Note / Memo

HaskoningDHV UK Ltd.
Water

To: Robin Siddle
From: Tom Ward & Nick Cooper
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Subject: **Cell 1 Coastal Asset Condition Summary_v2**

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1 Introduction

The following note sets out summary statistics of the Cell 1 coastal defence data held in the SANDS database that has been established under the Cell 1 Regional Coastal Monitoring programme.

Cell 1 covers the coastline between St. Abb's Head in Scotland and Flamborough Head in East Yorkshire, covering the councils of Scottish Borders (part), Northumberland, North Tyneside, South Tyneside, Sunderland, County Durham, Hartlepool, Redcar & Cleveland, Scarborough and East Riding of Yorkshire (part).

The Cell 1 Regional Coastal Monitoring programme covers the majority of this frontage, but the short section between St. Abb's Head and the Scottish Border is covered separately by Scottish Borders Council as part of management of its wider overall frontage, and the section between Speeton and Flamborough Head is likewise covered separately by East Riding of Yorkshire Council in management of its wider overall frontage.

2 Source of data and status

The asset length, location and categorisation data summarised in this note is based on analysis of the Cell 1 coastal defence data held on a SANDS Cell 1 Regional Coastal Monitoring database.

This database holds the findings from all walkover coastal inspections undertaken to date as part of the Cell 1 Regional Coastal Monitoring programme for both defended and undefended lengths of shoreline, except for the sea cliffs of the Cleveland and North Yorkshire coasts between Saltburn and Speeton. These cliffs are considered in a different manner to the sea cliffs elsewhere within Cell 1 due to their geology and geomorphological behaviour (essentially predominantly landslip-prone cliffs), with these data being held on a separate GIS database.

The inspection data for each of the asset lengths is from the summer/autumn 2020 walkover surveys.

Note that the SANDS database also holds historical inspection data and photographs for most assets, with inspections typically having been undertaken at 2 year intervals since 2002 (Scottish Border to River Tyne) or 2008 (River Tyne to Speeton). In addition to the regular inspections, SANDS also holds data for other ad-hoc inspections such as post storm inspections for a few assets and in some cases baseline data from MAFF's Coast Protection Survey of England surveys undertaken in the 1990s.

3 Overall Summary Data

Overall lengths of frontages recorded in the database are provided in Table 1. Note that the lengths reported will not necessarily be precisely the same as the overall coastline length for each authority as some assets, such as harbour breakwaters, are dual sided and, in some locations, inner and outer faces are recorded as separate assets but in other locations both sides are defined the same asset.

Local Authority	Defended frontage length (km)	Natural shoreline length (km)	Total frontage length (km)
Northumberland County Council	31	118	149
North Tyneside BC	10	3	13
South Tyneside MBC	5	10	15
Sunderland City Council	12	4	16
Durham County Council	12	8	20
Hartlepool Council	16	5	21
Redcar and Cleveland BC	8	14	22
Scarborough Borough Council	19	81	100
Grand Total	**113**	**243**	**356**

Table 1 - Cell 1 asset frontage lengths by local authority area [2020]
Note: lengths are rounded to the nearest kilometre

4 Summary asset condition data by local authority area

For built assets the condition grading classification held in the database is from walk-over inspections undertaken in accordance with the Condition Assessment Manual (EA, 2011). An extract of the grading classification for built assets is presented in Table 2.

Grade	Rating	Description
0	Redundant	Redundant defence no longer required or replaced by alternative asset ref
1	Very Good	Cosmetic defects that will have no effect on performance.
2	Good	Minor defects that will not reduce the overall performance of the asset.
3	Fair	Defects that could reduce performance of the asset.
4	Poor	Defects that would significantly reduce performance of the asset. Further investigation needed.
5	Very Poor	Severe defects resulting in complete performance failure.

Table 2 - Condition assessment grading for man-made assets

For natural assets, such as sand dunes, sea cliffs and coastal slopes, the grading and rating system shown in Table 2 has been used in the inspections for most areas (with the description modified to reflect the fact that natural, rather than built assets are being considered), but for the predominantly landslip-prone cliffs in Cleveland and North Yorkshire the five-point activity scale shown in Table 3 has in preference been used.

Rank	Activity Class	Description
1	Dormant	Protected cliff line or landslide complex with no visible evidence of landslide activity.
2	Inactive	Relict cliffs or landslides with vegetated slopes and localised erosion of the toe or failure of the headscarp.
3	Locally	Retreating cliff line with localised small landslides or areas of erosion.
4	Partly	Retreating cliff line with very common smaller-scale landslides or areas of intense erosion.
5	Totally	Retreating cliff line almost entirely affected by large-scale landsliding or intense erosion.

Table 3 - Activity scale grading for natural coastal assets in Cleveland and North Yorkshire

The following tables provide a breakdown of the length and condition of coastal assets in each local authority area for both defended and undefended frontages based on the 2020 walkover inspections. The results of previous inspections are also retained in the tables for purposes of comparison.

Note that assets with a condition category given as blank are either redundant or have not been inspected within the Cell 1 programme, for example this includes some port breakwaters and quay walls where there was no public access.

Northumberland

Northumberland County Council												
Condition	Defended 2020		Undefended 2020		Totals2020		Totals2018		Totals2016		Totals2014	
	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets
1	1.4	6	0.3	2	1.8	8	1.1	5	0.5	5	0.3	3
2	10.6	66	75.7	75	86.4	141	85.2	145	80.8	136	79.8	135
3	14.5	85	31.7	61	46.2	146	47.7	139	50.3	148	51.8	152
4	3.2	22	9.5	23	12.7	45	13.2	50	15.8	52	15.0	52
5	1.0	5	0.3	1	1.3	6	1.3	5	1.5	6	2.0	6
(blank)	0.2	2	-	-	0.2	2	1.3	2	1.3	2	1.3	2
Grand Total	30.9	186	117.6	162	148.5	348	149.6	346	150.2	349	150.2	350

Table 4 - Summary asset data for Northumberland County Council

Data Clarifications

- *Note: In the years between 2014 and 2020 some assets were changed (e.g. split or merged) and/or included or omitted from the inspections, reflecting the slight variations at times in overall totals between successive years.*
- *Two additional assets, 121AA901A3401C03 & 121AA901A3401C04, totalling 0.2km in length, were added in 2020 that correspond to a buried rock revetment to the south of Lynemouth Power Station. The assets buried beneath tipped colliery spoil could not be inspected and so have been included in the "blank" column. Their inclusion is for awareness to show as the colliery spoil erodes, the Power Station will remain defended. This supersedes the two assets, with combined length of 1.3km, included in the "blank" column for previous years,*
- *Asset number 121AA901A1701C32, in Beadnell, changed from undefended to defended due to construction of rock revetment.*

Generally, there has been an ongoing overall improvement in the condition of coastal defence assets within the Northumberland County Council frontage. This is evidenced by the decrease in the number of assets in 'very poor' or 'poor' condition between 2014 (58), 2016 (58), 2018 (55) and now the 2020 walkover inspections (51). The number of assets in 'very good' condition is also at the highest it has been (8) in recent records.

The majority of the improvements in the condition of assets can be attributed to the implementation of capital schemes across the region. Between 2018 and 2020, there have been further capital schemes at Seahouses Main Pier and Little Shore Wave Basin. Furthermore, assets at Beadnell, Amble, Boulmer, Alnmouth, Blyth South Beach and Holy Island have all also been subject to capital schemes since 2014.

Despite this positive outlook, there are some sections of defence that have suffered from further deterioration since the previous inspections, most notably at: Green's Haven (concrete apron), Newbiggin Point (upper coastal slope), Hawks Cliff (cliff), North Blyth (gabions) and Blyth South Beach (groynes and Meggies Burn). As a result, although it appears that the condition of Northumberland frontage as a whole is slowly improving, the area would benefit from additional maintenance budget or further capital schemes to improve the considerable number of assets still in poor to very poor condition.

Moreover, it is expected that significant maintenance and repairs will need to be undertaken across the frontage as structures deteriorate or suffer further storm damage, with capital schemes also needed at appropriate intervals.

North Tyneside

North Tyneside Council												
Condition	Defended 2020		Undefended 2020		Totals2020		Totals2018		Totals2016		Totals2014	
	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets
1	0.3	2	0.0	0	0.3	2	0.5	3	0.2	1	0.2	1
2	6.5	30	1.2	5	7.7	35	7.2	33	6.1	31	5.7	31
3	2.5	18	1.8	9	4.3	27	4.3	28	5.6	32	6.4	33
4	0.6	3	0.0	0	0.6	3	0.4	2	0.4	2	0.1	1
5	0.0	0	0.0	0	0.0	0	0.5	1	0.5	1	0.5	1
(blank)												
Grand Total	9.8	53	3.0	14	12.8	67	12.9	67	12.8	67	12.8	67

Table 5 - Summary asset data for North Tyneside Council

Since 2018, there have been generally relatively few changes in the condition of coastal defence assets within the North Tyneside frontage, with 96% of the assets in 'fair' or above condition (the same percentage as in 2018).

The condition of assets within the North Tyneside Council frontage improved considerably prior to 2018. This is in a large part thanks to the capital works undertaken as part of the Whitley Bay Seafront Master Plan. Since 2016 significant capital and maintenance works have been undertaken on the North and Central Promenades, particularly around the Spanish City complex. Further works could be observed happening in 2020, where the Southern Promenade Seawall Strengthening Scheme was ongoing. This project will involve infilling the redundant stairwell to create a continuous seawall, which will help reduce the risk of future storm damage.

A number of ongoing concerns raised 2018 have not been addressed, including the condition of a rock stack near Tynemouth North Point, which has the potential to topple imminently, and the southern tie-in of the Tynemouth Pool wall. The St. Mary's Island causeway was not inspected in 2020 due to the COVID-19; however, it was previously reported to have some defects. It is believed improvements to the causeway are planned as part of the final phase of the Whitely Bay Seafront Master Plan.

As per the previous inspections, it can be concluded that maintenance budgets in North Tyneside are generally being utilised effectively and pro-actively by prioritising the revenue spend on areas flagged up by the 2-yearly walkover inspections undertaken as part of the Cell 1 Regional Coastal Monitoring programme. It is however recognised that there a number of assets that may not be getting the required attention because of prioritisation elsewhere or awaiting future stages of capital works, specifically the assets mentioned above.

The ongoing capital works which form part of the Whitley Bay Seafront Masterplan will continue to assist in improving the condition of some assets in the near future where current ongoing maintenance is barely keeping pace with the abrasion and damage that is being caused (e.g. St. Mary's Island causeway), but other areas will continue to rely on both pro-active, prioritised maintenance, and re-active post-storm repairs as necessary to sustain their condition.

South Tyneside

South Tyneside Council												
Condition	Defended 2020		Undefended 2020		Totals 2020		Totals 2018		Totals 2016		Totals 2014	
	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets
1	0.9	4	0.0	0	0.9	4	0.9	4	1.1	5	1.1	6
2	0.5	3	0.6	2	1.1	5	1.3	7	1.2	6	4.2	6
3	4.0	7	3.4	6	7.4	13	6.9	12	6.9	12	3.5	11
4	0.0	0	4.6	4	4.6	4	3.4	3	3.4	3	3.9	3
5	0.1	1	0.9	1	1	2	0.9	2	0.9	2	0.8	1
(blank)									0	0	0.0	0
Grand Total	5.4	15	9.5	13	15	28	13.5	28	13.5	28	13.5	27

Table 6 - Summary asset data for South Tyneside Council

Data Clarifications

- *In 2018 and 2016, a decision was made post analysis, to manually reduce length of grade 3 undefended by 1km and grade 4 undefended by 0.5km to be consistent with the 2014 survey (undertaken by a different consultant). However, in 2020 it has been decided to reflect the total lengths recorded in the SANDS database for ease of future reporting.*

When analysing the data at face value, it appears there has been an overall slight deterioration in the condition of coastal defence assets within the South Tyneside Council frontage. The percentage of assets graded in 'good' or 'very good' condition has reduced to 32% in 2020, from 39% in 2018 and from 43% in 2014.

This said, the results are somewhat misleading due to the timing of the inspection. At the time of the walkover inspection, Redwell Steps/Lifeguard Station in Marsden Bay remained in very poor condition. However, in the time between the inspection and the writing of this supporting summary note, the structure has been demolished and replacement steps are planned to be installed in late 2021, allowing the winter period to naturalise the newly exposed section of cliff before access is reinstated. As a result, it is envisaged that the condition of this asset will have significantly improved by the time of the next inspections in 2022. With this asset condition improving, it will mean no defended assets within the South Tyneside frontage will be graded worse than in 'fair' condition, suggesting the maintenance budgets in South Tyneside are generally being utilised effectively.

In recent years a number of assets have also benefited from substantial capital investments. These include the Littlehaven sea wall and promenade scheme which was completed in 2014 and the rock revetment at Trow Quarry which continues to remain effective in preventing the wash-out of backing waste material.

There are no major emerging concerns along South Tyneside's frontage, with the exception the ongoing expansion of the sinkholes and caves in Whitburn Coastal Park. A new sinkhole, taking the total number to four, has opened along Whitburn coastal path since 2018. It is highly recommended that further monitoring and, if appropriate, works are undertaken to guarantee public safety in this area.

[In late January 2021, a local rock fall occurred in Marsden Bay, to the south of the Redwell Steps, following a period of prolonged intense rainfall and cycles of freeze-thaw due to severe weather

conditions. It is estimated that the rockfall resulted in a slip of 310.9m^3 of material with a maximum depth of cliff loss of 3.6m].

Local rock fall at Marsden Bay, January 2021

Sunderland

Sunderland City Council												
Condition	Defended 2020		Undefended 2020		Totals 2020		Totals 2018		Totals 2016		Totals 2014	
	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets
1	0.0	0	0.0	0	0.0	0	0	0	0.0	0	0.0	0
2	2.4	4	0.6	1	3.0	5	3.0	5	4.6	6	4.6	6
3	6.1	14	0.0	0	6.1	14	4.3	12	6.5	18	5.6	17
4	2.4	9	3.8	3	6.3	12	8.1	14	6.4	11	7.1	11
5	0.9	4	0.0	0	0.9	4	1.0	4	0.8	3	0.9	4
(blank)							0.0	0	0.0	0	0.0	0
Grand Total	11.9	31	4.4	4	16.3	35	16.3	35	18.3	38	18.3	38

Table 7 - Summary asset data for Sunderland City Council

Data Clarifications

- *Note: In the years between 2014 and 2020 some assets were changed (e.g. split or merged) and/or included or omitted from the inspections, reflecting the slight variations at times in overall totals between successive years.*
- *Asset 121AB901B0804C01 extends across parts of both Sunderland and County Durham frontages. For the purpose of this summary analysis this asset has been presented in the Sunderland summary table.*

There has been a slight overall improvement to condition of assets along the Sunderland City Council frontage, largely due to the repair works undertaken to several structures within the Port of Sunderland since 2018, particularly the New South Pier, Stonehill seawall and deck south of New South Pier that all received significant storm damage pre-2018.

This said, there a number of assets within the port that remain in 'poor' to 'very poor' condition and continue to be a concern. Most notably the collapsed wall fronting the Sewage Treatment Works that has significantly deteriorated, resulting in a large wash out of material. Emergency works are recommended to repair the scour hole whilst a capital scheme is developed to replace the asset.

Of all the assets along Sunderland City Council's frontage, only 14% are in 'good' or 'very good' condition. Whilst it is recognised that this figure is skewed by the high proportion of deteriorating assets in the port, it does reinforce that many assets throughout the frontage would benefit from additional maintenance repairs.

County Durham

County Durham Council												
Condition	Defended 2020		Undefended 2020		Totals2020		Totals2018		Totals2016		Totals2014	
	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets
1	0.0	0	0.0	0	0.0	0	0.0	0	0.6	1	0.6	1
2	0.8	3	1.2	2	2.0	5	2.1	5	1.5	4	1.7	7
3	10.0	19	7.2	4	18.4	23	17.2	23	17.2	23	16.1	16
4	0.5	2	0.0	0	0.5	2	0.5	2	0.5	2	0.5	2
5	0.0	0	0.0	0	0.0	0	0	0	0	0	0.0	0
(blank)	0.5	3			0.5	3	0.5	3	0.5	3	1.4	7
Grand Total	11.9	27	8.3	6	20.3	33	20.3	33	20.3	33	20.2	33

Table 8 - Summary asset data for County Durham Council

Data Clarifications

- *Asset 121AB901B0804C01 extends across parts of both Sunderland and County Durham frontages. For the purpose of this summary analysis this asset has been presented in the Sunderland summary table only to prevent double-counting. However, with much of the asset's length being within County Durham, the asset is also discussed in the County Durham walk-over reports.*

The County Durham Council frontage remains predominantly unchanged in overall condition grading and behaviour patterns since the previous inspection, with few major problems observed. As reported previously, most asset remain in 'good' or 'fair' condition, with 85% of the assets falling in these categories for the 2020 inspections.

The area has benefited from significant recent investment such as the North Dock Regeneration Project at Seaham Harbour.

The colliery spoil beaches along the frontage continue to erode landwards, but do not warrant a condition downgrade at this time. It appeared that the greatest erosion was occurring to the bay south of Horden Point. A large slip failure has occurred through the coastal footpath between Shot Rock and Loom. All the colliery spoil beaches should be monitored closely to understand when the cliffs will start to re-activate.

High beach levels along Seaham sea wall at the time of the 2020 inspections concealed a number of defects that have previously been reported, including exposed reinforcement at the southern beach access ramp and the outflanking of the short concrete wall to the north. The damaged/missing flap valves remained visible and were first noted as being in this condition in 2016.

At face value, the 'good' and 'fair' condition of the majority of most assets within this frontage indicates that maintenance budgets are being utilised reasonably effectively. This said, it appears several areas do require further maintenance and/or capital investment, particularly Seaham seawall which has continued to deteriorate unchecked. As reported previously, there is a significant risk that without intervention the condition of some historic assets such as the Seaham Harbour South Pier and Dawdon Dene Outfall may deteriorate further rapidly.

Hartlepool

Hartlepool Borough Council												
Condition	Defended 2020		Undefended 2020		Totals 2020		Totals 2018		Totals 2016		Totals 2014	
	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets
1	2	6	0.0	0	2	6	0.7	2	1.2	4	1.2	4
2	4.3	6	3.0	3	7.3	9	7.3	9	8.1	12	8.0	12
3	4.4	15	2.1	1	6.4	16	6.1	17	8.8	27	8.7	26
4	2.5	5	<0.1	1	2.6	7	2.1	4	2.4	4	2.5	5
5	0.1	1	<0.1	1	0.1	1	0.2	2	0.1	1	0.1	1
(blank)	2.2	10	0.0	0	2.2	10	4.2	15	<0.1	1	0.1	1
Grand Total	15.5	43	5.2	6	20.6	49	20.6	49	20.6	49	20.6	49

Data Clarifications

- *Asset 1221C901C0302C02 changed from defended to undefended in 2020. Formerly this was characterised by a 'wall' of brick-filled welded-mesh gabions, however this structure has since failed leaving an undefended section in its place.*
- *A large number of assets are blank because they are privately-owned and cannot be inspected due to access restrictions. These are mostly (9) around the Port of Hartlepool (Victoria Harbour). In 2018, five further assets could not be inspected due to ongoing construction of the Hartlepool Headland scheme. With those works completed, the assets have been moved to 'as built' condition in 2020.*

Table 9 - Summary asset data for Hartlepool Borough Council

At first glance, the overall condition of assets within the Hartlepool Borough Council frontage appear to have improved somewhat since 2018. This is in a large part thanks to the capital works undertaken around the Hartlepool Headland. The completion of this scheme takes the percentage of assets in 'good' or 'very good' condition across the frontage up to 30%.

Despite the initial positive outlook, there are numerous sections of defence that have suffered from further deterioration since the previous inspections and are at the point of requiring significant maintenance and/or a capital scheme. This is most notably at Middleton Beach (gabion baskets and blockwork wall), Spion Kop (undefended frontage backed by new development), Hartlepool Marina gate (concrete block revetment) and the North Pier.

The ongoing deterioration of these assets indicates that there is a possible shortfall in maintenance resource or that capital schemes are planned and awaited. All assets in 'poor' and 'very poor' condition should be monitored rigorously to guarantee public safety and maintain their functionality as coastal defences. It is noteworthy that two separate maintenance activities were observed along the frontage during the 2020 inspections; namely maintenance of North Gare Breakwater and repointing of the Town Wall.

Redcar & Cleveland

In Redcar & Cleveland (and also in Scarborough Borough), the cliffs are considered in a different manner to those elsewhere within Cell 1 due to their geology and geomorphological behaviour (essentially predominantly landslip-prone cliffs). This means that as well as being stored in SANDS, the cliff condition data for Redcar & Cleveland is also held within a separate GIS database focused on individual 'cliff behaviour units'.

The summary table below (Table 10) therefore only presents condition data from SANDS on the built assets along the defended frontages within the borough, with the condition of individual 'cliff behaviour units' considered separately thereafter (see Figure 1).

Built Assets (Defended Frontages)

Redcar & Cleveland Borough Council								
Condition	Defended 2020		Defended 2018		Defended 2016		Defended 2014	
	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets
1	2.7	6	2.7	6	2.7	6	2.7	6
2	1.1	4	1.1	4	1.2	5	0.7	4
3	2.4	11	2.4	11	2.5	12	2.4	11
4	1.9	3	1.9	3	1.8	2	2.3	4
5	0	0	0	0	0	0	0.0	0
(blank)					0	0	0	0
Grand Total	8.1	24	8.1	24	8.2	25	8.2	25

Table 10 - Summary asset data for Redcar & Cleveland Borough Council

Data Clarifications

- *In the years between 2014 and 2020 some assets were changed (e.g. split or merged) and/or included or omitted from the inspections, reflecting the slight variations at times in overall totals between successive years.*

The condition of coastal defence assets within the Redcar & Cleveland Council frontage remains unchanged since the 2018 walkover inspections, with no assets justifying a condition change within this period. As reported previously, most assets remain in 'good' or 'fair' condition (65%). The capital investment schemes along the Redcar town frontage and in the village of Skinningrove remain in good condition.

The most major changes since 2018 exist along undefended cliffs, especially along Cowbar Lane where the rapid erosion of the upper cliff continues. In this location laser scanning of the cliffs is undertaken to improve understanding of rates and locations of change. There are also several built assets which retain a poor condition grading, most notably the South Gare Breakwater the condition of which has continued to deteriorate and is noted as having numerous significant defects.

Although present maintenance budgets appear sufficient to retain the grading of the assets, additions funds would be beneficial to start improving the assets and address those which have remained in 'poor' condition for some time, notably South Gare Breakwater.

Natural Assets (Undefended Frontages)

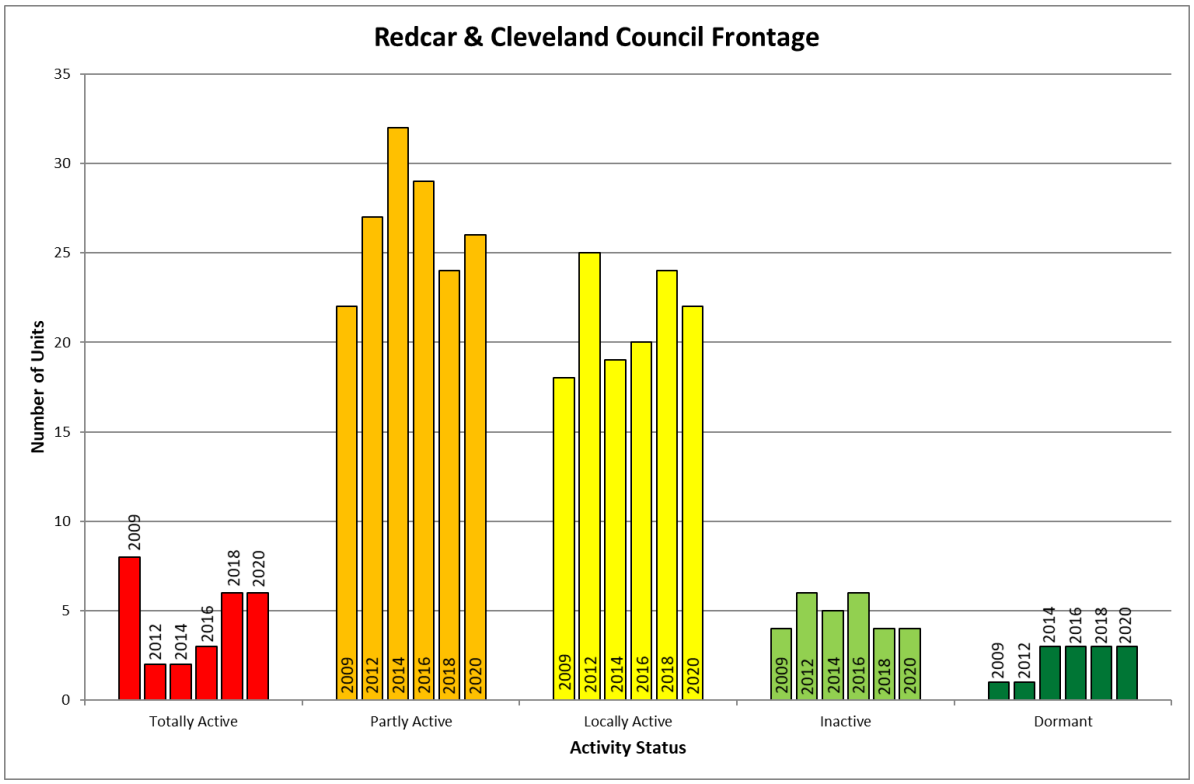

Figure 1 - Frequency of cliff activity along the Redcar & Cleveland frontage 2010 to 2020

Figure 1 shows the clear majority (96%) of cliff units have retained their condition since 2018, highlighting the lack of significant change along the natural Redcar & Cleveland frontage during this time. The units that have changed have been upgraded from Locally Active to Partly Active, suggesting that local slips have occurred. However, it acknowledged that some of this change may be attributable to different interpretations of classifications gradings by different inspectors (or the by the same inspections on successive surveys).

[In late January 2021, a local landslip occurred at Huntcliff (below). This was following a period of prolonged intense rainfall and cycles of freeze-thaw due to severe weather conditions. The slip caused a section of the Cleveland Way to become impassable].

Scarborough Borough

In Scarborough Borough (and also in Redcar & Cleveland), the cliffs are considered in a different manner to those elsewhere within Cell 1 due to their geology and geomorphological behaviour (essentially predominantly landslip-prone cliffs). This means that the cliff condition data for Scarborough is not held within SANDS but instead it is held within a separate GIS database focused on individual 'cliff behaviour units'.

The summary table below (Table 11) therefore only presents condition data from SANDS on the built assets along the defended frontages within the borough, with the condition of individual 'cliff behaviour units' considered separately thereafter (in Figure 2).

Built Assets (Defended Frontages)

Scarborough Borough Council								
Condition	Defended 2020		Defended 2018		Defended 2016		Defended 2014	
	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets	Length (km)	No. of assets
1	2.1	3	0.8	2	0.8	1	0.0	0
2	4.2	31	3.5	25	3.5	22	3.5	21
3	10.3	83	12.4	94	12.5	98	12.0	100
4	2.3	17	1.6	12	2.4	13	3.8	18
5	0.2	4	<1	2	0.2	4	0.2	2
(blank)	0	0	0.7	5	0.4	4	0.2	1
Grand Total	19	138	19.1	140	19.8	142	19.8	142

Table 11 - Summary asset data for Scarborough Borough Council

Data Clarifications

- *In the years between 2014 and 2020 some assets were changed (e.g. split or merged) and/or included or omitted from the inspections, reflecting the slight variations at times in overall totals between successive years.*

The Scarborough Borough Council frontage is comprised of a large number of structural defence assets, generally associated with coastal towns and villages, interlinked by natural (undefended) cliff units.

The overall condition grade of the built assets in 2020 remains similar to that recorded in 2018, with many of the assets in good or fair condition. However as with previous inspections, there are a large number that require minor repair works, a few where more significant works are recommended and several locations where urgent attention to provide further, more detailed, assessments are recommended.

The majority of the improvements in the condition of assets can be attributed to the implementation of capital schemes across the region. Since 2018, there have been further capital scheme completed at Flat Cliffs (time-limited works), Scarborough Spa (slope stabilisation scheme), Whitby Piers (refurbishment scheme) and Scarborough Clock Café (slope stabilisation scheme). These schemes can be added to the growing list of recent projects, including Sandsend Road coast protection and slope stabilisation scheme, the Scarborough RNLI lifeboat station and Runswick Bay coast protection scheme that have all contributed to the improvement of assets within the region. A further capital scheme in Robin Hood's Bay is expected to improve the condition of coastal defence assets in this area by the time of the next inspections in 2022.

There is extensive evidence of previous repairs on many structures (some of which are in need of further repair), which suggests a relatively high, and ongoing, maintenance commitment. Many of these are re-active repairs to storm-damage, especially to coping walls, and a large proportion of the assets remain in only 'fair' or worse condition. Due to this it may be expected that maintenance and repair commitments will continue to be demanding simply in order to sustain the present condition of these structures, many of which are of Victorian age.

Natural Assets (Undefended Frontages)

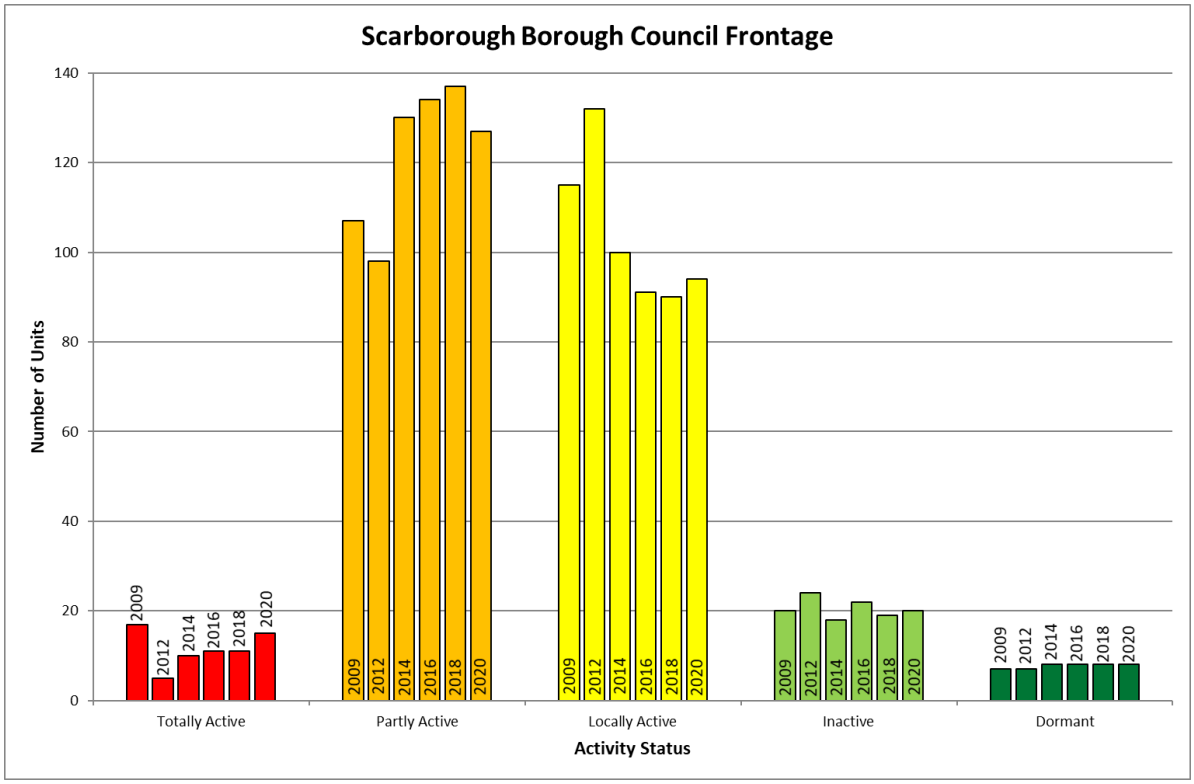

Figure 2 - Frequency of cliff activity along the Scarborough BC frontage 2009 – 2020

Figure 2 shows that the clear majority (approximately 90%) of the 265 cliff behaviour units surveyed during the 2020 walkover retained the same activity status as they had in 2018. This indicates little significant change along the frontage. Of those units that have changed, the majority have changed from Partly to Locally Active (or *vice versa*). A small in increase in 'Totally Active' units can be observed since 2018, however all of these units are located within the immediate vicinity of previously reported sustained levels of high erosion (Tenants Cliff, Filey Brigg and Hunmanby Gap).

Two high profile rock falls have occurred since the 2018 inspections, one at Staithes where tragically a young girl was killed in August that year (shortly after the inspections) and another at Boggle Hole near Whitby in 2020. Cliffs of this nature are expected to experience some localised occurrences of activity and it is not possible to remove this risk completely.

[In late January 2021, landslips occurred at Port Mulgrave (below, left) and Runswick Bay (below, right), following a period of intense rainfall and cycles of freeze-thaw due to severe weather conditions].

5 Conclusion

This note summarises overview findings from the Cell 1 walkover inspections that were undertaken in 2020. It is concluded that following the 2020 inspections, the net condition of assets across the Cell 1 frontage has remained generally relatively consistent with findings from the most recent inspections in 2018. Several large-scale capital schemes which have been completed in recent years have contributed to the improvement in condition of some assets, however a number of assets remain in 'poor' or 'very poor' condition. Therefore, in order to ensure public health and safety, and to ensure effective management of coastal defence assets throughout the frontage, ongoing monitoring and maintenance activities are essential in addition to planned capital schemes across the frontage.