



Cell 1 Regional Coastal Monitoring Programme Walkover Inspection Surveys 2022

Sunderland City Council



July 2022

Sunderland City Council

Walkover Inspection Surveys 2022

Contents Amendment Record

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¹ Scarborough Borough Council is acting as client on behalf of all Local Authorities within 'Coastal Cell 1'.

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.

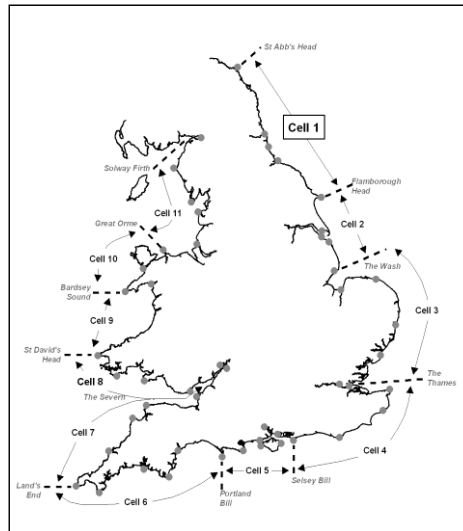


Figure 0-1 - Sediment Cells in England and Wales

The work commenced with a three-year monitoring programme in 2008² that was managed by Scarborough Borough Council on behalf of the North East Coastal Observatory. It is funded by the Environment Agency, working in partnership with the following organisations.



² Prior to 2008, coastal monitoring was undertaken on a consistent basis across Northumberland and North Tyneside as part of the (then) Northumbrian Coastal Authorities Group's monitoring programme which commenced in 2002, whilst several authorities between the River Tyne and Flamborough Head undertook their own local monitoring programmes.

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 present phase of the Cell 1 Regional Coastal Monitoring Programme, between 2016 - 2027.

The present report is **Walkover Inspection Surveys 2022** and provides a summary of the main findings from the walkover inspections of Sunderland City 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

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

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

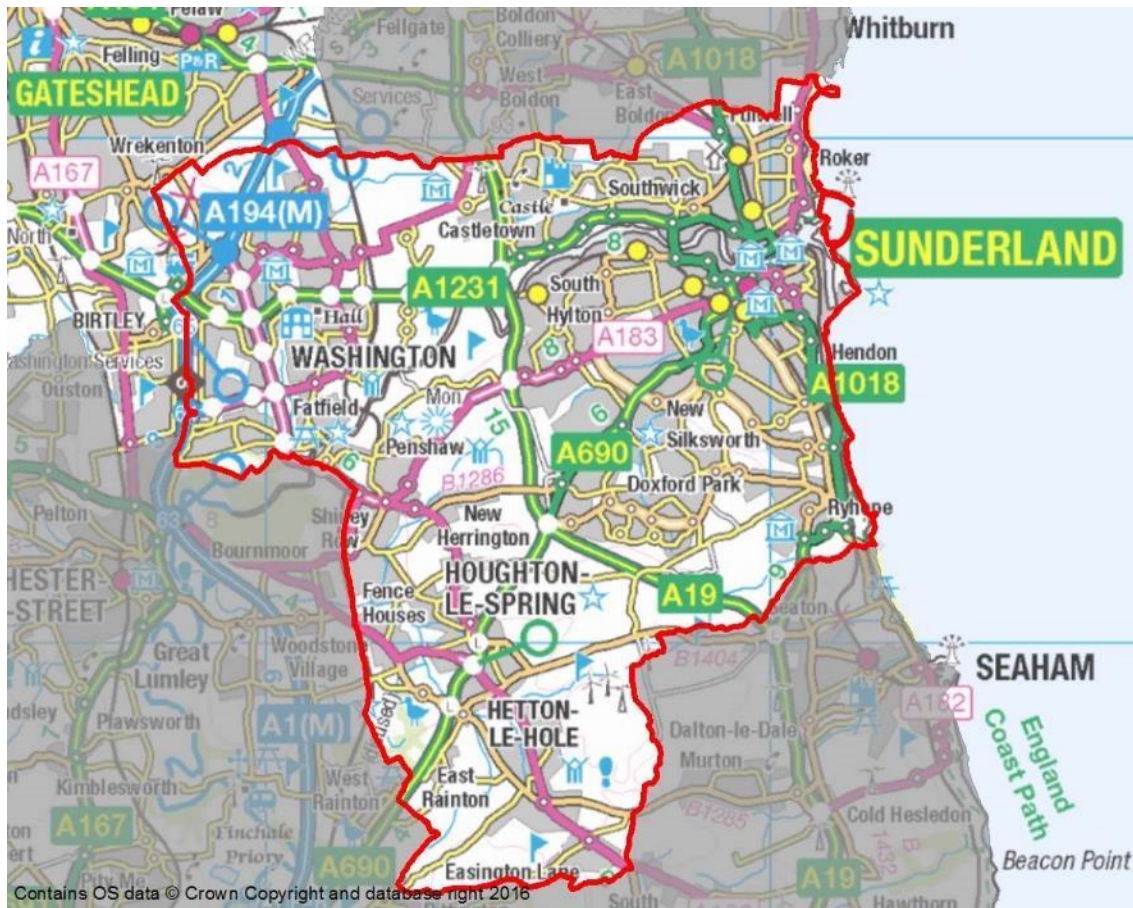


Figure 1-1: Sunderland City Council study area

1.2 Methodology

This section presents the approach taken by the asset inspectors for the Sunderland City Council coastal frontage.

The walkover inspection surveys for the Sunderland City Council frontage were undertaken on 19th May (Port of Sunderland), 10th June (Hendon to Ryhope) and 29th June (Whitburn to Roker) 2022. The weather experienced during the inspections was generally dry and fine.

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 built 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 following significant findings were observed during the 2022 walkover inspection surveys:

- There was little significant change observed to frontage north of the River Wear since 2020
- Since 2020 repair works have been undertaken to the Stonehill Sea Wall and the condition of the asset has improved.
- Emergency works to the Hendon Foreshore Barrier have been undertaken to infill a large void at the northern end of the defence.
- Capital works are proposed at Stonehill Sea Wall and the Hendon Foreshore Barrier to reduce the risk of coastal erosion and wave overtopping.
- Several assets throughout the frontage would benefit from maintenance repairs.

3. Condition Assessment

3.1 Souter Point to Roker Pier (MA 06)

3.1.1 The Bents

Sunderland City Council's coastal frontage starts midway through the SMP2 Management Area 06 at The Bents, near Whitburn.

The most northerly asset is an undefended grassed slope, NFCDD Asset Reference Number 121AB901B0602C01, located landward of the Whitburn Steel rock outcrop. This asset length is continuous across the local authority boundary into South Tyneside Council's coastal responsibilities and consists of a grassy coastal slope fronted by vegetated sand dunes. The dunes appeared stable in a similar condition to previous inspections, and the grassy slope remains wide and stable. There was evidence of localised erosion around footpaths and desire lines through the dunes, in particular near the main access points. The northern part of this asset switches to an eroding clay cliff north of the local authority boundary.



Well vegetated slope, embryonic dune growth at toe. (Asset Ref No. 121AB901B0602C01)



View towards north boundary, shingle berm at toe. (Asset Ref No. 121AB901B0602C01)



Access ramp at Whitburn Steel, toe undercut during previous inspections. (Asset Ref No. 121AB901B0602C01)

The promenade at South Bents, Asset Reference Number 121AB901B0603C01, is fronted by concrete and masonry seawalls. The beach level at the time of the inspection in June 2022 generally appeared similar to 2020 beach levels, and there was no shingle observed at the southern end of the masonry seawall. At the northern end the concrete section of wall was in fair condition although in several areas the concrete is heavily spalled and cracked. Beach sand levels were higher at the

northern end of the asset decreasing towards the south. Erosion was noted to the rear embankment around benches and along the crest of the low retaining wall. The grouted stone revetment at the picnic area was notably cracked with sporadic missing stones.

The repaired/replaced coping blocks and handrail of masonry wall at the southern end, previously damaged by storms, appeared to be in good condition. There was a small area of damage at the southernmost end, adjacent the tie-in with the concrete access steps where the coping appeared to be chipped and cracked.



Sandy upper beach surface and dune accretion in front of concrete seawall.
(Asset Ref No. 121AB901B0603C01)



Spalled/damaged concrete cope and facing
(Asset Ref No. 121AB901B0603C01)



Lateral crack along rear of revetment at picnic area
(Asset Ref No. 121AB901B0603C01)



Asphalt surface appears in good condition,
erosion to rear embankment
(Asset Ref No. 121AB901B0603C01)

The repaired/replaced coping blocks and handrail of masonry wall at the southern end, previously damaged by storms, appeared to be in good condition. There was a small area of damage at the southernmost end, adjacent the tie-in with the concrete access steps where the coping appeared to be chipped and cracked.



Erosion along the crest of the low retaining wall at the rear of the promenade.
(Asset Ref No. 121AB901B0603C01)



Repaired section of coping blocks in good condition.
(Asset Ref No. 121AB901B0603C01)



Localised damage on repaired section of coping.
(Asset Ref No. 121AB901B0603C01)



Original coping in fair condition.
(Asset Ref No. 121AB901B0603C01)

3.1.2 Seaburn

The beach level falls to the southern end of Whitburn Sands, exposing more of the seawall. The structure here is formed from masonry with a concrete coping (Asset Ref. No. 121AB901B0603C02). The repairs from storm damage are continuous across this defence, with concrete coping blocks and handrails replaced, as well as new promenade surface landward of the seawall.

There are two concrete outfall structures located immediately seaward of the seawall, with repaired seawall coping blocks above. The beach levels were the same as during the 2020 inspection, with the same number of block courses visible.



Repaired concrete coping above masonry seawall generally in good condition.
(Asset Ref No. 121AB901B0603C02)



Repaired concrete coping above outfall structure in fair condition.
(Asset Ref No. 121AB901B0603C02)



Repairs to step abutments in fair condition. Handrail is corroded in places
(Asset Ref No. 121AB901B0603C02)



Beach level the same as in 2020
(Asset Ref No. 121AB901B0603C02)

The wall between Dykelands Road and the roundabout at Seaburn Terrace (Asset Ref No. 121AB901B0603C03) was in fair overall condition. Similar to previous inspections, rust staining was present throughout the crest wall although this is likely to have arisen from fixings from previous benches. There was also extensive cracking to the crest wall, although the seaward masonry wall face was generally in fair condition.



Cracking in seaward side of crest wall
(Asset Ref. No. 121AB901B0603C03)



Rust staining and cracking in crest wall.
(Asset Ref. No. 121AB901B0603C03)

The beach levels were similar to those observed in 2020, and the toe of the wall and previous bag-work repairs remained buried as they were in 2020. There is some marine growth on the lower visible part of the wall. Previous Inspection Reports have noted that the repairs to the toe may need to be extended to prevent further undermining and loss of fill.

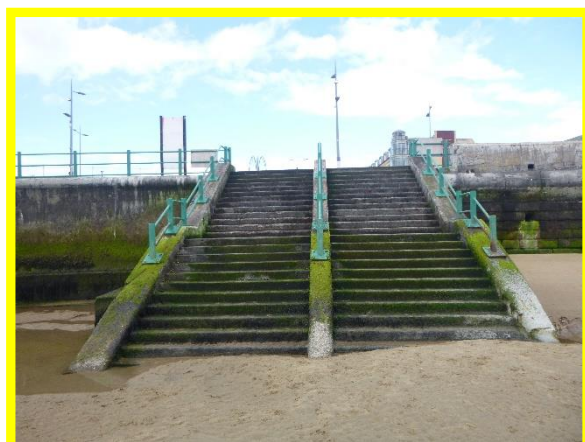
The steps at Seaburn Terrace roundabout are generally in fair condition, although some steps are heavily abraded and there is exposed reinforcement in the wing-wall at the toe There did not appear to have been any change to the condition of the steps since the previous inspection in 2020.



Access steps at Dykeland Road, beach covering heavily abraded lower steps (Asset Ref. No. 121AB901B0603C03)



Several open joints in wall, beach levels the same as in 2020 with previously exposed voids buried. (Asset Ref. No. 121AB901B0603C03)



Seaburn Terrace roundabout steps, several abraded/chipped steps with algae growth. Higher beach levels (Asset Ref. No. 121AB901B0603C03 / B0604C01)



Recently constructed seawall infill section adjacent to steps at Seaburn Terrace (Asset Ref. No. 121AB901B0603C03)

The seawall south of Seaburn Terrace remains in fair condition, with localised areas of damage including a section of coping which has broken off causing chloride staining (as was reported in 2020). Across the seawall there were small areas of rust/chloride staining. Beach levels appeared slightly lower than in the previous inspection exposing parts of the concrete toe beam. The visible parts of the toe beam appeared in fair condition with extensive marine vegetation growth. The landward concrete retaining wall appeared to be in good condition.



Beach levels marginally lower than 2020, spalling damage at crest and abrasion across wall face.
(Asset Ref. No. 121AB901B0604C01)



Damaged section of coping and chloride staining (Asset Ref. No. 121AB901B0604C01)

3.1.3 Parsons' Rocks

The masonry seawall backing Parson's Rocks is in fair condition with some open joints and occasional damaged blocks. The masonry structure ties in with the elevated limestone rock outcrop, which is abrading and eroding in places.

A previously reported void in the rock outcrop which was starting to extend below the promenade has been repaired with a grouted stone infill.

Elsewhere there are several other voids in the rocky outcrops. It is advised that this area is regularly monitored and any maintenance activity required is undertaken swiftly to reduce the risk of undermining of the wall.



View northwards from Parsons Rocks, seawall in fair condition.
(Asset Ref. No. 121AB901B0604C02)



Eroded natural rock at access steps to Parsons Rocks (access to steps blocked by handrail).
(Asset Ref. No. 121AB901B0604C02)



Remains of previous access steps breaking up onto foreshore. (Asset Ref. No. 121AB901B0604C02)



Access steps at southern end of defence in fair condition. (Asset Ref. No. 121AB901B0604C02)



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



Damage to coping on ramp south of Parsons Rocks. (Asset Ref. No. 121AB901B0604C02)

The grouted stone revetment landward of the promenade around Roker Cliff Park is in fair condition with some small voids and evidence of historic grouted repairs. The low concrete retaining wall with inbuilt bench seats at the base of the revetment is in poor condition with evidence of cracking and spalling throughout and localised areas of corrosion staining from fixings.



Recently infilled voids in grouted revetment (Asset Ref. No. 121AB901B0604C02)



Recently infilled voids in grouted revetment (Asset Ref. No. 121AB901B0604C02)

3.1.4 Roker

South of Parsons' Rocks the high masonry wall around the headland extending south of the ravine at Roker Park (Asset Ref. No. 121AB901B0605C01) was in generally good condition, with minor mortar loss, and cracked blocks in places. One historic repair is in fair condition although a lateral open joint approximately 10m in length remains adjacent the repair. It is recommended that repointing work is undertaken to address the open joint and prevent destabilisation of the surrounding blockwork. The natural cliffs above the wall appear to be relatively stable with no obvious signs of recent activity.



Masonry wall generally in good condition
(Asset Ref. No. 121AB901B0605C01)



Area of missing blocks repaired since 2018,
part of longitudinal crack remains.
(Asset Ref. No. 121AB901B0605C01)

The low level concrete encasing wall fronting Marine Walk was generally in good condition with localised sections in fair condition. Vertical cracks in the encasing concrete of the northern section were noted in the majority of blocks. Improvements to the promenade were undertaken in 2012. At the north end near the Roker Park entrance, beach levels appeared the same as in 2020. It was apparent during the inspection that the beach is groomed and maintained along Marine Drive to Roker Pier.



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



Outfall pipes at north end of Marine Walk.
(Asset Ref. No. 121AB901B0605C02)



Northern access steps in fair to poor condition requiring minor repairs. (Asset Ref. No. 121AB901B0605C02)



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



Damage to coping stone, similar to 2020. (Asset Ref. No. 121AB901B0605C02)



Southern access steps in fair condition with historic repair holding. (Asset Ref. No. 121AB901B0605C02)

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

3.2.1 Roker Pier

Roker Pier is located to the north of the mouth of the River Wear. Refurbishment works were undertaken to the pier in 2014, this involved foundation repairs including placing underwater concrete, concrete resurfacing of the deck slab, repointing joints, and restoration of the lighthouse. A further phase has been recently completed which included replacement/repairs to handrailing and damaged coping damaged by storms, and restoration of the pier tunnel to allow visits by the public.

The pier structure appeared generally in good condition, with minor defects noted. On both faces of the pier there was occasional damage to blocks and coping stones, and some open joints. Occasional vertical cracks were noted through the height of the structure indicating potential settlement, these cracks should be monitored. Inspection by boat, and potential underwater surveys would be recommended to identify potential issues at the toe of the structure.

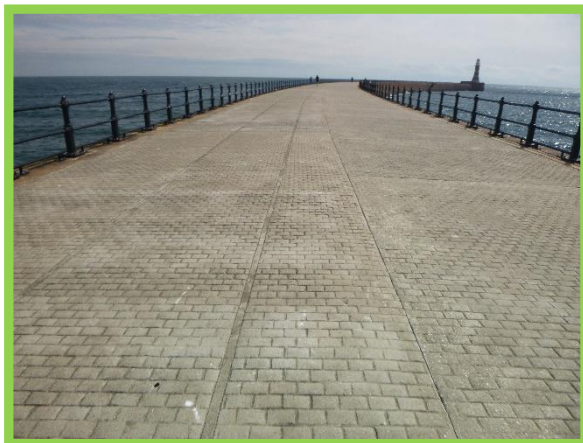
The deck of Pier which is formed from in-situ printed concrete slabs was generally in good condition however several slabs have lateral and longitudinal cracks. The condition of the cracks should be monitored and remedial action considered.



Northern (outer) face of pier
(Asset Ref. No. 121AB901B0702C04)



Recently refurbished lighthouse.
(Asset Ref. No. 121AB901B0702C04)



Recently constructed concrete deck
(Asset Ref. No. 121AB901B0702C04)



Roker Pier northern (inner) face
(Asset Ref. No. 121AB901B0702C04)



Recently replaced handrail and coping blocks.
(Asset Ref. No. 121AB901B0702C04)



Roker Pier northern (outer) face, vertical cracks and open joints along coping
(Asset Ref. No. 121AB901B0702C05)

The masonry wall at the northern side of the root of the pier (Asset Ref. No. 121AB901B0702C05) appeared in fair to good condition, although there was localised abrasion and loss of mortar in joints on both the seaward and landward faces, notably between the coping stone and the crest of the masonry wall.

The masonry splash wall at the southern side of the root of the pier (Asset Ref. No. 121AB901B0702C05), appeared in fair condition although there were several sections of damaged concrete coping and the masonry facing appeared heavily weathered/abraded. Beach levels were approximately similar to those at the time of the inspections in 2020.



View on northern side of masonry wall at root of pier – localised abrasion and mortar loss. (Asset Ref. No. 121AB901B0702C05)



Masonry splash wall at southern root of pier – sections of damaged coping and weathered masonry. (Asset Ref. No. 121AB901B0702C05)

3.2.2 Roker Beach

South of Roker Pier the masonry and concrete seawall, asset 121AB901B0702C01 is in fair overall condition with evidence of previous patch repairs and multiple horizontal cracks in the concrete sections as seen in previous inspections. The promenade surface appeared to be in fair condition. In some areas, spalling has taken place between the horizontal cracks. The wide fronting beach offers protection to the wall and beach levels were high, similar to that seen in 2020.



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



Example of spalling between horizontal cracking (Asset Ref. No. 121AB901B0702C01)



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



Slipway at southern end of wall in fair condition. (Asset Ref. No. 121AB901B0702C01)

The rock armour revetment to the south of the public car park was generally in good condition. There was evidence of localised movement of some armour stone, in particular at the northern end of the defence. There appeared to be good interlock between the rocks, and an even profile and crest level, however vegetation growth was observed at the south end. As the rock was placed in front of the seawall, it was not possible to inspect the face of the wall. The promenade crest and handrailing appeared in good condition.

The rock armour revetment was narrower at the northern end adjacent to the lifeboat slipway. Beach levels were similar to 2020 at the slipway, covering void/undercutting previously observed at the toe.



Even profile and crest level on rock armour revetment . (Asset Ref. No. 121AB901B0702C02)



Rock armour and promenade in good condition. (Asset Ref. No. 121AB901B0702C02)

3.2.3 Old North Pier

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

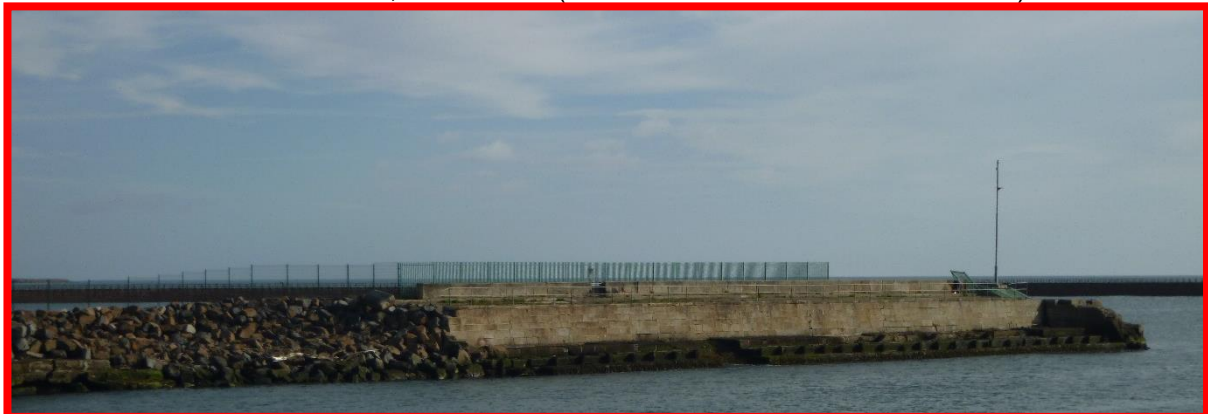
The Old North Pier was breached during storms in March 2018 resulting in washout of the rubble infill into the navigation channel of the port. The structure has subsequently been repaired by infilling the breached/voided area with armour stone and grout, and previously reported voids have been infilled with concrete.

The structure remains partially fenced off to the public with signs describing the structure as unsafe and therefore full assessment of the structure was not possible. The 2020 report noted that there was an opening in the fencing on the pier, however in June 2022 this was found to have been repaired meaning that there is no access onto the structure.

Generally, the Old North Pier appeared in similar condition to that reported in previous inspections. There was missing concrete and masonry from both sides of the grouted revetment that form the north face, voids towards the toe of the north face, and several missing blocks at the seaward end. The masonry wall forming the southern face appeared to also have several missing blocks.



Northern face of Old North Pier, voids at toe (Asset Ref. No. 121AB901B0702C03)



Southern face of Old North Pier (Asset Ref. No. 121AB901B0702C03)



Vegetation growth on haulage path built for delivery of rock repairs.
(Asset Ref. No. 121AB901B0702C03)



Former breach infilled with rock armour and grout. (Asset Ref. No. 121AB901B0702C03)



Missing blocks at seaward end of Old North Pier. (Asset Ref. No. 121AB901B0702C03)



Fencing detached locally enabling access by public to unsafe structure. (Asset Ref. No. 121AB901B0702C03)

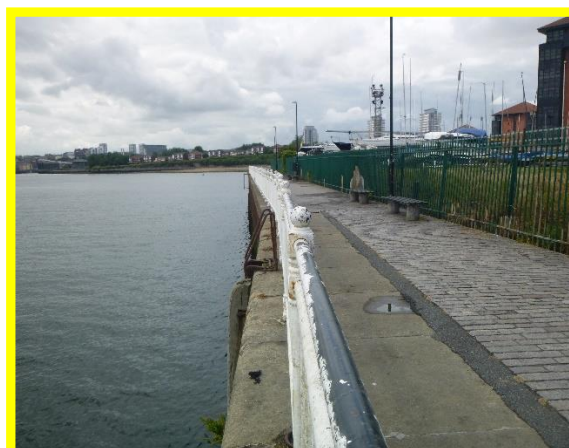


Cracked deck slab and splash wall with vegetation growth throughout. (Asset Ref. No. 121AB901B0702C03)

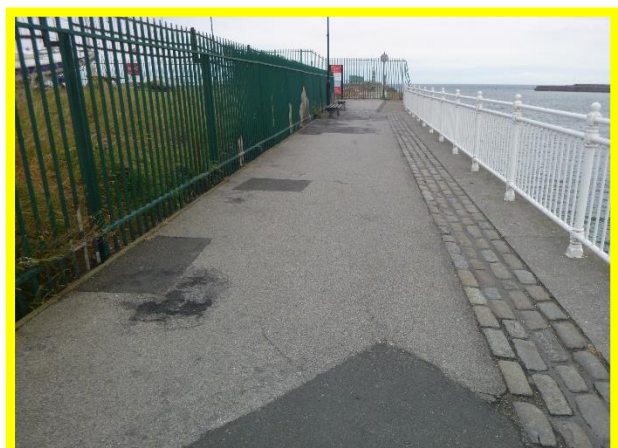


Old North Pier southern face showing extent of the breach. (Asset Ref. No. 121AB901B0702C03)

Upstream of the Old North Pier adjacent to the yachting club is "Rat House Corner", a popular fishing spot, where the defence is comprised of a sheet pile wall with concrete capping beam. It was not possible to visually assess the condition of the sheet piles, however the concrete capping beam appeared in fair condition with small areas of damage at corners.



Damage to concrete coping at "Rat House Corner". (Asset Ref. No. 121AB901B0702C03)



Promenade at "Rat House Corner" in fair condition (Asset Ref. 121AB901B0702C03)



Sheet piling along southern face of wall
(Asset Ref. No. 121AB901B0702C03)



Sheet piling at "Rat House Corner" in fair
condition (Asset Ref. 121AB901B0702C03)

3.2.4 River Wear to New South Pier

The frontage to the south of the mouth of the River Wear is inaccessible to members of the public as it is located within the restricted area of the Port of Sunderland. Access to the port for purposes of inspections was arranged through Sunderland City Council, who own and operate the port.

The northernmost structure consists of a rock armour revetment which remains in fair overall condition. The rock armour is loosely placed with some gaps towards its toe and in places lacks interlock. The profiling of the rock armour is fairly uniform however at the southern end of the revetment there appears to have been some localised slumping of the armour stone.

The crest section of the revetment is formed of a grouted mattress with inset stone. This is generally in fair condition however is experiencing continued loss of the rock and occasional sections of damage to the grout. On the landward side of the crest there is a continuous depression, likely caused by wave overtopping and washout of the made ground to the rear. The revetment ties into a sheet piled river wall to the north which houses a heavily corroded navigation light. To the south the revetment ties into a masonry faced sea wall with a precast concrete recurve crest to the south, which extends landward acting as a secondary line of defence behind the revetment. It is recommended that localised reprofiling of the rock armour at the south of the revetment is undertaken, in addition to re-grouting damaged sections of the crest. Potential microbial induced corrosion (MIC) has been noted to sheet piling forming the navigational wall at the north in previous inspections, which would reduce the structural capacity of piles. Vegetation growth was observed through joints of the concrete deck slab of the river wall..

The secondary wall (towards the south end) was inspected only towards the seaward end and is in fair condition. Minor spalling and cracking of the concrete and spalling of the surface of the concrete walkway to the rear was noted. The very seaward end has reinforcement bars standing vertically from the top of the concrete wall, it appears these were placed to allow the continuation of a boundary wall which was not completed. The asset remains in the same condition to the previous inspection in 2020.



View on sheet pile river navigation wall, noted previously with staining indicating microbial induced corrosion (MIC) reducing structural capacity (Asset Ref. No. 121AB901BO703C03)



View of rock revetment from north showing loosely placed armour (Asset Ref. No. 121AB901BO703C03)



View of slumping at southern end of revetment (Asset Ref. No. 121AB901BO703C03)



Low spot on landward side of concrete crest and overtopping/rock debris (Asset Ref. No. 121AB901BO703C03)

The masonry faced concrete sea wall to the south which links into the north face of the New South Pier remains in fair condition. However, the embankment to the rear is in poor condition due to continuing erosion and slumping caused by wave overtopping, therefore the asset is classified as poor condition overall.

The masonry faced wall appears in similar condition to previous surveys. No further blocks were noted to have been lost from the toe at the northern end since 2020, however there remains a risk of outflanking due to the poor condition of the tie-in to the adjacent asset. As noted in previous reports, the concrete apron to the rear of the wall (south part only) has sections of concrete missing due to damage caused by wave overtopping. There is evidence of cracking and spalling on the rear face and crest of the concrete recurve wall appeared similar to the 2020 inspection. Rubble protecting the rear embankment has further degraded and provides little protection against wave overtopping. There has been further erosion to the rear flood embankment, with the seaward slope of the embankment eroded back to the crest in places, one recent slump on the seaward face of the embankment was noted during the inspection.



Extensive crest and rear embankment damage due to wave overtopping.
(Asset Ref. No. 121AB901BO703C02)



Masonry wall in fair condition except for missing blocks at North end.
(Asset Ref. No. 121AB901BO703C02)

As recommended in previous reports, the surfacing to the rear should be repaired / replaced. Voids in the rubble surface immediately behind the wall should be filled, in order to avoid wave overtopping causing further erosion and pooling behind the wall destabilising the structure. It is recommended the rear embankment is reprofiled and repaired where necessary, particularly at its southernmost end. Alternatively, a crest wave return wall could be constructed to prevent overtopping. Minor repairs to the concrete apron and coping, and replacement of missing masonry blocks are also recommended.

3.2.5 New South Pier

Generally, the New South Pier appeared in similar condition to the 2020 inspection. The Pier experienced significant damage prior to the 2018 survey and during the 2020 survey the majority of the remedial work had been completed. During the 2022 inspection evidence of further remedial work was observed along with some additional defects.

The most significant recent repairs were undertaken to areas of localised damage as identified in the 2018 inspection including;

- Repairs to lower deck slabs by filling in with concrete.
- Reinstatement of missing stone coping beams along riverward side of deck.

At the seaward end, the new navigation light column with concrete foundation base was installed prior to the 2020 survey. The light column and base appeared in good condition.

The previously reported open water-filled chambers in the lower deck remained covered with thick steel sheeting.

There are frequent minor defects such as cracking and spalling of concrete deck slabs and the upper wall coping along with localised open joints caused due to loss of mortar between masonry blocks in the main wall. It was noted that a long contraction joint has been cut across 4 deck slabs seemingly to reduce the risk of crack propagation along the deck. Previous concrete deck repairs towards the seaward end of the structure appeared in good condition. During the 2022 inspection it was noted that the arched recesses in the upper wall (some of which are partially bricked up) are rapidly degrading with extensive leaching, spalling and cracking. There was also some local damage at the upper section of the most landward set of access steps although this did not affect the overall performance of the steps.

As noted in previous reports there are a number of large blocks missing at the seaward end of the pier, although this is not new damage. It is advised that the end of the pier is repaired in order to prevent further degradation of the structure.

There were no signs of global movement or distress to indicate major problems with the foundations of the structure, but an underwater survey is recommended, particularly towards the seaward end as wave action within the central chamber was noted in the 2010 report indicating that there must be voids in the structure.

Along the southern face of the wall between the upper and lower deck there are localised sections of heavily abraded brickwork.

The upper deck of the breakwater was not inspected at its seaward end due to fall from height risk, and the seaward face of the breakwater was inspected at a distance from the south (approximately 1/3 of its length).



New South Pier, upper deck. (Asset Ref. No. 121AB901B0703C01)



Local repairs to upper deck from root of pier. (Asset Ref. No. 121AB901B0703C01)



Steel sheet covering void reported in 2018. (Asset Ref. No. 121AB901B0703C01)



Recently installed navigation light column. (Asset Ref. No. 121AB901B0703C01)



Contraction joint has been cut into slabs.
(Asset Ref. No. 121AB901B0703C01)



Repaired slabs in good condition.
(Asset Ref. No. 121AB901B0703C01)



Damage to access steps.
(Asset Ref. No. 121AB901B0703C01)



Damage in upper wall recess.
(Asset Ref. No. 121AB901B0703C01)



Northern tip of New South Pier.
(Asset Ref. No. 121AB901B0703C01)

3.3 Sunderland Harbour to Pincushion Rocks (MA 08)

3.3.1 New South Pier to South Outlet

The seawall to the south of New South Pier, Stonehill Wall, (Asset Ref. No. 121AB901B0801C03) is a masonry wall continuous with the southern face of New South Pier.

Following the severe damage to the deck observed during the 2018 survey, repairs were undertaken around the time of the 2020 inspection. Since the 2020 inspection further remedial actions have been undertaken including the construction of a deck slab and a new pre-cast concrete splash wall along most of the length of the asset.

The masonry wall facing appears generally in a similar condition to the 2020 survey.

- An area of missing facing blocks appear to have worsened since 2020, with more blocks now out of place,
- An open horizontal joint approx. 10m length appears similar to 2020.
- A previous (2010) void at the base of the wall appears covered by rock.
- Missing blocks and several open joints were noted in the masonry wall during inspection at southern end of structure.

Reconstruction works to the crest and rear of the masonry wall over a 185m length were undertaken in 2020/2021 and comprised:

- Construction of a series of deck slabs over the existing structure,
- Construction of a replacement splash wall
- Extending deck slabs and splash wall down to the southern fringe of the Stonehill Wall where a new reinforced concrete access ramp will be constructed to the foreshore,
- Constructing a new reinforced concrete access ramp to the north of the existing deck slab (near to the root of the New South Pier),
- Replacement of missing coping stones with precast reinforced concrete coping.

Sunderland City Council has also proposed works to extend the existing rock armour revetment which is present to the south of the Stonehill Wall along the entirety of the wall to improve the structure's performance against coastal erosion and wave overtopping. This would involve an approximately 215m long extension to the existing rock armour all the way along to the root of the New South Pier. The proposed revetment would be approximately 17m wide from the toe of the existing masonry wall.

It is anticipated that the proposed scheme will progress to the construction phase at the earliest possible opportunity (subject to Marine Licence and Planning Permission) although this may not be before the 2022/23 over-wintering bird period due to likely timescales associated with a Marine Licence determination.

The rock armour to the southern part of the wall appears in fair condition, however there is a continuing depletion which has been observed since the 2018 survey.

It was noted that on the new deck, approximately four alternate in-situ cast concrete slabs had localised depressions on their surface. This is caused by water (likely rainwater) collecting and standing on the concrete as it cured. It was also noted that these slabs did not have a brush finish whereas other slabs did.



Localised missing blocks worsened (since 2020) and open joint, similar(to 2020). (Asset Ref. No. B901B0801C03)



Deck slab repaired and new precast splash wall constructed. (Asset Ref. No. B901B0801C03)



New precast coping stones. (Asset Ref. No. B901B0801C03)



Southern end of wall repaired. (Asset Ref. No. B901B0801C03)



Depressions in deck slab. (Asset Ref. No. B901B0801C03)



Remaining section of original splash wall in poor condition. (Asset Ref. No. B901B0801C03)

South of the seawall there are two lengths of rock armour sea defence (121AB901B0801C02 and 121AB901B0801C06) which sit either side of the remains of a collapsed concrete groyne (121AB901B0801C01). The rock revetment (mixed with some concrete blocks and rubble/debris) remains in fair condition with some minor displacement of material and local slumping of crest. At the

north end of the revetment there has been local movement of armour stone which has resulted in a steepening of the profile.

It was noted that the embankment to the rear of the revetment, has been reprofiled and was in good condition.



Rock/rubble revetment north of derelict groyne.
(Asset Ref. No.121AB901B0801C02)



Uneven crest level of revetment. Embankment to rear has been reprofiled and is in good condition
(Asset Ref. No.121AB901B0801C02)

The concrete groyne appeared in a similar derelict condition to that reported in 2020 and in previous reports. A section of upstanding groyne appears at risk of toppling in the short to medium term. The remains do not appear to have adverse effects on the surrounding rock armour and although the beach has accreted since 2010, the groyne is considered to have a negligible effect on wave energy and sediment transport along the frontage. A degree of protection will be provided by the South Rocks outcrop, erosion of which is possibly the source of the shingle accumulation on the northern part of the beach.



Derelict concrete groyne from north.
(Asset Ref. No. 121AB901B0801C01)



Derelict concrete groyne from south.
(Asset Ref. No. 121AB901B0801C01)

South of the groyne is another section of rock revetment (121AB901B0801C06) in fair condition, with interlocked rocks although crest remains uneven similar to section north of the derelict groyne. There are signs of movement in the rock armour, and the profile of the revetment is steep, particularly at the northern end, adjacent the groyne remains.



Derelict concrete groyne from north.
(Asset Ref. No. 121AB901B0801C06)



Derelict concrete groyne from south.
(Asset Ref. No. 121AB901B0801C06)

3.3.2 South Outlet

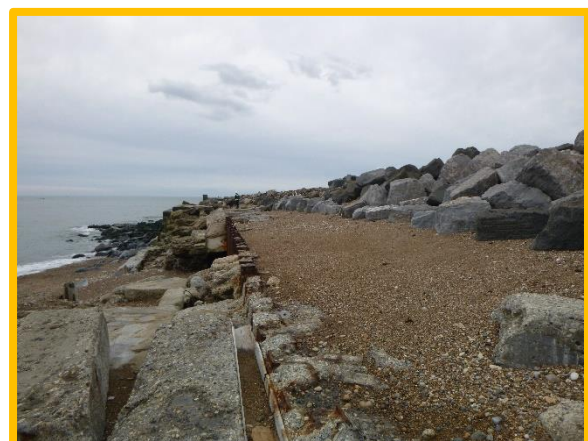
The South Outlet is formed between the North East Pier and the South West Breakwater. The assets are in generally poor condition and continue to experience further degradation. The size of the structures means that they will continue to provide some protection to the headland even if no remedial action or maintenance program is undertaken.

As noted in the previous reports, to ensure that the protection provided is sufficient for the needs of the Port a strategy should be developed for the South Outlet defences, which incorporates the development plans of the Port. The South West Breakwater requires extensive remedial work and the North East Pier requires major refurbishment or possible replacement although the importance of maintaining the South Outlet is unlikely to be significant enough to justify the significant capital expenditure required unless it were associated with redevelopment of the area behind.

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



Derelict former defence structures with stacked bund of rock armour at crest.
(Asset Ref. 121AB901B0801C05)



Derelict concrete wall and heavily corroded sheet piles with rock armour crest. (Asset Ref. No. 121AB901B0801C05)

At the inner end of the North East Pier is asset B901B0801C07 and asset B901B0801C04 which is located at the outer end of the pier. The inner end of the pier remains largely unchanged since the

2020 inspection. The seaward facing concrete structures are heavily abraded exposing reinforcement, and the innermost buttress has become detached from the main structure. The deck of the pier is heavily spalled with cracking throughout. The inner end of the pier is backed by rubble armour which is in fair condition.

The seaward section of North East Pier, including the roundhead and both faces is asset 121AB901B0801C04, and is in very poor condition. The deck remains severely abraded with missing sections and exposed reinforcement observed throughout.

As reported in previous years the roundhead of the structure has become detached, leaving the exposed nose of the pier vulnerable to wave attack and causing ongoing loss of material from the end of the breakwater. There did not appear to have been significant change to the pier nose since 2020, however the failed state of the end of the defence means the structure and in particular the nose is at immediate risk of further failure.



Buttress detached from main structure and heavily abraded deck
(Asset Ref. No. 121B901B0801C07)



Heavily abraded deck.
(Asset Ref. No. 121B901B0801C04)



Nose of pier undercut.
(Asset Ref. No. 121B901B0801C04)



North East Pier viewed from south.
(Asset Ref. No. 121B901B0801C04)

The South Outlet basin has been partly filled and protected with random tipped rubble which is comprised of broken sections of concrete slabs, masonry, rock and debris see images below. Although this affords a degree of protection, it is not a formal defence so is assessed as poor condition. There are three asset lengths in NFCDD, which are from north to south 121AB901B0801C08, 121AB901B0802C07 and 121AB901B0802C06. All three assets in this area appear to be in similar poor condition to the 2018 report. Gullying was noted along the crest of asset 121AB901B0801C08, which may be caused by surface water runoff from land to the rear. The heavily corroded sheet pile wall at asset 121AB901B0802C07 crumbled when touched. However,

the likelihood of water reaching the structure is low due to its distance from the shoreline and height above the water line.



Tipped rubble at northern end of South Outlet basin. (Asset Ref. No. 121AB901B0801C08)



Heavily corroded sheet pile wall (Asset Ref. No. 121AB901B0802C07).



Informal transition between infill (C08) and sheet pile wall (C07). (Asset Ref. No. 121AB901B0802C07).



South side of basin taken from South West Breakwater. (Asset Ref. No. 121B901B02C06)

The South West Breakwater was in similar condition as past inspections. As described in the 2010 to 2020 reports the South West Breakwater is in a derelict condition, with significant damage to and loss of deck sections, displaced core blocks to landward (north) side, missing sections of concrete blockwork and severe damage. The 2022 inspection noted a significant void in the northern aspect of the breakwater. It was possible to hear the wash of waves through the structure indicating that the void is clear through the base of the structure. The risk of collapse is imminent.



Significant displacement of blocks on landward side of SW Breakwater.. (Asset Ref. 121AB901B0802C05)

Large void beneath structure, washout of fill material through the structure is evident . (Asset Ref. No. 121AB901B0802C05)



Extensive damage to concrete apron on seaward face of structure. (Asset Ref. 121AB901B0802C05)



The roundhead is undercut, and the deck is heavily abraded. (Asset Ref. 121AB901B0802C05)

3.3.3 Spur Barrier to Hendon Banks Barrier

Located to the south of the South West Breakwater is a large concrete seawall with sheet piled toe and set back crest wall, asset 121AB901B0802C04, approximately 500m length, terminating at the north end of the sewage treatment works. The asset was in fair overall condition, with localised damage and cracking/spalling of concrete and missing sealant in some construction joints.

Viewed from a distance, the toe piles appear corroded and abraded, and some piles had become detached from the adjacent concrete toe. An underwater inspection and boat survey is recommended as voids through the piles could lead to loss of fill material and destabilisation of the wall. Stop logs noted in previous reports remain, corrosion was noted to fixing bolts.



North end of Spur Barrier upper wall. (Asset Ref. No. 121AB901B0802C04)



Cracking and spalling of upper sea wall. (Asset Ref. No. 121AB901B0802C04)



Spur Barrier wall in fair overall condition with evidence of localised damage throughout structure. (Asset Ref. No. 121AB901B0802C04)



Corroded/abraded sheet pile wall at toe. (Asset Ref. No. 121AB901B0802C04)



Undermining of upper seawall at south end. (Asset Ref. No. 121AB901B0802C04)

Seaward of the sewage treatment works there is a relatively new pre-cast concrete boundary wall with anti-climb spikes on its crest. The concrete wall remains in good condition. However, this is fronted by a section of seawall, asset 121AB901B0802C03, which is in very poor (failing) condition. The crest apron consists of broken rubble, rock, and demolition waste, hence during a storm wave overtopping could displace this material and undermine the boundary wall.

The old in-situ concrete seawall has limited protection from rock armour at its toe. The most northern part of the sea wall collapsed prior to the 2018 survey. This led to a significant wash out of material from behind the defence line. In December 2020, the scour hole was infilled with 1-3 tonne rock armour as an emergency measure to prevent further erosion.

It is understood that Sunderland City Council is proposing a capital improvement scheme to improve the condition and performance of the existing structure against coastal erosion and wave overtopping.

The proposed works include:

- Encasing seaward face of existing seawall and apron with reinforced concrete,
- Backfilling behind existing seawall to provide a uniform base along full length of asset,
- Casting new deck slabs over the newly levelled base and backfilling the gap between these slabs and existing splash wall with concrete,
- Constructing a 17m wide rock armour revetment using 3T-6T armour stone.
- 21m length of 12m long steel sheet piles to retain contaminated soils which are present at north end of asset.

It is anticipated that the proposed scheme will progress to the construction phase after the Stonehill Wall scheme has been completed (and subject to Marine Licence and Planning Permission)



Sea wall in similar condition to 2020.
(Asset Ref. No. 121B901B0802C03)



Rock armour in poor condition similar to previous inspections.
(Asset Ref. No. 121B901B0802C03)



Scour hole at north end has been infilled with rock armour..
(Asset Ref. No. 121B901B0802C03)



Unprotected crest apron and rear concrete boundary wall.
(Asset Ref. No. 121B901B0802C03)

The defence protecting the Sewage Treatment Works, asset 121AB901B0802C02, is in fair overall condition but the rock armour at the toe of the seawall is in poor condition. There has been extensive movement of the armour stone and in places this has resulted in sparse protection of the wall. The concrete wall and deck slab has been damaged during storms when large rocks and boulders have

been washed onto the deck.. It is recommended that the armour is re-profiled and topped up with larger armour and better interlock. There was evidence of damage to the seaward edge of the crest slab and cope blocks along the length of the structure.

At the south end of this section the rock armour terminates at a concrete groyne which extends from the defence 121AB901B0802C01 to the south, with the toe protected by sheet piles and some rock armour. There appeared to be some undercutting and missing masonry which has been noted in previous inspections. It is recommended that the groyne is repaired, and rock armour to the south is reinstated and re-profiled..



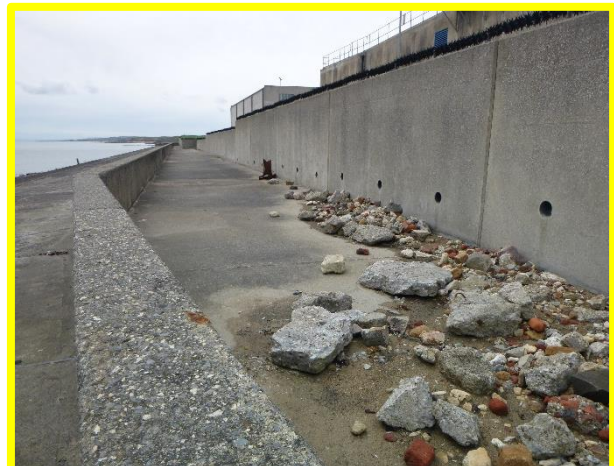
Damaged cope blocks and deck slab
(Asset Ref. 121AB901B0802C02)



Steep, uneven rock armour profile.
(Asset Ref. No. 121AB901B0802C02)



Abrasion and cracking of deck slab. (Asset Ref. No. 121AB901B0802C02)



Overtopping debris between splash wall and rear boundary wall.
(Asset Ref. No. 121AB901B0802C02)

The most southerly defence within the port area is asset 121AB901B0802C01, which remains in poor condition similar to 2020. Several sections of the rear crest wall have been replaced in recent years. The repaired sections are typically in good condition; elsewhere however the crest wall is spalled and heavily stained with rust. The south facing wall adjacent the sewage treatment works has several missing masonry blocks.

The toe piles remain heavily corroded and abraded with holes through. A length of cope beam has been lost towards the south. Significant large Cracking between the crest slab and coping, shown in image below, indicates a rotational movement of the most seaward slab and coping.. It is recommended to consider placing rock armour in front of this wall to reduce the impact of waves and to undertake further repairs to the slabs, crest wall drains.

There has been significant damage to the concrete deck slab around several outfall drains since 2016 so that in parts the drains are discharging directly into fill material behind the concrete seawall. It was noted that one outfall appeared to have been recently repaired however there were two other outfalls which have now degraded and are causing washout of material from beneath the deck slab.



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



Various cracks and open joints to deck slab with past concrete repairs.
(Asset Ref. No. 121AB901B0802C01)



Example of damaged deck slab at outfall drain leading to washout of infill material.
(Asset Ref. No. 121AB901B0802C01)



Section of recently replaced rear wall.
(Asset Ref. No. 121AB901B0802C01)

The breakwater marking the southern extent of the Port of Sunderland continues to fail at the seaward end but remains generally in a similar condition to that reported previously. The sheet piles around the base of the structure are in poor condition and show signs of corrosion. In NFCDD this structure forms part of the asset length to the south, 121AB901B0803C02.



Breakwater with nose detached, from north side. (Asset Ref. No. 121AB901B0803C02.)



Breakwater with nose detached, from south side.(Asset Ref. No. 121AB901B0803C02)

3.3.4 Port of Sunderland to Grangetown (Hendon Seawall)

South of the port boundary is the concrete Hendon Seawall, Asset Ref. No. 121AB901B0803C02, which was in fair overall condition, similar to 2020. Rock armour protection has been placed in front of the wall in several sections and this was in fair condition with appropriate voids and interlock. It appears that there is localised movement of the rock armour stone and there are several sections where the level of protection to the wall has diminished due to the crest of the rock armour revetment slipping.

There are twelve concrete groynes on the foreshore which appear to be having some limited impact on the control of sediment movement, see image bottom left. Beach levels were similar to the 2020 inspection. Each groyne has access points through the structures on the upper foreshore. The groynes are in fair condition but are notably abraded towards the inner end.

There is a concrete sewage outflow pipe that runs from the beach out to sea, this is protected by a pile wall which is heavily corroded / abraded and in poor condition; however the concrete pipe appears to remain in fair condition.

Steel sheet piling was visible along significant lengths of the toe of the wall where it is not protected by rock armour., The piles are generally heavily corroded and abraded with limited remaining life. Furthermore, the railings on the northernmost and central slipways have failed due to corrosion and/or impact damage.



Hendon Seawall, groynes and rock armour
(Asset Ref. No. 121AB901B0803C02)



Failed railings along the northernmost ramp.
(Asset Ref. No. 121AB901B0803C02)



Rock armour generally in fair condition.
(Asset Ref. No. 121AB901B0803C02)



Movement of rock armour
(Asset Ref. No. 121AB901B0803C02)



Concrete groyne, beach levels similar to 2020. (Asset Ref. No. 121AB901B0803C02)



Concrete sewage outfall pipe in fair condition, heavily corroded / abraded at pile head. (Asset Ref. No. 121AB901B0803C02)

Similar to 2020, sealant was missing from construction joints in the concrete slabs in a number of locations. Minor spalling was evident around drainage holes with exposed reinforcement in the crest wall to the southern part of the defence. There was also abrasion evident to the front face of the wall in places as shown below. In particular, around the concrete sewage outfall. Additional rock armour to protect the failing piles and abraded wall should be considered in future.

At the southern end of the asset where the seawall is backed by cliffs, there is a localised slumped overlying till layer and gullying possibly due to surface water overflow. The slipway at the southern end is in fair condition with some cracking and spalling along beams. The rock armour surrounding the southern slipway is in overall good condition.



Heavily abraded and corroded steel toe piling (northernmost slipway). (Asset Ref. No. 121AB901B0803C02)



Exposed reinforcement to seawall and redundant steps. (Asset Ref. No. 121AB901B0803C02)



Localised gullying of slope to rear of seawall
(Asset Ref. No. 121AB901B0803C02).



Localised section of damaged railing
(Asset Ref. No. 121AB901B0803C02).

3.3.5 Hendon Seawall to Ryhope Dene

The natural coastal frontage extending from the southern end of the Hendon Seawall to Ryhope Dene comprises of Magnesian Limestone cliffs overlain by softer glacial till.

In 2022 the cliffs were found to be relatively active with evidence of occasional local minor rock falls in the limestone and frequent slumps in the till. There are numerous caves, arches and sea stacks present along this frontage.



Sea stack near Ryhope Village Dene
(Asset Ref. No. 121AB901B0804C02)



Sea stack at Pincushion
(Asset Ref. No. 121AB901B0804C02)

There are signs of recent localised slumping and tension cracks present in the cliff face between the southern end of the Hendon Seawall and Salterfen Rocks.

Further to the south, it was noted the concrete surround to the outfall structure at Ryhope Nook has been undercut. Safe access to/from the beach at Ryhope Nook has been previously lost, and ongoing erosion was noted to the remaining footpath/steps at this location.



Recent slumping at Salterfen Rocks
(Asset Ref. No. 121AB901B0804C03)



Undercutting to Ryhope Nook outfall.
(Asset Ref. No. 121AB901B0804C03)



Recent slumping at Salterfen Rocks
(Asset Ref. No. 121AB901B0804C03)



Undercutting to Ryhope Nook outfall.
(Asset Ref. No. 121AB901B0804C03)

The cliffs become more unstable along Halliwell Banks (/0804C02, between Ryhope Village Dene and Ryhope Dene). Just south of Ryhope Village Dene, more frequent debris lobes and slumps can be seen in places over the full height of the cliffs and water seepage through the cliffs is frequent. There are several precipitous sections where there are cracks and overhangs, with considerable water seepage adding to the likelihood of further imminent collapses. The /0804C02 frontage is classified as Partly Active, and some local movements of material were observed during the inspection.



Recent Slumping along Halliwell Banks
(Asset Ref. No. 121AB901B0804C02)



Access steps at Ryhope Village Dene in fair condition, although locally undercut.
(Asset Ref. No. 121AB901B0804C02)



Access steps at Ryhope Village Dene in fair condition
(Asset Ref. No. 121AB901B0804C02)



Access steps at Ryhope Village Dene in fair condition, although locally undercut.
(Asset Ref. No. 121AB901B0804C02)

In the vicinity of a large rock stack along Pincushion Rocks, there have been further larger falls and slumps in the till section which would have originally connected the stack to the main cliff. There is evidence of water seepage and the precipitous overhang looks ready to fall. There are many further localised slumps in the cliffs all around the Pincushion Rocks headland.



Slumping and seepage near sea stack at Pincushion (Asset Ref. 121AB901B0804C02)



Recent large slump south of Pincushion (Asset Ref. No. 121AB901B0804C02)



Pincushion Rocks, active sand martin nests in upper cliff to left side of photo
(Asset Ref. No. 121AB901B0804C02)



Active sand martin nests (Asset Ref. No. 121AB901B0804C02)



Southern boundary of frontage at Ryhope Dene
(Asset Ref. No. 121AB901B0804C02)

The slumping continues along the southern section of Halliwell Banks all the way to Ryhope Dene. There have been several recent large slumps and there are many areas with extensive water seepage.

Slumps also are apparent either side of Ryhope Dene, and there is an extensive area of sand martin nests in the relatively freshly exposed sheer face to the immediate north of the dene.

4. Comparison with Previous Assessment

The previous formal walkover inspections across the whole study frontage were undertaken in Summer 2020.

Beach levels along the frontage north of the River Wear were similar to 2020, covering some defects at the toe of structures which have been previously reported.

Many structures were identified as being in fair, poor or very poor condition in 2020 and these findings remain valid in most locations where such grading was applied. However, some of the worst affected areas are subject to planned capital schemes (subject to necessary permissions and licences).

Within the Port of Sunderland, repairs to structures damaged by storms identified in 2018 have been undertaken and generally appear to be in good condition. There is continuing significant deterioration in some areas.

5. Problems Encountered and Uncertainty in Analysis

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

Access to inspect the assets around the Port of Sunderland was arranged with Sunderland City Council. Parts of some assets within the Port of Sunderland could not be accessed for Health & Safety reasons, e.g. overtopping waves, falls from height. All structures were inspected from the deck and it is recommended that a programme of vessel-based inspections (and if necessary underwater inspections) is undertaken by the Council to inform their ongoing maintenance and capital investment regimes in the port.

6. Conclusions and Recommended Actions

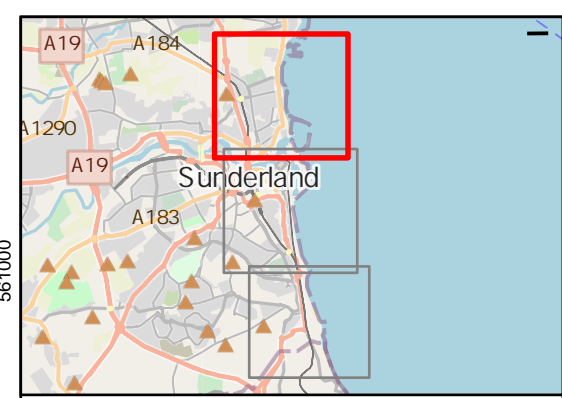
Further to the visual inspection of all assets, specific conclusions and recommendations for individual assets are given in **Appendix B**.

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

- Coastal Asset location
- NFCDD Asset Number

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Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 1 - Map 1
COASTAL ASSET LOCATIONS
Sunderland City Council Frontage

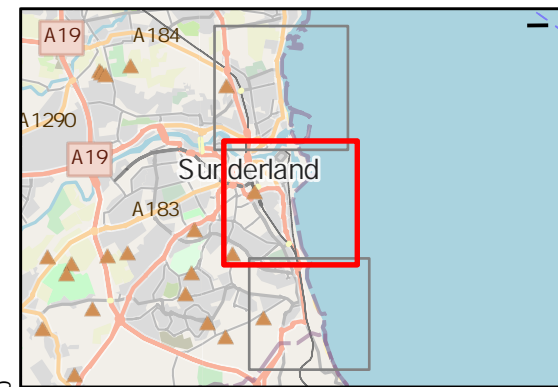
Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:20,000

Co-ordinate system: British National Grid





Legend

- Coastal Asset location
- NFCDD Asset Number

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Figure 1 - Map 2

COASTAL ASSET LOCATIONS

Sunderland City Council Frontage

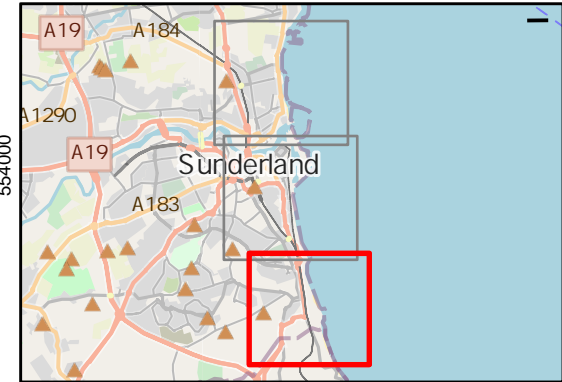
Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:20,000

Co-ordinate system: British National Grid





Legend

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North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 1 - Map 3

COASTAL ASSET LOCATIONS

Sunderland City Council Frontage

Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:18,000

Co-ordinate system: British National Grid



Appendix B Asset Condition & Recommendations

Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspection Date	Inspection Comments for 2022	Overall Condition	Worst Condition	Residual Life (Years)	Recommendations	Urgency
121AB901B0602C01		Undefended frontage	Undefended frontage		609.3	29/06/2022	Similar to 2020: Beach backed by dunes in north which appear stable in front of coastal slope. Switches to eroding cliff at northern boundary.	2	2	>20	Continue to monitor	Routine
121AB901B0603C01	CPSE-220/6901/01	Concrete wall to promenade and to main coast road	Wall		551.6	29/06/2022	Walkway landward of sea wall replaced with recent concrete finish surface along entire length. Concrete wall in north: cracking and spalling to promenade wall below coping along significant lengths, rear revetment has some damage e.g. at picnic area. Masonry wall in south: some damage to coping blocks in north, coping blocks recently installed at south. Minor damage to new coping observed at southernmost extent.	3	4	11-20	Repair cracks and spalling on face of concrete wall	Routine
121AB901B0603C02	CPSE-220/6902/01	690201 Masonry wall badly cracked over 30m section, possible settlement or undermining	Wall		172.4	29/06/2022	Cope stones recently replaced, and walkway landward of seawall replaced with exposed concrete exposed aggregate finish surface. Minor leakage through face of wall, occasional cracked blockwork. 1 No. riser of access steps damaged. Cracking and rust staining above outfall structure.	3	3	11-20	Repair cracking/damage, investigate leakage and locally repoint.	Routine
121AB901B0603C03	CPSE-220/6903/02	Masonry wall, recurve concrete coping and parapet wall	Wall		164	29/06/2022	Similar to 2020: Some open joints between masonry blocks. Cracks in bullnose in many places and cracking in crest wall. Corrosion on landward side from previous seat fixings. At access steps, handrail replaced and algal growth removed recently.	3	4	11-20	Infill cracks and repoint locally	Routine
121AB901B0604C01	CPSE-220/6904/01	Concrete encasement to old wall in good condition. Highly reflective wall effecting beach levels to North.	Wall		88.6	29/06/2022	Signs of localised chloride attack/staining in face of encasement wall. Recent infill section adjacent Seaburn Terrace in good condition. Landward concrete retaining wall and prom surfacing in fair condition. No change since 2020.	3	3	>20	Repair local damage/spalling	Routine
121AB901B0604C02	CPSE-220/6905/03	Masonry wall with concrete coping. Concrete splash wall/grouted rubble revetment / natural slopes to rear.	Wall		528.1	29/06/2022	Seawall in fair condition. Heavy algal growth down face of wall at surface water outlets north of Parsons Rocks. Recent void repairs appear to be holding however there are other smaller embryonic voids visible. Asphalt surface of promenade above seawall generally in fair condition with some uneven sections and surface cracks. Coping locally abraded/spalled although generally in fair condition. Remains of former access steps south of Parsons Rocks breaking up with blockwork debris on foreshore. Handrail at steps south of Parsons Rocks heavily corroded at base. Damage to coping at southern steps and on slipway.	3	3	>20	Repair/repoint damaged coping. Investigate and repair void under promenade.	Routine
121AB901B0605C01	CPSE-220/6906/01	Concrete block wall above masonry wall cladding high cliff. Crest of wall 12.4mODN. Some blocks cracked	Wall		323.7	29/06/2022	High masonry wall above beach in fair condition. Some localised mortar loss in low masonry wall, localised abrasion damage in cope, occasional cracked blocks. Section of missing blocks has been repaired however lateral open joint remains and requires repointing.	3	3	>20	Infill cracks and repoint where required.	Routine
121AB901B0605C02	CPSE-220/6907/01	Concrete encasement of seawall. Masonry wall at southern extent.	Wall		418	29/06/2022	Seawall generally in good condition with some cracking and open joints. Damage to coping in masonry wall. Northernmost steps opposite Smugglers Inn require repairs to the risers and treads, southernmost steps have been repaired, repairs appear to be holding.	2	3	>20	Undertake localised repairs to cracks, joints and steps.	Routine
121AB901B0702C05	CPSE-220/6908/01	Masonry wall with concrete coping running into Roker Pier.	Wall		161.9	29/06/2022	Masonry walls at root of Roker Pier in good condition. Some localised mortar loss and abrasion of blockwork. Several sections of localised mortar loss on landward (pier) side, most notably between coping stone and crest of wall.	2	3	>20	Localised repointing	Routine

Asset NFCDD Reference Number	Alternative Asset Reference	Description of Asset (As recorded in NFCDD)	Asset Type (As recorded in NFCDD)	Asset Location description (As recorded in NFCDD)	Asset Length (m)	Inspection Date	Inspection Comments for 2022	Overall Condition	Worst Condition	Residual Life (Years)	Recommendations	Urgency
121AB901B0702C04	CPSE-220/6909/01	Roker Pier: Masonry and concrete structure protects harbour and retains beach to north.	Breakwater		1579	29/06/2022	Pier and lighthouse generally in good condition. Concrete deck surface completed in 2014. Handrailing recently replaced. Localised mortar loss below coping on north face above Roker Beach, occasional vertical cracking.	2	3	>20	Localised repointing and blockwork repairs. Monitor	Routine
121AB901B0702C01	CPSE-220/6910/02	Intermittent concrete splash wall.	Wall		201.8	29/06/2022	Similar to 2020: Wall generally in fair condition. Some spalling and abrasion of front face. Several horizontal cracks concrete in face of walls, with some spalling between cracks.	3	4	11-20	Repointing and infill spalled sections. Monitor cracking to deckslab.	Routine
121AB901B0702C02	CPSE-220/6911/03	New splash wall behind car park except over short section where wall is advanced. Rock armour revetment fronting concrete seawall.	Wall		228.4	29/06/2022	Similar to 2020: Rock revetment placed in front of splash wall. Coping and promenade surface in good condition, face of wall not visible behind rock armour. Rock revetment in good condition with even crest profile and good interlock. Vegetation growth in rock armour at south end.	2	2	>20	Monitor, manage vegetation growth in rock armour.	Routine
121AB901B0702C03		Masonry and concrete pier structure. Access limited.	Breakwater		480.8	29/06/2022	Recent breach to Old North Pier infilled with rock armour and grout. Voids in north face infilled with grout. Void noted towards toe on northern side, missing blocks at seaward end and on southern side. At "Rats Corner" section upstream, localised damage to concrete coping, sheet piles not sufficiently visible for inspection. Opening in fencing has been repaired.	4	4	11-20	Full inspection / survey of structure / confirm future strategy. Review security of unsafe structure.	Routine
121AB901B0703C03	CPSE-220/6912/02	Armoured toe to grouted revetment	Armour	NZ41065810, NZ41035824	187.8	19/05/2022	Similar to 2020. Rock armour loosely placed with some towards toe and lacking interlock, slab shaped surface profile. Evidence of movement and potential void forming at southern end. Crest section of rock grouted with concrete has some localised damage to rocks and cracked grout. Several rocks detached from grout mattress at crest. Evidence of overtopping particularly at southern end, where rock armour appears depleted and there is settlement of grassland to rear of defence crest. Asset in poor condition overall.	4	4	1-5	Review overtopping performance of structure. Consider placement of additional rock armour and repair suspected overtopping damage.	Urgent
121AB901B0703C02	CPSE-220/6913/01	Masonry Quay wall. Development land to rear and crest wall above.	Wall	NZ41195785, NZ41085812	307.8	19/05/2022	Similar to 2020: wave overtopping has caused further erosion to high level berm, seaward slope of berm eroded back to crest in localised areas. Coping of wall appears in fair condition, with cracking observed in rear face allowing vegetation growth. Missing blocks observed at northern (outer) end of structure similar to 2020. Overtopping has also broken up concrete apron on landward side of wall.	4	4	1-5	Reprofile embankment and place rock armour on seaward side to prevent further erosion of embankment. Alternatively crest wave return wall could be constructed. Repair missing blocks at northern end of wall. Minor repairs to concrete apron and coping stone.	Urgent
121AB901B0703C01	CPSE-220/6914/01	New South Pier, precast concrete and concrete bed footing founded to rock. Inspection and maintenance on a regular basis.	Breakwater	NZ41205777, NZ41575846	1625.7	19/05/2022	Storm damage from 2018 has been repaired, including: sections of lower deck concrete slabs and coping blocks. Extensive damage to cope stones on landward side of upper wall. Navigation light structure and concrete base in good condition. Several large blocks remain missing at roundhead. 2No. open chambers identified in 2018 remain covered. Upper deck of breakwater not inspected at seaward end due to fall from height risk. Localised damage to access steps. Damaged deck slabs have been repaired and are in fair condition. One recent in-situ cut contraction joint to reduce crack propagation in deckslab. No inspection of seaward face possible without boat.	3	4	11-20	Undertake full survey/underwater inspection. Replace missing blocks at seaward end, repair damage throughout structure.	Routine
121AB901B0801C03	CPSE-220/6915/01	Masonry wall undermined in poor condition. Docks behind.	Wall	NZ41305757, NZ41205777	229.4	19/05/2022	Extensive repairs to deckslab and reinstatement of splash wall. New deckslabs in good condition, slight depressions noted in alternate slabs. Splash wall in very good condition. Replacement precast concrete coping stone in very good condition. Masonry facing of wall in similar condition to 2020: small area of rock remains at area where void identified in 2010 inspection. Approx. 6 No. blocks are missing from middle of wall and there appears to be open joints of approx. 10m length section. Capital works are proposed to construct 215m long rock armour revetment in front of asset.	2	3	11-20	Undertake capital scheme to increase resilience of asset and reduce risk of damage to masonry fronted wall.	Routine
121AB901B0801C02	CPSE-220/6916/01	Rock and rubble armour in good condition.	Armour	NZ41485737, NZ41305757	282.6	19/05/2022	Similar to 2020. Rock armour in fair overall condition. Generally even profiling however profile at northern end is notably steep. Demolition waste and debris mixed in. Slightly uneven crest. Embankment to rear has been reprofiled and is in good condition.	3	3	11-20	Continue to monitor	No Repairs
121AB901B0801C01	CPSE-220/6917/01	Concrete groyne in state of collapse.	Wall	NZ41475736, NZ41535740	141.5	19/05/2022	Similar to 2020. Structure remains in a collapsed state. Landwards section of asset integrated with rock armour. Remains will have limited effect on sediment transport and waves. One section of groyne appears at risk of toppling in short to medium term.	5	5	0	Confirm asset as redundant	No Repairs

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121AB901B0801C06	CPSE-220/6917/02	Rubble revetment.	Revetment	NZ41545719, NZ41475736	181.9	19/05/2022	Similar to 2020: rock revetment in fair condition. Generally even profiling at southern end with relatively good interlock, some localised steeper sections particularly at northern end. Sheet pile structure exposed towards southern end where there are gaps in rock armour.	3	4	>20	In-fill gaps in rock armour as required, continue to monitor.	Routine
121AB901B0801C05		Rubble revetment.	Revetment	NZ41685704, NZ41545719	217.5	19/05/2022	Similar to 2020. Stacked revetment of rock armour at crest fronted by various concrete/masonry/sheet pile derelict structures with scattered blocks of concrete and armour stone and debris. Development of land to the rear is ongoing.	4	4	>20	Review defence requirements for any new developments.	Routine
121AB901B0801C07	CPSE-220/6925/01	Derelict breakwater made irregularly from masonry blocks, concrete, bag work and rubble. Section and type varies greatly along length.	Breakwater	NZ41675703, NZ41635709	86	19/05/2022	Similar to 2020 poor to very poor condition. Extensive abrasion, cracking and spalling of concrete. Exposed reinforcement present throughout structure. Most northerly abutment on seaward face has become detached from pier and appears likely to topple. Landward side of pier backed by rubble armour which is in poor condition.	4	5	<5	Full survey. Significant repair works required, consider replacement or requirement for pier in wider strategy.	Urgent
121AB901B0801C04	CPSE-220/6918/02	Rock toe to old harbour wall.	Apron	NZ41685703, NZ41755698	184.5	19/05/2022	Derelict structure in similar condition to 2020 inspection. Heavily abraded deck and walls, exposing reinforcement. Roundhead failed. Extensive spalling and cracking of concrete on all sides of pier. Continuing loss of material from end of pier, however extent of undercutting appears similar to 2020 (approx. 4m).	5	5	<10	Strategic review of South Outlet defence requirements	Urgent
121AB901B0801C08	CPSE-220/6926/01	Random rubble tipped into old dock to fill in front of buried quays.	Revetment	NZ41495697, NZ41675703	205.1	19/05/2022	Similar to 2020 inspection. Mainly demolition rubble in fair condition, no defined crest or profile. Some apparent erosion gullies present on crest, potentially due to surface water runoff from land behind. Some displacement of rubble due to wave overtopping of old North East Pier.	3	4	11-20	Strategic review of South Outlet defence requirements, consider constructing formal revetment	Routine
121AB901B0802C07	CPSE-220/6927/02	Random brick rubble tipped to slope above piling.	Revetment	NZ41465686, NZ41495697	199.3	19/05/2022	Similar to 2020 . Sheet pile wall is heavily corroded (crumbles when touched). Rubble backing behind piled wall in fair condition. Rubble backfill in old dock basin seaward of piling with sandy foreshore between piles and rubble.	4	4	6-10	Consider within strategy for South Outlet defences	Routine
121AB901B0802C06	CPSE-220/6928/01	Partial rubble infilling of old dock. Slope variable	Revetment	NZ41515688, NZ41635689	166.6	19/05/2022	Similar to 2018. Rubble infill of former dock consisting mainly of demolition waste such as broken concrete slabs. In poor condition.	4	4	6-10	Consider within strategy for South Outlet defences. Consider topping up or constructing rock revetment.	Routine
121AB901B0802C05	CPSE-220/6929/03		Breakwater	NZ41515679, NZ41685692	449.2	19/05/2022	SW Breakwater in derelict condition. Significant new void developed in landward face, structure now entirely undermined and risk of breach imminent. Many blocks missing and displaced from landward face. Unable to inspect seaward face of breakwater. Many large deck slabs are missing as in previous inspections. Large scale movement of foundations towards northern end of wall on landward side.	5	5	<5	Strategic review consider realignment landward and/or replace with revetment.	Urgent
121AB901B0802C04	CPSE-220/6919/03	Splash wall set back from main crest and with a crest of 8.0 mODN.	Splash Wall	NZ41175644, NZ41515679	511.2	19/05/2022	Similar to 2020. Spalling and corrosion marks in upper deck slabs and sea wall. Some coping stones along upper deck have been abraded. Section of lower deck slab missing towards northern end. Some sealant is missing between slabs in upper deck. Pile wall at toe appears corroded, some areas where sheet piles have become detached from concrete. Boat survey required for survey of sheet pile wall. Splash wall and upper deck are undercut at south end adjacent to asset 121AB901B0802C03.	3	4	11-20	Inspect piles from boat/diver. Replace sealant between slabs. Repairs to southern transition needed urgently.	Routine
121AB901B0802C03	CPSE-220/6920/04	Rubble placed to top of seawall.	Bank	NZ41085631, NZ41175644	163.4	19/05/2022	Temporary remedial works undertaken since previous inspection. Northern end of seawall is collapsed leading to significant wash out of material behind the defence line. Since 2020, 1T-3T rock armour has been placed in a previously reported void. Remainder of seawall is failing along majority of length. Demolition waste / rubble placed on and behind crest. Rock armour toe fronting the retaining wall is in poor condition, lacking interlock with several displaced rocks. Seaward face of concrete boundary wall between STW and demolition rubble appears in good condition, however there is potential for undermining of foundations due to overtopping. Major capital works proposed to reduce risk of coastal erosion and wave overtopping. Works proposed include construction of rock armour breakwater, new concrete deckslabs and sheet pile wall.	5	5	<5	Undertake capital scheme to repair/replace asset. Add rock armour to increase level of protection to failing seawall.	Urgent

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121AB901B0802C02	CPSE-220/6921/02	Splash wall with crest to 7.35mODN	Splash Wall	NZ41095615, NZ41085631	152.9	19/05/2022	Similar to 2018. Some rock armour is too small/placed too steeply so has been displaced causing damage to concrete wall. Uneven crest height of rock armour as rock displaced. Damage to crest and coping, particularly towards south, with crack and gaps between slabs, and some exposed reinforcement.	4	4	6-10	Top up rock armour and reprofile. Repair damage to coping and deck slabs.	Urgent
121AB901B0802C01	CPSE-220/6922/03		Splash Wall	NZ41135564, NZ41125616	616.9	19/05/2022	Similar to 2020: Missing section of coping at southern end. Many sections of crest wall are heavily spalled/rust stained. Some sections of splash wall have recently been replaced. Concrete apron in poor condition with significant spalling/cracking of the concrete. Surface water drain outfalls have degraded, and surface water discharges into fill material behind seawall, likely washout occurring. Sealant absent between some coping and deck slabs. Sheet pile wall at toe of sea wall is heavily corroded and abraded with holes. Several missing masonry blocks at toe of wall in northern corner. Several gaps in rock armour at northern corner.	4	4	6-10	Intrusive investigation to investigate cause of settled slabs combined with inspection of toe for undermining. Part of remediation of voiding and undermining could be undertaken by placing rock armour in front of sea wall. Replace sealant between deck slabs and coping. Repair surface water drainage outfalls to ensure adequate drainage from landward side of upper splash wall.	Urgent
121AB901B0803C02	CPSE-220/6923/08	Concrete sea wall with rock armour at toe	Sea Wall	NZ41285473, NZ41175565	1056.9	10/06/2022	Seawall and rock armour similar to 2020. Concrete facing at some sections of wall heavily abraded exposing reinforcement. Some spalled concrete along length of promenade. Sheet pile wall is heavily corroded/abraded along toe of wall. Sections of failed railings along slipway and promenade due to corrosion/debris impact damage. Further deterioration of Port Boundary groyne nosing noted, change noted in 2018 does not appear to have worsened in 2020 or 2022. Toe of northern slipway heavily abraded exposing reinforcement. Gap in defence height at Port Boundary groyne. Several concrete groynes are abraded at inner end exposing rebar. Access gaps in some groynes. Rock armour fronting sea wall is in fair condition. Concrete sewage outflow pipe in fair condition with sheet piles heavily corroded. South of the car park, pebbles / shingle have accumulated on promenade and on the rear slope behind secondary wall, likely due to overtopping.	3	4	11-20	Review historic drawings to determine importance of sheet piles, consider extending rock armour. Replace sealant between coping slabs. Repair defective concrete elements. Repair hand railing.	Routine
121AB901B0804C01	CPSE-220/6801/01	Eroding cliff to agricultural land.	Cliff - south of Ryhope Dene	NZ42335082, NZ41985195	1193.4	10/06/2022	Active erosion along length upper cliff not vegetated. Access to Ryhope Nook has been lost due to erosion. Steps at Ryhope Dene appear in fair condition.	4	4	>20	Monitor slope failure with regards to cliff top footpath. Formally abandon access at Ryhope Nook.	No repairs
121AB901B0804C02		Undefended Frontage	Undefended Frontage	NZ41985195, NZ41445383	2040.3	10/06/2022	Continuous slope failures in upper cliff and mud slides evident. Lower rock cliff eroding although some protection from cobble beach. Ryhope Village access steps undercut and may be at risk of outflanking to the south due to a large void in the cliff face.	4	4	>20	Monitor slope failure with regards to cliff top footpath.	Routine

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121AB901B0804C03	CPSE-220/6924/01	Eroding cliff over full length but only 0.6Km reported to be in need of work.	Undefended Frontage	NZ41445383, NZ41415437	614.9	10/06/2022	Small-scale but regular ongoing slumping in soft material that overlays the solid geology base. Occasional caves and arches formed at the base of the cliffs. Many recent mudslides / slips of upper cliff onto beach.	4	4	>20	Monitor slope failure with regards to cliff top footpath.	Routine

	= condition worse than 2020
	= condition improved since 2020