Note / Memo

HaskoningDHV UK Ltd.
Water

To: Robin Siddle
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Subject: **Cell 1 Coastal Asset Condition Summary**

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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.

An Excel format download of relevant sections from the database was generated in March 2017. 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 2016 walk over survey.

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 be 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 the same asset.

Local Authority	Defended frontage length (km)	Natural shoreline length (km)	Total length (km)	Number of assets
Northumberland County Council	35.4	114.8	150.2	349
North Tyneside BC	9.3	3.5	12.8	67
South Tyneside MBC	5.6	7.9	13.5	27
Sunderland City Council	11.9	6.4	18.3	38
Durham County Council	13.2	7.1	20.3	33
Hartlepool Council	15.5	5.1	20.6	49
Redcar and Cleveland BC	8.2	21.0	29.1	33
Scarborough Borough Council	19.8	80.3	100.1	178
Grand Total	118.8	246.0	364.9	774

Table 1 - Cell 1 asset frontage lengths by local authority area

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

Table 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 2016 walkover inspections. The 2014 results 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		Undefended		Totals 2014		Totals 2016	
	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets
1	0.3	3	0.2	2	0.3	3	0.5	5
2	12.8	66	68	70	79.8	135	80.8	136
3	14.2	82	36.1	66	51.8	152	50.3	148
4	5.6	33	10.2	19	15.0	52	15.8	52
5	1.2	5	0.3	1	2.0	6	1.5	6
(blank)	1.3	2	0.0	0	1.3	2	1.3	2
Grand Total	35.4	191	114.8	158	150.2	350	150.2	349

Table 4 - Summary asset data for Northumberland County Council

The increase in the number of assets in Northumberland in ‘very good’ or ‘good’ condition was due to implementation of capital schemes (e.g. Boulmer) or notable repairs (e.g. Holy Island pier and causeway). Some of the repairs were from funds other than the FCERM team’s revenue budgets (e.g. highways budgets) or were made by third parties (e.g. Seahouses Harbour Commissioners). Therefore,

whilst it may appear at face value that the maintenance budgets are currently sufficient to sustain, although not necessarily improve, condition of the assets in Northumberland, this is slightly misleading and the actual picture suggests that with around 60% of the assets in 'fair' or worse condition, maintenance or repairs will need to be increased in the future as the structures deteriorate or suffer storm damage, with capital schemes also needed at appropriate intervals. Indeed, some structures are currently in failed condition (Church Hill) or continue to deteriorate (e.g. Warkworth Harbour North Pier).

North Tyneside

North Tyneside Council								
Condition	Defended		Undefended		Totals 2014		Totals 2016	
	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets
1	0.2	1	0.0	0	0.2	1	0.2	1
2	5.0	26	1.1	5	5.7	31	6.1	31
3	3.2	23	2.4	9	6.4	33	5.6	32
4	0.4	2	0.0	0	0.1	1	0.4	2
5	0.5	1	0.0	0	0.5	1	0.5	1
(blank)	0.0	0	0.0	0	0.0	0	0	0
Grand Total	9.3	53	3.5	14	12.8	67	12.8	67

Table 5 - Summary asset data for North Tyneside Council

The maintenance budgets in North Tyneside are 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. As such, pro-active maintenance and re-active repairs are currently generally sustaining, although not necessarily improving, condition of the assets in North Tyneside according to a face value analysis of the statistics. It should, however, be noted that some areas have benefited in recent years from significant repairs (e.g. Southern Lower Promenade, Cullercoats North Pier) or capital schemes (e.g. Trinity Road Seawall outflanking, Cullercoats South Pier) and as such their condition improved prior to the 2014 inspections. Capital works planned as part of the Whitley Bay Seafront Masterplan will 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, Whitley Bay Central Promenade), 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		Undefended		Totals 2014		Totals 2016	
	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets
1	1.1	5	0.0	0	1.1	6	1.1	5
2	0.7	4	0.5	2	4.2	6	1.2	6
3	3.8	6	3.1	6	3.5	11	6.9	12
4	0.0	0	3.4	2	3.9	3	3.4	2
5	<0.1	1	0.9	1	0.8	1	0.9	2
(blank)	0.0	0	0.0	0	0.0	0	0	0
Grand Total	5.6	16	7.9	11	13.5	27	13.5	27

Table 6 - Summary asset data for South Tyneside Council

Whilst at face value it appears from the statistics that maintenance budgets are generally sustaining, although not necessarily improving, condition of the assets in South Tyneside, it should be pointed out that some defects have not been rectified for such a long time that the situation is now beyond the remit of maintenance or repair and requires more significant investment. These include the caves and sink hole at Whitburn Coastal Park and the access steps and former Lifeguard Station at Redwell Steps in Marsden Bay, where there are interlinked issues of very poor structural condition and instability of the adjacent cliffs.

Sunderland

Sunderland City Council								
Condition	Defended		Undefended		Totals 2014		Totals 2016	
	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
2	4.0	5	0.6	1	4.6	6	4.6	6
3	5.1	16	1.4	2	5.6	17	6.5	18
4	2.0	7	4.4	4	7.1	11	6.4	11
5	0.8	3	0.0	0	0.9	4	0.8	3
(blank)	0.0	0	0.0	0	0.0	0	0.0	0
Grand Total	11.9	31	6.4	7	18.3	38	18.3	38

Table 7 - Summary asset data for Sunderland City Council

One of the reasons that there is little overall change in condition of assets within Sunderland between 2014 and 2016 is because notable investment was made in repairs to many of the assets which were heavily damaged by storms in 2013-14. These repairs are remaining effective. However, in considering future maintenance requirements, it should be noted that there remain many defects that require attention at Old North Pier and on many of the assets within the Port of Sunderland.

County Durham

County Durham Council								
Condition	Defended		Undefended		Totals 2014		Totals 2016	
	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets
1	0.6	1	0.0	0	0.6	1	0.6	1
2	0.3	2	1.2	2	1.7	7	1.5	4
3	11.3	19	5.9	4	16.1	16	17.2	23
4	0.5	2	0.0	0	0.5	2	0.5	2
5	0.0	0	0.0	0	0.0	0	0	0
(blank)	0.5	3	0.0	0	1.4	7	0.5	3
Grand Total	13.2	27	7.1	6	20.2	33	20.3	33

Table 8 - Summary asset data for County Durham Council

The increase in number of assets within County Durham in only 'fair' condition suggests that maintenance budgets may be insufficient to sustain the standard of assets. There are several areas were defects have been reported but untreated for some considerable time (e.g. Seaham seawall), again potentially suggesting insufficient resource.

Hartlepool

Hartlepool Council								
Condition	Defended		Undefended		Totals 2014		Totals 2016	
	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets
1	1.2	4	0.0	0	1.2	4	1.2	4
2	5.1	9	3.0	3	8.0	12	8.1	12
3	6.7	26	2.1	1	8.7	26	8.8	27
4	2.4	3	0.0	1	2.5	5	2.4	4
5	0.1	1	0.0	0	0.1	1	0.1	1
(blank)	<0.1	1	0.0	0	0.1	1	<0.1	1
Grand Total	15.5	44	5.1	5	20.6	49	20.6	49

Table 9 - Summary asset data for Hartlepool Borough Council

Whilst the statistics remain relatively unchanged overall, there are several areas were defects have previously been reported but have remained untreated for some considerable time (e.g. Spion Kop), potentially suggesting insufficient maintenance resource. There were some major capital works ongoing at the time of the 2016 inspections (e.g. Hartlepool Headland, Town Wall, North Gare Breakwater) which should be reflected in some assets receiving improved condition ratings in the 2018 walkover inspection regime.

Redcar & Cleveland

Redcar and Cleveland Council								
Condition	Defended		Undefended		Totals 2014		Totals 2016	
	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets
1	2.7	6	0.0	0	2.7	6	2.7	6
2	1.2	5	5.3	2	6.0	6	6.5	7
3	2.5	12	1.8	1	4.2	12	4.3	13
4	1.8	2	3.1	2	4.2	5	4.9	4
5	0	0	0.0	0	0.0	0	0	0
(blank)*	0	0	10.7	3	12.0	4	10.7	3
Grand Total	8.2	25	21.0	8	29.1	33	29.1	33

Table 10 - Summary asset data for Redcar & Cleveland Council

Some areas benefited from recent capital investment (e.g. Redcar seafront, Skinningrove) which means that they are in sufficiently good condition to not require significant maintenance at the present time. Other areas, however, have more long-standing issues (e.g. Cowbar) or assets that remain in poor condition and would undoubtedly benefit from increased maintenance spend.

Scarborough

Scarborough Borough Council								
Condition	Defended		Undefended		Totals 2014		Totals 2016	
	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets	Length (km)	No of assets
1	0.8	1	0.0	0	0.0	0	0.8	1
2	3.5	22	0.0	0	3.5	21	3.5	22
3	12.5	98	0.3	1	12.4	101	12.8	99
4	2.4	13	1.5	4	5.3	22	3.9	17
5	0.2	4	0.3	2	0.5	4	0.5	6
(blank)*	0.4	4	78.2	29	78.4	30	78.6	33
Grand Total	19.8	142	80.3	36	100.1	178	100.1	178

Table 11 - Summary asset data for Scarborough Borough Council

Several assets had deteriorated to ‘very poor’ condition at the time of the 2016 inspections, but upon reporting of the defects immediate repair work was undertaken to remedy the problems. These repairs are not included in the above statistics because they occurred after the records were made. One recently completed scheme at Sandsend has improved the asset condition to ‘very good’. A number of forthcoming capital schemes (e.g. Scarborough Spa, Whitby Piers, Runswick Bay, Filey Flat Cliffs, Robin Hood’s Bay) will help significantly improve the condition of some major assets in future years. Elsewhere, however, numerous previous repairs are evident 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.

Note: Data on the condition of the undefended lengths of sea cliffs in Redcar & Cleveland Council and Scarborough Borough Council is not held in SANDS so Tables 10 and 11 do not include condition data for the undefended lengths of sea cliff within these two authority areas. The cliffs in these two authority areas are subdivided into cliff behaviour units, the condition of which are rated in accordance with Table 3 and stored within a GIS, rather than SNADS.

Figures 1 and 2, taken from the 2016 walkover inspection reports, summarise the condition of the cliffs.

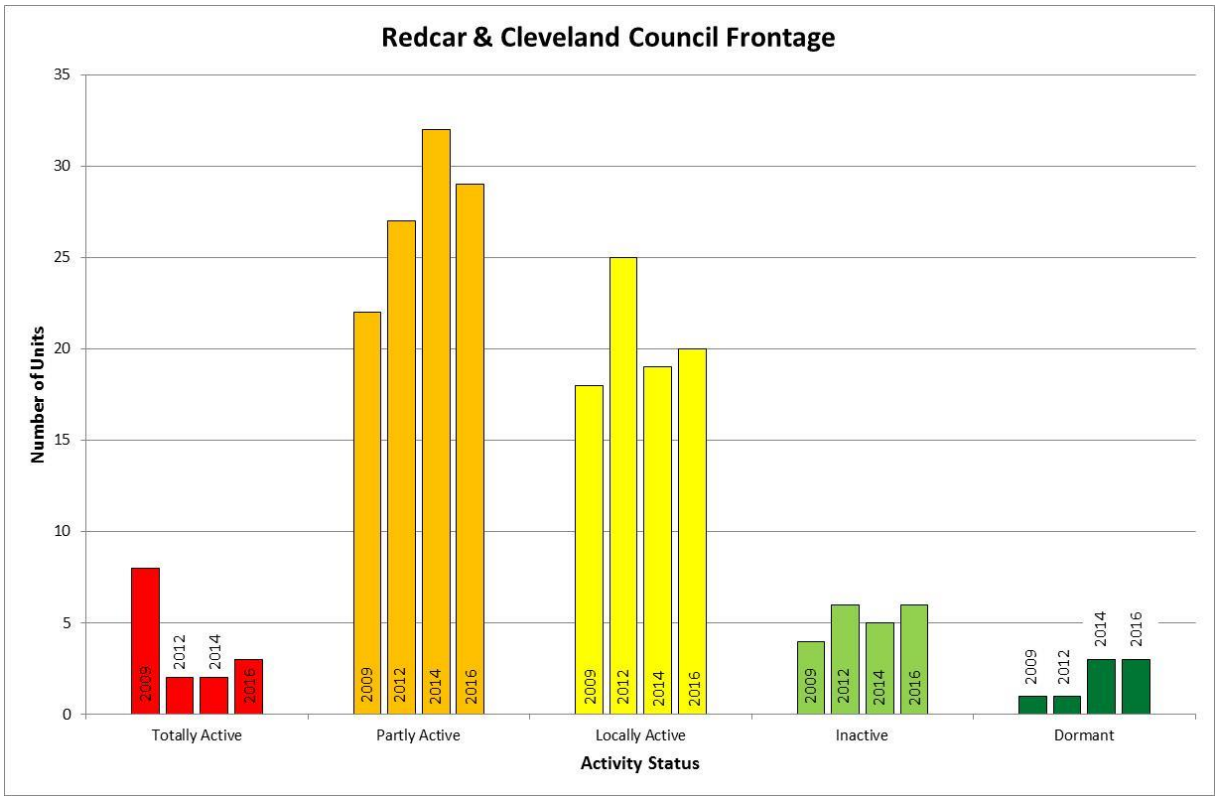

Figure 1 - Frequency of cliff activity along the Redcar & Cleveland frontage 2010 to 2016

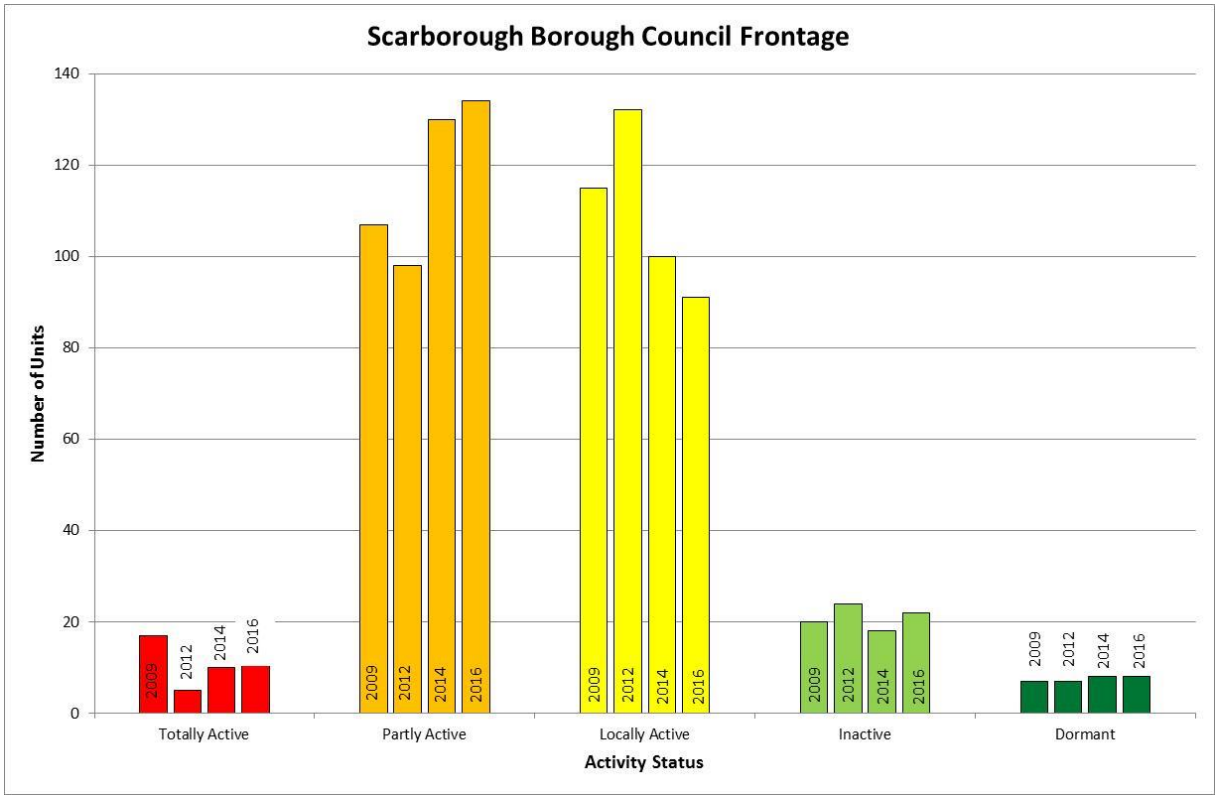

Figure 2 - Frequency of cliff activity along the Scarborough BC frontage 2009 – 2016