

THE BRIEF FOR ANALYTICAL SERVICES

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| Scheme Title | Cell 1 Regional Coastal Monitoring Programme |
| Employer's Address | Scarborough Borough Council, St Nicholas Street, Scarborough YO11 2HG |
| Nominated Employer's Representative | Mr Robin Siddle |
| Contract Title | Cell 1 Analytical Services (2016 – 2021) |
| Purpose of Services | <p>The services will be used to undertake the following tasks associated with coastal data collection as part of the Cell 1 Regional Coastal Monitoring Programme:</p> <ul style="list-style-type: none"> • Quality Assurance and Data Management • Suitable storage of incoming survey data and analytical reports • Processing and plotting of data to enable analysis and interpretation • Inspections of natural and built coastal frontages • Analysis and interpretation of data and reporting on findings |
| Tender Submission Date | See the invitation to tender letter |
| Contract Completion Date | 2021 |
| Known Hazards | <p>The majority of the services do not involve any special hazards other than those normally associated with office working.</p> <p>The coastal inspection surveys will involve managing hazards related to working near the coast in publicly accessible areas including intertidal zones on beaches, and working adjacent to cliffs and landslides.</p> |
| Site Conditions/ Restrictions, Access and Public Relations | All public relations activities are to be undertaken via the Employer |

1. GENERAL

Scarborough Borough Council is acting as the Lead Authority on the Cell 1 Analytical Services (2016 – 2021) Contract on behalf of Northumberland County Council, North Tyneside Council, South Tyneside Council, City of Sunderland Council, Durham County Council, Hartlepool Borough Council, Redcar and Cleveland Borough Council, and Scarborough Borough Council.

The Contract is one component of the Cell 1 Regional Coastal Monitoring Programme, which will run from autumn 2016 to summer 2021, covering various data collection activities along the coastline between St. Abb's Head in Scottish Borders and Flamborough Head in North Yorkshire (a frontage known as known as "Coastal Cell 1").

Coastal monitoring and associated analysis has previously been undertaken on a consistent basis across the frontage between St. Abb's Head and the River Tyne since 2002 and the whole of Cell 1 since autumn 2008. The Cell 1 monitoring was coordinated during an initial three year contract,

which ran from 2008 until spring 2011. Further contracts were issued in 2011 which have continued the coastal monitoring and analysis through to 2016.

The present Contract is for a five year extension of the analytical services associated with:

- Beach profile, beach topographic and cliff top survey data
- Walkover inspections of the condition of the natural shoreline and coastal defences
- Wave and tide data
- Bathymetric and Sea Bed survey data
- Aerial photography and LiDAR survey data

2. SCOPE OF SERVICES

2.1 Background

The following data will be provided to the Contractor direct from the relevant Surveying Contractor.

(a) Full and Partial Measures Survey Data

Table 1 shows the data that will be provided at each full and partial measures survey. Full measures data will be provided once in the autumn/winter of each of 2016, 2017, 2018, 2019 and 2020. Partial Measures data will be provided in the spring/summer of each of 2017, 2018, 2019, 2020, 2021. It should be noted that a bespoke sand area survey is undertaken at both Full and Partial Measures at Newbiggin Bay.

| Work Package | Survey Unit | Full Measures (Autumn) | | | Partial Measures (Spring) | | |
|-------------------------------|-----------------------------|--------------------------|------------------------|-----------------------------------|---------------------------|------------------------|-----------------------------------|
| | | Number of Beach Profiles | Number of Topo Surveys | No. of cliff Monitoring Locations | Number of Beach Profiles | Number of Topo Surveys | No. of Cliff Monitoring Locations |
| TNE01 Northumber -land | Sandstell Point (Spittal A) | 10 | 1 | - | 4 | 1 | - |
| | Spittal (Spittal B) | 4 | - | - | 2 | - | - |
| | Goswick Sands | 6 | - | - | 2 | - | - |
| | Holy Island | 8 | 1 ¹ | - | 2 | - | - |
| | Bamburgh | 1 | - | - | - | - | - |
| | Beadnell Village | 2 | - | - | 1 | - | - |
| | Beadnell Bay | 9 | - | - | 5 | - | - |
| | Embleton Bay | 2 | - | - | - | - | - |
| | Boulmer | 2 | - | - | 2 | - | - |
| | Alnmouth Bay | 10 | 1 | - | 3 | 1 | - |
| High Hauxley and Druridge Bay | 9 | - | - | 8 | - | - | |

¹ Survey of causeway and flanks

| Work Package | Survey Unit | Full Measures (Autumn) | | | Partial Measures (Spring) | | |
|-------------------------------------|--|--------------------------|------------------------|-----------------------------------|---------------------------|------------------------|-----------------------------------|
| | | Number of Beach Profiles | Number of Topo Surveys | No. of cliff Monitoring Locations | Number of Beach Profiles | Number of Topo Surveys | No. of Cliff Monitoring Locations |
| | Lynemouth Bay | 7 | - | 1 Topo Line | 2 | - | 1 Topo Line |
| | Newbiggin Bay ² | 30 | 1 | - | 30 | 1 | - |
| | Cambois Bay | 7 | - | 1 Topo Line | - | - | 1 Topo Line Survey |
| | Blyth South Beach | 6 | - | - | 6 | - | - |
| <i>SUB-TOTAL for Northumberland</i> | | <i>113</i> | <i>4</i> | <i>2 Topo Lines</i> | <i>67</i> | <i>3</i> | <i>2 Topo Lines</i> |
| TNE02 North Tyneside | Whitley Bay | 5 | 1 | - | 5 | - | - |
| | Cullercoats Bay | 1 | - | - | 1 | - | - |
| | Tynemouth Longsands | 3 | 1 | - | 3 | 1 | - |
| | King Edward's Bay | 1 | - | - | 1 | - | - |
| <i>SUB-TOTAL for North Tyneside</i> | | <i>10</i> | <i>2</i> | <i>-</i> | <i>10</i> | <i>1</i> | <i>-</i> |
| TNE03 South Tyneside | Littlehaven Beach | 4 | 1 | - | 4 | 1 | - |
| | Herd Sands | 5 | 1 | - | 3 | - | - |
| | Trow Quarry (Including Frenchman's Bay) | 4 | | 6 VMPs | 4 | - | 6 VMPs |
| | Marsden Bay | 4 | - | - | 2 | - | - |
| <i>SUB-TOTAL for South Tyneside</i> | | <i>17</i> | <i>2</i> | <i>6 VMPs</i> | <i>13</i> | <i>1</i> | <i>6 VMPs</i> |
| TNE04 Sunderland | Whitburn Bay | 11 | 1 | - | 3 | - | - |
| | Sunderland Harbour and Docks | 11 | - | - | - | - | - |
| | Hendon to Ryhope (including Halliwell Banks) | 36 | 1 | 35 VMPs | 13 | - | 35 VMPs |

² Also includes a bespoke 'Edge of Sand' survey at both Full and Partial Measures

| Work Package | Survey Unit | Full Measures (Autumn) | | | Partial Measures (Spring) | | |
|---|--------------------------------|--------------------------|------------------------|-----------------------------------|---------------------------|------------------------|-----------------------------------|
| | | Number of Beach Profiles | Number of Topo Surveys | No. of cliff Monitoring Locations | Number of Beach Profiles | Number of Topo Surveys | No. of Cliff Monitoring Locations |
| <i>SUB-TOTAL for Sunderland</i> | | 58 | 2 | 35 VMPs | 16 | - | 35 VMPs |
| TNE05 County Durham | Featherbed Rocks | 1 | - | - | 1 | - | - |
| | Dawdon and Seaham | 1 | - | 3 VMPs | 1 | - | 3 VMPs |
| | Blast Beach | 3 | - | - | 3 | - | - |
| | Hawthorn Hive | 1 | - | - | 1 | - | - |
| | Blackhall Colliery | 3 | - | - | - | - | - |
| <i>SUB-TOTAL for County Durham</i> | | 9 | - | 3 VMPs | 6 | - | 3 VMPs |
| TNE06 Hartlepool | North Sands and Headland | 7 ³ | 1 ⁴ | - | 7 | - | - |
| | Middleton | 1 | 1 | - | 1 | - | - |
| | Hartlepool Bay | 4 | 1 | - | 4 | - | - |
| | North Gare | - | 1 | - | - | - | - |
| <i>SUB-TOTAL for Hartlepool</i> | | 12 | 4 | - | 12 | - | - |
| TNE07 Redcar and Cleveland | Coatham Sands | 3 | 1 | - | 3 | - | - |
| | Redcar Sands | 4 | | - | 4 | 1 | - |
| | Marske Sands | 1 | | - | 1 | - | - |
| | Saltburn Sands | 1 | | - | 1 | 1 | - |
| | Cattersty Sands (Skinningrove) | - | 1 | - | - | 1 | - |
| | Staithe ⁵ | - | - | 12 VMPs | - | - | 12 VMPs |
| <i>SUB-TOTAL for Redcar and Cleveland</i> | | 9 | 2 | 12 VMPs | 9 | 3 | 12 VMPs |
| TNE08 Scarborough | Staithe ⁶ | - | - | 8 VMPs | - | - | 8 VMPs |
| | Runswick Bay | - | 1 | - | - | 1 | - |

³ 1cHN1 is in County Durham, but is reported under Hartlepool

⁴ Extended survey area once every five years. Next in 2018 – see GIS database

⁵ Site straddles R&C and Scarborough

⁶ Site straddles R&C and Scarborough

| Work Package | Survey Unit | Full Measures (Autumn) | | | Partial Measures (Spring) | | |
|----------------------------------|------------------------------|--------------------------|------------------------|---------------------------------------|---------------------------|------------------------|---------------------------------------|
| | | Number of Beach Profiles | Number of Topo Surveys | No. of cliff Monitoring Locations | Number of Beach Profiles | Number of Topo Surveys | No. of Cliff Monitoring Locations |
| | Sandsend, Uppgang and Whitby | 3 | 1 | - | 3 | - | - |
| | Robin Hoods Bay | - | 1 | 13 VMPs | - | 1 | 13 VMPs |
| | Scarborough North Bay | 5 | 1 | 1 Topo Line | 5 | - | 1 Topo Line |
| | Scarborough South Bay | 4 | 1 | 13 VMPs | 4 | - | 13 VMPs |
| | Cayton Bay | 4 | 1 | 8 VMPs | 4 | - | 8 VMPs |
| | Filey Bay | 5 | 1 | 28 VMPs | 5 | 1 | 28 VMPs |
| <i>SUB-TOTAL for Scarborough</i> | | 21 | 7 | 70 VMPs 1 Topo Line | 21 | 3 | 70 VMPs 1 Topo Line |
| GRAND TOTAL | | 249 | 23 | 126 VMPs 3 Topo Line | 154 | 11 | 126 VMPs 3 Topo Line |

(b) Wave and Tide Data will typically be provided monthly from Autumn 2016 to Summer 2021 from Waverider buoys located at:

- Newbiggin Ness
- Whitby
- Scarborough

The wave and tide data will be provided via the Channel Coastal Observatory who review and quality control data from the network of wave buoys and tide gauges deployed under the regional programmes.

(c) Aerial Photography and LiDAR Data, twice likely to be in summer 2017 and summer 2019, covering:

- St. Abb's Head to Flamborough Head

The aerial photography will include both vertical orthorectified and geofenced imagery and oblique imagery.

(d) Bathymetric and Sea Bed Survey Data covering, nominally, 807km² between Flamborough Head and Robin Hoods Bay and 689km² between Robin Hoods Bay and Redcar. These two datasets are expected to be delivered during 2016 and 2017 respectively. Further data sets for other areas in Cell 1 may become available during the programme.

2.2 Quality Assurance and Data Management

Upon receipt of the incoming survey data, metadata and associated surveyors reports, the Contractor will firstly log all incoming data/metadata/reports and then promptly and thoroughly undertake a quality control check against the Survey Contractor's brief and advise the Employer of any quality issues that arise, making a recommendation to accept or reject the data as appropriate. This is required for all incoming data and their respective metadata and surveyors reports.

2.3 Suitable storage of incoming survey data and analytical reports

Data and reports from the Cell 1 Regional Coastal Monitoring Programme are presently stored on the North East Coastal Observatory (NECO) website (www.northeastcoastalobservatory.org.uk). This has been developed and hosted by a third party Consultant on behalf of the Employer under the previous two phases of the programme. Most data are stored as digital files (including wave data). The wave and tide data is also telemetered in near real time from the three wave buoys to the Cefas WaveNet and Channel Coastal Observatory websites and relayed to the NECO website where it is available as a series of tables and graphical plots via the 'Wave Data' tab. This data is also transferred onto the Cefas WaveNet and Channel Coastal Observatory websites for similar storage and access purposes. In addition, it is possible to visualise the aerial photography and search for data using the GIS-enabled on-screen mapping.

The Contractor must propose a method for replicating, taking over hosting or using the third party Consultant to continue to host the NECO website. The Contractor will then:

- Modify the website in terms of layout and capacity to allow for its organic growth (in terms of data and report storage) between 2016 and 2021 (it was originally designed and build for a three year programme between 2008 and 2011 and is suitable for that purpose, but may become somewhat cumbersome if a further five years data and reports are uploaded).
- Upload all quality controlled data (and any associated metadata and surveyors reports, if applicable) to the website, making it accessible via the 'Search' menus and via the GIS-enabled on-screen mapping and 'shopping cart'. This is to include all beach profile, beach topographic survey, cliff-top survey lines, cliff-top survey points, aerial photography, LiDAR, wave, bathymetric and sea bed data collected from autumn 2016 to spring 2021 (as listed in Section 2.1).
- Continue to enable wave data to be tabulated and plotted in near real time as it is received via telemetry from 1st September 2016 to 31st March 2021.
- Update the 'Latest News' tab on a monthly basis when new data or reports are added
- Upload all analytical reports produced as deliverables from this Contract (as described in Section 2.5) onto the website, accessible under the 'Reports' tab.

- Upload any ancillary information or reports that the Employer may reasonably request from time to time (e.g. published papers arising from the programme), including appropriate links via the 'Links' tab.
- Provide 'help-desk' type support to any partnering authority who seeks assistance in the download of data or use of the site.
- Liaise, as and when necessary, with the Channel Coastal Observatory (CCO) and other regional observatories as part of the programme to ensure a consistent national approach and exchange of data. (Note: All data and metadata produced as part of the programme will be provided by the relevant survey contractor directly to CCO) as part of their commissions. An electronic copy of all Analysis reports should be sent to the CCO for uploading on their website.
- Provide an annual report/note highlighting the number of hits on the website along with statistics relating to what data and reports have been downloaded each month. It is the intention that this information can be used to aid the business case for seeking future grant aid to continue the monitoring programme into future phases.

2.4 Processing and plotting of data to enable analysis and interpretation

All quality controlled data will be processed and plotted as appropriate to enable suitable analysis and interpretation to be undertaken. This will involve, as a minimum:

Beach Profiles (from Full Measures Surveys and Partial Measures Surveys)

- Plotting of beach profiles from each Full Measures and Partial Measures survey from 2016 - 2021, including the sediment reference codes associated with the data
- Viewing the most recent survey alongside all previous surveys from that particular profile line. All data from autumn 2008 onwards are available (via download from the NECO website) in a standard format (which will also be used for the 2016-2021 data collection) although many profile lines have data extending back to 2002.
- Plotting an appropriately selected series of beach profiles along each surveyed section from previous survey dates in order to demonstrate patterns of change compared to each present survey. This is to include the envelope of previous change from when surveying began along a particular profile line to the present survey as well as water levels such as HAT MHWS, and MLWS.
- In appropriate circumstance (i.e. when beach changes demand, not necessarily as a routine analytical activity), calculate beach volumes per unit width to quantify changes along a particular profile line.

Beach Topographic Surveys (from Full Measures Surveys and Partial Measures Surveys)

- Create, using a GIS, a Digital Terrain Model (DTM) of the beach from each topographic survey data set provided, plotting beach contour lines at appropriate intervals.
- Compare this DTM against the preceding topographic survey to identify and plot areas of erosion and accretion of sand.
- In appropriate circumstances (*i.e.* when beach changes demand, not necessarily as a routine analytical activity), calculate beach ‘cut’ and ‘fill’ volumes and net changes to quantify areas of erosion and accretion of beach sediment between appropriate surveys.
- Where changes dictate, compare each current DTM against earlier surveys to enable longer term trends to be identified and plotted and, where appropriate, quantified.

Clifftop Surveys – Lines (from Full Measures Surveys and Partial Measures Surveys)

- Create a clifftop line for the present survey using GIS
- Compare this line against all previous surveys to identify and visualise using appropriate software the locations and rates of cliff recession

Clifftop Surveys – Points (from Full Measures Surveys and Partial Measures Surveys)

- Create a spreadsheet showing the changes over time in the distance from the Virtual Marker Point to the edge of the clifftop.
- Calculate an erosion rate for each marker point.

Sand edge surveys

- Create a sand edge line from the data provided by the survey contractor.
- Compare, using GIS, this line against all previous surveys to identify and visualise change in the position of the sand edge.

Wave Data

In addition to the plotting and tabulation of data in near real time on the NECO website (as described in Section 2.3):

- Produce tables and plots of the key wave parameters (height, period and direction)
- Undertake any other wave data processing that may add value to the analysis *e.g.* plot wave spectra and/or wave roses

Aerial Photography and LiDAR

- Compile the orthorectified aerial photography data from 2017 and from 2019 within a GIS to provide a comprehensive digital coverage of the Cell 1 frontage

- Compare within a GIS the 2017 and 2019 aerial photography against the 2010, 2013 and 2015 aerial photography (which is available for the Contractor to download from NECO) and identify and quantify locations and rates of change in the cliffs and dunes in particular, noting any other significant changes. In Redcar & Cleveland and Scarborough Borough frontages, this will necessarily consider both the toe and headscarp of landslip complexes. Cliff line positions for parts of the coast, mapped in 2010 and 2015 are available on the NECO website and we expect there to be a 1940 cliffline, mapped from orthorectified historic aerial photography available soon.
- Plot images showing changes through a comparison of aerial photographs in key hot spot areas of erosion.
- Where necessary (i.e. where aerial photographs identify notable change has occurred in the cliff or dune position) use the LiDAR data to create a Digital Terrain Model (DTM) to enable better identification and quantification of the changes. For the purposes of ensuring a consistent approach to tendering, it should be assumed at the present time that four such LiDAR-based DTMs will be required from each survey (i.e. 2017 and 2019).

Bathymetric and Sea Bed Survey

- Create, using a GIS, a Digital Terrain Model (DTM) of the sea bed from each bathymetric data set provided, plotting beach contour lines at appropriate intervals. Sediment characteristics from the sea bed characterisation survey shall also be plotted.
- Where there is coincident data, compare this DTM against the preceding bathymetric surveys (which is available for the Contractor to download from NECO) to identify and plot and, in appropriate circumstances, quantify areas of erosion and accretion of sediment. It should be noted that the previous bathymetric surveys from 2010 and 2015 were undertaken at a series of 15 no. offshore transects to the 20m sea bed contour at the following locations, linked by a shorelong swath nominally at the 20m depth contour:
 - Herd Sands, South Shields
 - Whitburn Bay
 - Salterfen Rocks
 - Blast Beach (near Noses Point)
 - Hartlepool North Sands
 - Saltburn-by-the-Sea
 - Skinningrove
 - Runswick Bay
 - Sandsend
 - West Beach, Whitby
 - Robin Hood's Bay
 - Scarborough North Bay
 - Scarborough South Bay

- Cayton Bay
 - Filey Bay.
- Compare this DTM against the preceding sea bed characterisation surveys (2010 and 2015) along each transect line (which is available for the Contractor to download from NECO) to identify and plot and areas of change in sediment composition.

2.5 Coastal Asset Inspections

The entire coastline between the Scottish Border and Flamborough Head has been divided into a number of 'asset lengths' covering the natural assets (cliffs, slopes, dunes) and built defences along the Cell 1 coastline. Each asset length is uniquely by reference numbers that were originally defined within the former National Flood and Coastal Defence Database (NFCDD).

The location of each asset length is provided in the Appendices of previous Coastal Walkover Inspection Reports which are available to download from the Download/Reports section of the North East Coastal Observatory. (www.northeastcoastalobservatory.org.uk).

For the purposes of this contract, the East Riding of Yorkshire Council's coastline between Speeton and Flamborough Head does not need to be included and therefore the surveys shall be undertaken between the Scottish Border and Speeton. The Consultant is required to undertake a Walkover Inspection Survey of each asset length, in summer 2016, 2018, and 2020 and photograph and record its condition.

Each Walkover Inspection Survey must cover all natural assets and built defences, noting that in Redcar & Cleveland and Scarborough Borough it should also cover the coastal slopes which extend some way behind the built coastal defences.

The Walkover Inspection Surveys should be undertaken by a suitably qualified Chartered Engineer (expected to be of Senior Grade or above) and/or a suitably qualified Coastal Geomorphologist/ Coastal Engineering Geologist (expected to be of Senior Grade or above) depending on the nature of the asset length under consideration (i.e. structural/natural/coastal slope).

Visits may be made between March and September in each year, although weather conditions and visibility are likely to be best over the summer months. Visits must be made at a suitable stage of the tide to identify and record any defects on all natural assets and defence lengths.

For each natural asset and built defence length a summary shall be recorded in accordance with the Environment Agency's Condition Assessment Manual (CAM) of:

- asset name, location
- description and type classification
- owner and responsibility
- survey date and inspector
- notes
- condition

- recommendations for works (maintenance or capital)
- urgency of recommendations
- residual life
- condition grade (for each element of the defence) in accordance with CAM.

Where necessary, the asset lengths shall be modified (i.e. new lengths added, some lengths merged, etc.) to reflect ‘on the ground’ changes, such as the construction of new defences or the removal of old defences. In the instance of change in asset length/location, liaison must be made with the relevant contact at the relevant local authority and / or the Environment Agency. Additionally, a GIS layer showing the revised asset lengths/locations shall be provided to the Employer in ArcGIS format.

The findings from the asset inspections are to be used to prepare a report for each local authority and to update the SANDS database of previous coastal inspection data.

2.6 Analysis and interpretation of data and reporting on findings

Full Measures Surveys

To accompany each Full Measure survey between autumn 2016 and autumn 2020, a *Full Measures Survey - Analytical Report* shall be produced separately for each local authority. Examples of the format and style to be adopted are available to download from NECO under the ‘Reports’ tab. This shall include all Full Measures Beach Profile Surveys, Beach Topographic Surveys and Clifftop Surveys (Lines and Points).

Partial Measures Surveys

To accompany each Partial Measure survey between spring 2017 and spring 2021, a *Partial Measures Survey - Update Report* shall be produced for each local authority. Examples of the format and style to be adopted are available to download from NECO under the ‘Reports’ tab. This shall include all Partial Measures Beach Profile Surveys, Beach Topographic Surveys and Clifftop Surveys (Lines and Points).

Wave and tide Data

On an annual basis a *Wave and Tide Data Analysis Report* will be produced to summarise the main wave characteristics that were recorded at the two wave buoys over the preceding year. This will also incorporate any other freely available wave data from within, or adjacent to, the Cell 1 frontage to provide a broader context. Examples of the format and style to be adopted are available to download from NECO under the ‘Reports’ tab.

Aerial Photography and Lidar Survey

To accompany each of the two surveys, an *Aerial Photography Survey Report* will be produced. An example from the 2015 aerial photography and LiDAR survey is available to download from NECO under the ‘Reports’ tab.

Bathymetric and Sea Bed Survey

To accompany this survey, a *Bathymetric and Sea Bed Sediment Survey Report* will be produced. An example from the 2010 survey is available to download from NECO under the 'Reports' tab. However, this must be considered a 'baseline' report and the reports to be issued under this contract will need to be more comprehensive, quantifying change in bathymetry and sea bed sediment composition over the five year period between successive surveys. A report using data captured in 2015 is currently in preparation and may be available as a further example during the course of the tender process.

The Contractor is expected to use information from existing sediment samples to characterise the seabed.

Asset Inspections

Following completion of the Walkover Inspection Survey of each Authority's length of frontage, the information shall be reported to that Authority. Separate reports will be produced for the following Councils:

- Northumberland County Council
- North Tyneside Council
- South Tyneside Council
- Sunderland City Council
- Durham County Council
- Hartlepool Borough Council
- Redcar & Cleveland Council
- Scarborough Borough Council.

Each report will comprise the following sections:

- Pre-amble
- Introduction (Method & Study Area)
- Overview – including key defects/ issues and any areas of deterioration/improvement since previous survey(s)
- Condition Assessment – more detailed assessment on a frontage by frontage basis using photographs and text to highlight key points (Note: for Redcar &
- Cleveland and Scarborough Borough frontages this is best presented separately for the coastal cliffs and slopes and for the coastal defences)
- Comparison with Previous Assessment(s) – to highlight areas of deterioration/ improvement since previous survey(s)
- Problems Encountered and Uncertainty in Analysis (e.g. unexpected access restrictions, etc.)
- Conclusions and Recommendations – tabulated format covering each asset length
- Appendix A – maps of Asset Locations

Additionally for Redcar & Cleveland and Scarborough Borough frontages, the reports will contain:

- Geomorphological interpretation of the cliff and slope activity status and change since the previous survey(s)
- Mapping of the cliff activity status (e.g. dormant through to totally active)

- Mapping of the change in cliff activity since the previous survey(s)

The Walkover Inspection Reports are extensively used by Local Authorities to plan their maintenance activities and identify the need for capital investment projects, so must be at a suitable level of detail. Previous reports are available from the North East Coastal Observatory website.

Asset monitoring data from the walkover inspections, with data back to 2002 in many locations are presently stored on a SANDS database, which has been set up and maintained by a 3rd party consultant on behalf of the employer. The Contractor must propose a method for continuing to maintain and update the SANDS database.

Overview Report

Towards the end of the contract, an *Overview Report* shall be prepared covering all of the data captured during the period autumn 2016 to spring 2021. This shall synthesise the key findings from all previous analysis reports (as described above) to link together findings in an interpretative manner (*i.e.* beach changes caused by particular wave characteristics, beach changes linked to sea bed responses or cliff recession, *etc.*).

An overview report for the period 2008-2011 is available via the NECO website (reports tab), which would provide a suitable indicative template for our requirements. An overview report for data captured between 2011 and 2016 is currently in preparation and may be available as a further example during the course of the tender process.

The Overview Report should cover:

- Introduction (description of the study area and of the Monitoring Programme)
- Overview of Programme findings (for each authority's frontage in turn)
- Case studies (demonstrating how each of the different types of data – beach profiles, bathymetric surveys, aerial photographs *etc.* – have been used to positive effect in scheme design or development control)
- Website and data usage (demonstrating value from such usage)
- Future Coastal Monitoring (making recommendations for tuning the programme in the period 2016 – 2021)
- Conclusions
- References
- Appendices (as appropriate)

3. DELIVERABLES

Digital copies of draft and both hard copies and digital copies of final versions of the reports listed in 2 shall be provided.

| Year | Report | Due |
|----------------------|--|--------------------------|
| Year 1 FY 2016/17 | Asset Inspection Report and SANDS database update | Autumn 2016 |
| | Bathymetric and Sea Bed Sediment Survey Report – Flamborough Head to Robin Hoods Bay | Dec 2016 ⁺ |
| | Full Measures Survey 2016 - Analytical Reports* | Feb 2017 |
| Year 2 FY 2017/18 | Partial Measures Survey 2017 - Update Reports* | Aug 2017 |
| | Wave and Tide Data Analysis Report | Jun 2017 |
| | Aerial Photography Survey Report | Autumn 2017 |
| | Full Measures Survey 2017 - Analytical Reports* | Feb 2018 |
| | Bathymetric and Sea Bed Sediment Survey Report – Robin Hoods Bay to Redcar | Dec 2017 ⁺ |
| Year 3 FY 2018/19 | Partial Measures Survey 2018 - Update Reports* | Aug 2018 |
| | Wave and Tide Data Analysis Report | Jun 2018 |
| | Asset Inspection Report and SANDS database update | Autumn 2018 |
| | Full Measures Survey 2018 - Analytical Reports* | Feb 2019 |
| Year 4 FY 2019/20 | Partial Measures Survey 2019 - Update Reports* | Aug 2019 |
| | Wave and Tide Data Analysis Report | Jun 2019 |
| | Aerial Photography Survey Report | Autumn 2019 ⁺ |
| | Full Measures Survey 2019 - Analytical Reports* | Feb 2020 |
| Year 5 FY 2020/21 | Partial Measures Survey 2020 - Update Reports* | Aug 2020 |
| | Wave and Tide Data Analysis Report | Jun 2020 |
| | Asset Inspection Report and SANDS database update | Autumn 2020 |
| | Full Measures Survey 2020 - Analytical Reports* | Feb 2021 |
| Year 6 FY 2021/22 | Partial Measures Survey 2021 - Update Reports* | Aug 2021 |
| | Wave and Tide Data Analysis Report | Jun 2021 |
| | Overview Report 2016-2021 | Sep 2021 |

Table 2: Required reports ⁺ estimated date

* bespoke reports are required for **each of** Northumberland County Council, North Tyneside Council, South Tyneside Council, City of Sunderland Council, Durham County Council, Hartlepool Borough Council, Redcar and Cleveland Borough Council, and Scarborough Borough Council, as follows:

- One draft version (digital) and one final version (hard and digital) of each bespoke *Full Measures Survey – Analytical Report* shall be provided to the **respective** Council.
- One draft version (digital) and one final version (hard and digital) of each bespoke *Partial Measures Survey – Update Report* shall be provided to the **respective** Council.
- One draft version (digital) and one final version (hard and digital) of each *Wave Data Analysis Report* shall be provided to each of the **eight** Councils plus **two** additional recipients.
- One draft version (digital) and one final version (hard and digital) of each of the two *Aerial Photography Survey Reports* shall be provided to each of the **eight** Councils plus **two** additional recipients.
- One draft version (digital) and one final version (hard and digital) of each of the *Bathymetric and Sea Bed Sediment Survey Report* shall be provided to **two** of the Councils plus **two** additional recipients.
- One draft version (digital) and one final version (hard and digital) of each of the *Asset Inspection Reports* shall be provided to **each of the eight Councils along with an updated SANDS database**.
- One draft version (digital) and one final version (hard and digital) of the *Overview Report 2016-2021* shall be provided to each of the **eight** Councils plus **two** additional recipients.

Once approved by the Employer (or the respective Council), each of the final reports shall be uploaded to NECO in accordance with Section 2.3 a digital copy should also be issued to the CCO for uploading on to their website.