 - 20	Local repairs to capping and toe protection	routine
1221C901C0303C03	Concrete wall to Coastguard with toe (02).	Wall	533780	33.1		Royal HaskoningDHV					
1221C901C0303C04	Concrete toe to high wall. Access ramp to part of length.	Apron	533680	133	25/05/2016	Royal HaskoningDHV	Fair condition. Smaller blockwork. Multiple repairs. Ongoing construction works north of access ramp have replaced wall section graded as poor in 2014.	3	11 - 20	Local repairs to masonry	routine
1221C901C0401C02	Dressed stone wall continuing from pier.	Wall	533620	62.2	25/05/2016	Royal HaskoningDHV	Abrasion to lower courses, reducing block thickness. Some mortar loss locally.	3	>20	Local repairs. Monitor abrasion to inform potential replacement of blocks.	routine

Asset Name	Description	Type	Sort by N	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0401C03	Concrete and masonry wall poor in places. Protected by breakwater. Amenity area then wall to road and property behind.	Wall	533600	23.5	25/05/2016	Royal HaskoningDHV	Short section of protected wall at root of breakwater. Good condition.	2	>20	Routine inspection & maintenance	routine
1221C901C0401C01	Old breakwater, some repair carried out in 1990 but major problems forseen particularly at seaward end. Important protection to areas South.	Breakwater (Heugh Breakwater)	533280	791.9	25/05/2016	Royal HaskoningDHV	Heugh Breakwater. Seaward end/inside face not inspected. No public access past fencing at mid length. Landward end in fair condition. Minor loss of mortar locally.	3	11 - 20	Structural inspection incl. boat/dive survey	routine
1221C901C0401C04	New concrete wall but with some voiding to toe in places.	Wall	533530	141	25/05/2016	Royal HaskoningDHV	Fronting Bock Sands paddling pool. Abrasion and undercutting of toe where beach levels low at bend/access steps. Local scour fronting outfall pipes. Rear masonry wall in fair condition.	3	>20	Infill voids/undercutting. Scour protection beneath outfalls.	routine
1221C901C0401C05	Concrete wall as (01) but with high beach levels.	Wall	533480	282.5	25/05/2016	Royal HaskoningDHV	Cobble beach with vegetation growth in centre - protected by rock outcrop. Spalling/cracking of recurve concrete crest notably at each end. Vertical crack and undercutting evident in proximity to Old Pier. Cracking in historic public convenience building and access steps. Rear masonry wall in fair condition.	3	11 - 20	Local repairs to concrete. Infill void/undercutting.	routine
1221C901C0401C06	Concrete wall inside protection of jetty. Upper wall to road and houses.	Wall	533460	101.2	25/05/2016	Royal HaskoningDHV	Settlement of masonry blocks (historic) adjacent to accropodes. Generally fair condition.	3	11 - 20	Continue to monitor. Structural inspection of Old Pier.	routine
1221C901C0401C34	Fishing breakwater with armoured head. Important protection to inner area.	Breakwater	533450	181.3	26/05/2016	Royal HaskoningDHV	Old Pier. Accropode revetment at head in good condition. Cracking in deck and through parapet wall. Previous local repairs failed. Parapet wall appears to be moving away from deck – note cracking and gap between buttresses and parapet wall.	3	>20	Structural survey. Fill cracks, continue to monitor.	routine

Asset Name	Description	Type	Sort by N	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0401C35	Masonry apron to toe of wall over mid section.	Apron	533750	509.1	26/05/2016	Royal HaskoningDHV	Town Wall. Slipway from Old Pier; masonry blocks significantly abraided, voids forming beneath deck. Concrete apron in good condition. Loss of mortar/recessed mortar throughout esp. to lower courses – undercutting of concrete buttress at outfall/concrete wall section. Loss of mortar and missing masonry to landward side of crest wall .Ongoing construction works at outfall and constructing retaining wall and footway to rear of Town Wall.	3	>20	Local repair/infill voids at slipway. Repointing/repair of crest wall.	routine
1221C901C0401C07	673601 Blue brickwork quay.	Wall	533750	123.7		Royal HaskoningDHV	Not inspected				
1221C901C0401C08	673701 Timber suspended deck Fish Quay.	Wall	533850	259.8		Royal HaskoningDHV	Not inspected				
1221C901C0401C09	673801 Masonry quay wall.	Wall	533770	139.1		Royal HaskoningDHV	Not inspected				
1221C901C0401C10	673901 Rubble revtment to Quay.	Revetment	534040	302.7		Royal HaskoningDHV	Not inspected				
1221C901C0401C11	674001 Sheet steel piling with suspended dock in front.	Piling	534230	319.1		Royal HaskoningDHV	Not inspected				
1221C901C0401C12	674101 Suspended deck concrete quay on concrete piles.	Piling	534020	320.5		Royal HaskoningDHV	Not inspected				
1221C901C0401C13	674201 Masonry quay wall with apron.	Wall	534010	131.4		Royal HaskoningDHV	Not inspected				
1221C901C0401C14	674301 Rubble revetment.	Revetment	533910	86.2		Royal HaskoningDHV	Not inspected				
1221C901C0401C15	674401 Sheet steel pile and steel tubular pile quay wall with concrete coping.	Wall	533580	455.5		Royal HaskoningDHV	Not inspected				
1221C901C0401C16	Concrete armour units to breakwater with slag core. Acts to protect to North and retain beach to South.	Breakwater	533580	378.1	26/05/2016	Royal HaskoningDHV	Middleton Jetty. Accropode armoured breakwater. Good condition - coverage and interlock. No signs of distress on crest. Accretion of sand and cobbles/rubble to south.	2	>20	Routine inspection & maintenance	routine

Asset Name	Description	Type	Sort by N	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0401C17	Brick filled welded gabions fronted by rock armour revetment. Protects RNLI, boat club and industrial property.	Gabions	533460	175.2	26/05/2016	Royal HaskoningDHV	Brick filled gabions stacked to form wall. Largely obscured in north by embryo dunes and vegetation. Fronted by high beach to north, small rock armour (rip-rap) for majority of length, with larger rock armour towards south. Settlement of gabions to north of large rock armour - baskets remain intact.	3	11 - 20	Continue to monitor gabions. Extend/reprofile larger rock armour from south.	routine
1221C901C0401C18	Undefended	Undefended	533470	26.4	26/05/2016	Royal HaskoningDHV	Informal access point to foreshore between two defended lengths. Steep slope to south. Slope to north shallower and ties into rock armour.	4	11 - 20	Continue to monitor. Place rock armour to prevent outflanking.	no repairs
1221C901C0401C19	Warehouse and industrial property above. Blockwork wall.	Seawall	533360	189.7	26/05/2016	Royal HaskoningDHV	East 2/3 is small concrete block retaining wall. Missing blocks and coping locally (worsened since 2014). Wall bulges throughout and beginning to be undercut at W corner. West 1/3 is large concrete block wall. Significant abrasion/damage to faces.	3	11 - 20	Continue to monitor. Replace missing blocks/copes.	routine
1221C901C0401C20	Concrete block wall with commercial property above.	Wall	533350	40.5	26/05/2016	Royal HaskoningDHV	Large concrete blocks. Significant abrasion/spalling to faces. Damaged blocks. Significant vertical crack through full height close to western/inland extent. Cracks in coping units.	3	11 - 20	Local repair of voids. Infill crack – continue to monitor.	routine
1221C901C0401C21	New concrete head to masonry breakwater.	Breakwater (Inner arm of North Pier)	532970	279.3	26/05/2016	Royal HaskoningDHV	North Pier (inner arm). No public access although gates open. Concrete head viewed from distance in fair condition. Missing mortar and abrasion of masonry blocks further inland.	3	>20	Structural inspection incl. boat/dive survey.	routine

Asset Name	Description	Type	Sort by N	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0401C22	Breakwater and root wall to sheds and protection of redeveloped harbour area.	Breakwater (North Pier)	532900	1034	26/05/2016	Royal HaskoningDHV	North Pier (incl outer arm). No public access although gates open. North face - low beach exposed decaying timber piles and masonry apron with cracking, damaged/missing blocks and voids forming. South face - steel sheet piles in fair condition (from distance). Multiple repairs to deck (infilling of joints). Missing/recessed mortar, loose/missing masonry visible from distance. Landward section generally in fair condition.	4	11 - 20	Local repairs, infilling/grouting of voids. Structural inspection, boat/dive sur	urgent
1221C901C0401C23	Rock armour revetment.	Revetment	533280	105	26/05/2016	Royal HaskoningDHV	Rock revetment in fair condition. Cracking of concrete slabs to rear.	3	>20	Local repairs to concrete slabs.	routine
1221C901C0401C24	Massive masonry quay wall.	Wall	533120	188.9	26/05/2016	Royal HaskoningDHV	Soft ground – difficult to access. Masonry wall with various repairs. Extensive marine vegetation cover to lower section. Concrete lock entrance in fair condition. More recent flood wall/parapet wall in good condition.	3	>20	Routine inspection & maintenance.	routine
1221C901C0401C25	New concrete block quay wall with a block revetment apron.	Wall	533040	110.3	26/05/2016	Royal HaskoningDHV	Soft ground – difficult to access. Masonry wall in fair condition. Concrete wall in good condition. Concrete lock entrance in fair condition. Blockwork apron obscure by marine vegetation. No signs of distress, consistent profile.	2	>20	Routine inspection & maintenance.	no repairs
1221C901C0401C26	Concrete splash wall to precast concrete block revetment.	Revetment	532950	89.7	26/05/2016	Royal HaskoningDHV	Concrete blockwork revetment. Good condition apart from local area of settlement approx. 2-3m in diameter towards eastern end.	3	>20	Local repairs to backfill settlement. Continue to monitor.	routine
1221C901C0401C27	Block wall with rubble foreshore.	Wall	532950	87.1	26/05/2016	Royal HaskoningDHV	Undercutting of access s steps and slipway (more apparent on south as greater beach level to north). Voids forming beneath promenade access ramp leaving ramps and precast concrete block wall unsupported.	3	>20	Infill voids/undercutting. Add rock armour/toe protection.	routine

Asset Name	Description	Type	Sort by N	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0401C28	Masonry structure with concrete head.	Wall (Middle Pier)	532910	187.3	26/05/2016	Royal HaskoningDHV	Middle Pier. Vegetation growth in construction joints of deck. Lower structure obscured by marine vegetation. Generally fair condition – minor loss of mortar/open joints locally. Rock armour toe protection in fair condition – good coverage and interlock. Reasonably consistent profile. Does not extend all way around head.	3	>20	Remove vegetation from deck & repoint. Local repairs / repointing.	routine
1221C901C0401C29	Masonry quay wall with later addition of upper concrete wall.	Wall	532670	289.8	26/05/2016	Royal HaskoningDHV	Lower course of blockwork obscured by marine vegetation. Loss of mortar / open joints locally (esp in lower courses). Crest wall in good condition.	3	>20	Local repairs / repointing.	routine
1221C901C0401C30	Undefended	Undefended	532770	161.9	26/05/2016	Royal HaskoningDHV	Rock breakwater island. Looks in good condition from distance. Consistent profile, good coverage.	2	>20	n/a	no repairs
1221C901C0401C31	Old breakwater within harbour.	Breakwater	532740	229.6	26/05/2016	Royal HaskoningDHV	Historic quay wall structure. Open joints between masonry blocks. Vegetation growth on deck.	3	>20	N/A	no repairs
1221C901C0401C32	Concrete unit armour to breakwater on rock core.	Armour	532560	964.3	26/05/2016	Royal HaskoningDHV	South Pier. Good condition. Rock armour to inner face, concrete accropodes to head and outer face – consistent profiles, good interlock, no signs of distress. Vegetation (shrubs/bushes) growing on armour crest (inner face)	2	>20	Remove vegetation. Survey of outer face/head from boat.	routine
1221C901C0401C33	Concrete recurved splash wall above concrete wall and behind rock armour. Promenade and development land behind.	Recurved Wall	531270	2381	26/05/2016	Royal HaskoningDHV	Minor cracking/spalling/damage to concrete access steps locally. Displaced rock armour unit damaged guardrail to northern access ramp. Crest wall in good condition, loss of flexible joint sealant at construction joints in places. Minor cracking/spalling locally. Rock armour revetment in good condition. Potentially minor displacement at the toe close to outfall structure & Newburn Bridge.	2	>20	Local repairs access steps/ramp. Repair/replace flexible joint sealant. Monitor.	routine

Asset Name	Description	Type	Sort by N	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0501C05	Concrete wall generally in fair condition but beach low by Northern corner and evidence of voiding in promenade. Corner of wall interacts with waves lowering beach levels.	Wall	529900	482.8	26/05/2016	Royal HaskoningDHV	Rock armour generally in fair condition however possible displacement at the toe locally. Minor cracking and spalling locally, some of which has previously been repaired but still needs attention.	2	>20	Local repairs to cracks/spalling as required. Monitor rock armour.	routine
1221C901C0501C04	Crest wall in fair condition some minor repair needed.	Wall	529440	500.3	26/05/2016	Royal HaskoningDHV	Concrete wall in as new condition. Promenade in as new condition. Wide healthy beach. Wind-blown sand formed ridge fronting wall. Vegetation present locally in construction joints.	1	>20	Remove vegetation from construction joints. Routine inspection & maintenance.	routine
1221C901C0501C03	Concrete revetment. High accreting sand levels moving into dune area.	Revetment	529440	100.3	26/05/2016	Royal HaskoningDHV	Concrete wall in as new condition. Promenade in as new condition. Wide healthy beach. Wind-blown sand formed ridge fronting wall.	1	>20	Routine inspection & maintenance.	no repairs
1221C901C0501C02	Low crest wall to lower concrete plinth above high sands. CarPark and pump station behind.	Wall	529280	146.1	26/05/2016	Royal HaskoningDHV	Concrete wall in as new condition. Promenade in as new condition. Wide healthy beach. Wind-blown sand formed ridge fronting wall.	1	>20	Routine inspection & maintenance.	routine
1221C901C0502C01	Undefended	Undefended	529280	1755	26/05/2016	Royal HaskoningDHV	Wide dune field, relatively stable with good coverage of well-established vegetation. Localised erosion caused by public makeshift footpaths through dunes. Cliffing at southern extent close to North Gare.	2	>20	Consider fencing to control access/trampling.	no repairs

Asset Name	Description	Type	Sort by N	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
1221C901C0503C01	North Gare Breakwater	Breakwater	528230	986.7	26/05/2016	Royal HaskoningDHV	Closed to public. Evidence of ongoing/upcoming construction/repair works (site compound on deck – Southbay Civil Engineering). Massive structure comprising multiple masonry and concrete elements and numerous ad-hoc repairs. Appears poor and very poor in places. Multiple defects observed from landward end including cracking, spalling, displacement, settlement, undercutting, void formation. Beach and dunes formed to south of structure. Vegetation cover increases moving inland.	4	6 - 10	Structural inspection incl. boat/dive survey. Local repairs. Continue to monitor	urgent