



SPECIFICATION DOCUMENT

Project: 21529B – CERD Development – Pwll

Location: OS Grid Reference SN49300020

Mileage and ELR: SWM2 226m 21.5ch – 227m 74ch

Client: Amco Giffen

Scope of this Document: Topographical Survey & Ground Investigation Requirements

CW Document Reference No: 21529B-SPE-005

Address:

Crouch Waterfall, The Barn, Elms Farm, Hobb Lane, Warrington, WA4 5LS

Design Brief:

Works for this scheme include remediation works to the rock armour where low or deficient and repair of the wall were required as part of the CERD development.

Topographic Survey Requirements:

Methodology:

- The survey shall be carried out to an accuracy of Band 3 +/- 25mm as per Network Rail standard NR/L2/TRK/3100 issue 5, using a Drone UAV survey.
- National Grid Coordinates supplied for those points as well as the local grid xyz values.
- Surveyed heights (levels) shall be orthometric and quoted in metres above the national height datum published by the national mapping agency.
- The surveyor shall provide permanent survey control markers not more than 50m apart. All control points shall be inter visible by two other control points and part of the continuous survey control to demonstrate accuracy and residual redundancy.
- The surveyor shall locate permanent markers for survey control as required for the survey at the surveyor's discretion.
- The surveyor shall use their discretion to select the most appropriate marker type for all survey control points.

Provisions:

- 3D Topographic Survey Drawing in AutoCAD .dwg or Microstation.dgn format.
- 3D Point cloud data in .pod format suitable for use in Microstation or .rcs format suitable for use in AutoCAD/Revit and WebPointCloud (online point cloud viewer).
- Site wide 2D Orthophotos as jpeg images and .jgw files suitable for viewing as raster images backgrounds in AutoCAD and Microstation.
- ProjectWise integration is assumed to be required.
- It is assumed there is no requirement for snakegrid conversions.

General Information / Topographical survey Requirements:

- Boundary wall routes, plus boundary fencing as required.
- Closest running rail.
- Any vegetation and services such as manholes.
- Bases and other infrastructure in place.
- Any significant or irregular undulations to be surveyed where possible.
- Extent of walkway and capping stones at the base of the wall
- Extents of rock faces / wall / cuttings, including rock armour levels
- Average water levels (Where possible)

Survey Extents:



Figure 1 – Survey Extents

Figure 1 shows the chainage extents provided from the CRT documents, covering an approximate 2.7km length. The survey required shall cover this area. The adjacent rail track does require capturing, Confirmation of easements for undertaking drone surveys to be confirmed around the track, a possession may be required.

Ground Investigation Requirements:

Name of Contract

CERD Development – Pwll Sea Defences

Name of Investigation Supervisor

To be confirmed by AMCO GIFFEN.

Introduction

The following document provides a ground investigation specification for works to be carried out at Pwll Sea Defences in the context of the renovation requirements set out by NR and detailed within CRT document reference NR-IP-EN-2155-A01.

The existing sea defence at Pwll has been identified by Network Rail for renovation, following an assessment in 2014 where significant sections were found to be in poor condition. Several defects were recorded, attributable to the wave, weather conditions and coastal processes.

The sea defence structure is located adjacent to the SWM2 railway line between Llanelli and Burry Port and extends for a total length of 2700m.

The sea defence comprises of a rock armour revetment built up against an older masonry wall. It features one track access point built into the rock armour, located 800m from the low mileage end of the asset



An option selection report (5191937-ATK-REP-CIV-RP-C-00006) has been undertaken which evaluates a number of possible solutions. The option selection report recommends Option 2 which is outside

the scope of planned works. It has been agreed by RAM and the Project Team to develop Option 1. The key outputs for the chosen option are:

- Remove derelict structure on the east end of the asset and replace with an appropriate solution;
- Replenish rock armour where low or deficient.
- Repair defects to the masonry wall including voids front and back of the wall; and
- Address any outstanding defects score 12 or above in the latest Detailed Examination and Coastal Asset Condition Survey Report referenced in Annex 1.

Further details on the defects present at this structure can be found in the most recent examinations reports, the Coastal Asset Condition Survey Report (JBA 2014), or the GRIP 3 Option Selection Report 5191937-ATK-REP-CIV-RP-C-00006.

To enable the design of the above works, it is required that ground investigations are carried out to determine the existing ground conditions at the locations of repair.

The Specification shall be the UK Specification for Ground Investigation, Second Edition, as published by ICE Publishing in 2012.

Site Description

The existing sea defence structures are located adjacent to the SWM2 railway line, approximately 0m to 5m behind the defence crest. The sea defence is approximately 2700m long. It was designed to protect the coast of the Afon Llchwyr, south of Pwll. The sea wall is located between Ordnance Survey Reference (246671E, 200845N) and (249246E, 200232N). The nearest postcode is SA15 4DS. This is located 20km northwest of Swansea and 2km west of Llanelli in Carmarthenshire, southwest Wales.

Main Works Proposed and Purpose of Contract

The purpose of the Contract and investigation is to gather geotechnical information which shall be used to inform the design of renovation measures for the existing sea defence structures.

Scope of the Investigation

The scope of the ground investigation is as follows:

- 2no Windowless Samples to a minimum of 10m depth. These shall be carried out at immediately adjacent to the sea defence wall. All Windowless sample positions are to be commenced with a hand dug inspection pit to a depth of no less than 1.2m;
- 2no. Dynamic Probes (DPSH), adjacent to Windowless sample locations where relevant. These shall be carried out to a depth of 10m or refusal;
- 1no. windowless sample borehole with rotary core follow on to a minimum of 10m to examine the presence of the coal seams and/or workings along the sea wall
- Geotechnical and Geo-environmental laboratory testing of selected samples;
- Logging and reporting to BS EN 1997-1 and BS5930-2015;
- Factual report.

Working hours and access arrangements are to be confirmed by AMCO GIFFEN.



Geology and Ground Conditions

The underlying geology of the site has been determined from the British Geological Survey (BGS) online viewer, which shows the following bedrock of the Pennant Sandstone Formation strata to be present to underlie the site:

- Hughes Member-Mudstone, Siltstone and Sandstone. These are found in the west of the site.
- Hughes Member-Sandstone. These are found in the west of the site alongside the mudstone and siltstones.
- Swansea Member Mudstone, Siltstone and Sandstone. Found in the east of the site.

Superficial geology overlying rock includes:

- Raised Storm Beach Deposits– comprising sand and gravels.
- Blown Sand – pre-dominantly wind-blown sand particles, found in the southeast of the site.

Made Ground is expected to be found across the site, associated with the railway embankment.

The BGS online viewer at time of viewing does not have borehole records in the local area.

Mining and Mineral Extraction

The sea wall overlies coal bearing strata of the South Wales Coal Field with at least five recorded coal seams underlying the site. The site is within a 'development high risks area' as defined by the Coal Authority.

The five recorded coal seams that underlie the site include the Cille No. 1 Coal Seam, the Pwll Little Coal Seam, the Hughes (Pwll Big) Coal Seam, the Cilmaenllwyd Coal Seam and the Cwmmawr Coal Seam. The Cille No.1 coal seam is shown to outcrop at the centre of the site. The other coal seams listed are shown to outcrop to the north of the site. The Cille No. 1 Coal Seam is estimated to be up to 0.4m thick and approximately 8 m below the ground level at the sea wall based on a regional dip of 8° to the south-south-west.

Hydrogeology

The superficial deposits are designated as secondary (undifferentiated) aquifer and bedrock is designated as secondary A aquifer, which have high and medium vulnerability respectively.

Hydrology

The sea wall lies adjacent to the tidal flats of the Afon Llŵchwr Estuary. There are three bodies of water between the railway line and the A484 road between Llanelli and Bury port. These are associated with the sewage works, Ashpits Pond and Sandy Water Park. The area surrounding sandy Water Park and the Sewage Works reservoir have low surface water flood risk. The water bodies surrounding the sewage works have a high risk of surface water flooding.

Sandy Water Park reservoir have a depth 2.0m, the sewage works reservoir and surrounding areas have a depth of up to 2.0m.



Underground Drainage and Seepage

No evidence of seepage through the existing defences has been identified.

Flooding

The site has a history of flooding and now consequently has a series of sea defences located along the coastline protecting the Cambrian Coast Railway.

Natural Resources Wales identified areas of flood warning and flood alert in the surrounding areas. Flooding from rivers is high risk with greater than 3.3% chance a year, flooding from the sea is also high risk with greater than 3.3% chance a year. Flooding from surface water and small watercourses has a very low risk with less than 0.1% chance a year.

Unexploded bomb risk

An unexploded bomb (UXO) risk map (Accessed from Risk Maps | Zetica UXO) indicates that the area is of low UXO risk, having 15 bombs per 1000 acres or less.

General Requirements

CDM (2015) regulations apply to the Contract.

The Contractor shall carry out all work to ISO 9001 or a similarly approved quality management system.

The level of staffing provided by the Contractor shall be commensurate with the works being carried out. An experienced ground engineer shall be present on site full-time for the duration of the site-works; this engineer will be responsible for the supervision of all site activities, logging of exploratory holes, taking samples and photographs and the provision of daily records and preliminary logs.

Appropriate hygiene and welfare facilities shall be provided on site by the Contractor; the Contractor shall not use available public facilities. The Contractor shall detail any assumptions or requirements (e.g. availability of on-site power, space required for facilities) in their return.

Dates for mobilisation to site and commencement of the site-works are to be confirmed with AMCO GIFFEN.

Working hours are to be confirmed with AMCO GIFFEN. The challenges of working in a tidal environment should be considered.

Access arrangements and permits to work to be confirmed by AMCO GIFFEN.

Sentinel requirements or Network Rail safe systems of work may be necessary, it is for the Contractor to ascertain these requirements and provide appropriately qualified staff members to carry out the works.

Suitable safe systems of work are to be agreed with Amco-Giffin Client to allow safe access to the work site and adjacent to open water. Investigations are to be coordinated with tide times, taking especial consideration to access and egress to and from exploratory hole locations.



The Contractor is responsible for the security of site during the works, and their work sites will need to be fenced off. No exploratory holes are to be left open overnight. Any plant left on site overnight shall be appropriately secured to deny access to the public.

Contamination is not known to be present on site. However, as the site is located adjacent to an active railway, the possibility of contamination being present cannot be discounted. The Contractor shall take appropriate measures to safeguard their plant and employees, surrounding personnel and the environment from the spread of any contamination as a result of drilling activities. The Contractor shall decontaminate all drilling equipment on completion of each exploratory hole and on completion of the site works.

No services information has been provided to the Designer. The Contractor should take all necessary actions to avoid damaging any existing services. The Contractor is responsible for acquiring up to date service plans.

All exploratory hole locations shall be scanned with CAT and genny in accordance with HSG47. Hand dug pits are needed before any starting any exploratory position.

The Contractor is responsible for the disposal of all waste (including contaminated arisings and groundwater) generated as a result of the works, including the sampling and testing of all waste materials.

All unavoidable damage shall be reinstated by the Contractor.

The Contractor is responsible for reinstating the site to its previous condition following the completion of site-works.

The Contractor is responsible for the disposal of all waste (including contaminated arisings and groundwater) generated as a result of the works, including the sampling and testing of all waste materials.

All exploratory hole positions are to be surveyed in by the Contractor to a vertical and horizontal accuracy of 0.05m. Position and levelling information are to be provided to National Grid and Ordnance Datum respectively.

Sufficient photos to show the condition of the whole of the site prior to the start of the site-works and an analogous set on completion of the investigation are to be provided.

Dynamic Sampling

Dynamic sampling shall be undertaken using a windowless sampling rig. The Contractor is free to determine the drilling methodology and the starting diameter for the borehole such that drilling, sampling and testing can be carried out to the scheduled depth while suitable sampling and testing is undertaken.

The maximum period for chiselling / slow boring / excavation through hard strata shall be 30 minutes, following which the Investigation Supervisor shall be contacted for instruction.



Water shall not be added during drilling except where required to facilitate drilling in granular strata. Suitable measures should be taken to minimise the risk of creating pollutant pathways in vulnerable areas of the site such the estuary.

Rotary Drilling

CAT-scan and Genny to be conducted to check no services are present at the BH location.

Hand-dug inspection pit shall be carried out to at least 1.2mBGL to be carried out to confirm no services are present at the BH location.

Rotary core drilling boreholes to be carried out to a minimum depth of 10.0mBGL.

The Contractor is free to determine the starting diameter for each borehole such that boring, sampling and testing can be carried out to the scheduled depth with a minimum final diameter of 100mm. Minimum core recovery needs to be 95%.

Coal Authority permit needed to drill into coal/workings and use of air flush is not permitted. Drilling shall be carried out in accordance with Guidance on managing the risk of hazardous gases when drilling or piling near coal April 2019.

For drilling through hard rock, water may be employed exclusively as a lubricant. Any water used must be contained within re-circulation tanks to prevent contamination of adjacent land. Re-circulation tanks are to be emptied by pumping to a bowser with water disposed off site to a waste treatment area. There is no facility on site to dispose of the water flush utilised during the works.

Rotary core drilling to be carried out with diamond or tungsten carbide tipped bits. All bits, core barrels and casing shall conform to current standards. The requirements of BS EN 1997-2:2007 (Section 3.5 Rock sampling) and EN ISO 22475-1 shall be followed.

All rotary drill equipment is to be cleaned between boreholes to prevent cross contamination of boreholes. Similarly, water tanks are to be emptied by pumping to a bowser and water disposed off-site. There is no facility on-site to dispose of the water flush utilised during the works.

Engineering logs to be produced by qualified engineering geologist according to BS 5930:2015 (Section 6: Description of soils and Rock)

Backfilling of the completed borehole shall be using bentonite pellets and grout over the top 2.0mBGL. No monitoring installations are required in borehole positions.

Other aspects to comply with clause 5.2 and 5.4 of the UK Specification for Ground Investigation, Second Edition, as published by ICE in 2012.

Sampling and Monitoring during Intrusive Investigation

In Windowless sample holes, 1no bulk and 1no disturbed samples shall be taken at 1m intervals or at any change in strata.

In hand dug inspection pits, 1no bulk and 1no disturbed sample shall be taken at 0.5m intervals or at any change in strata, whichever is smaller.



Groundwater strikes should be recorded and monitored during drilling for 20mins. Groundwater level shall be measured again at the end of the borehole / end of shift. Groundwater shall be sampled once encountered in all positions.

In-Situ Testing Particular Restrictions/Relaxations

Standard Penetration Testing (SPT) shall be carried out in all windowless sample boreholes in accordance with BS EN ISO 22476-3. The first SPT shall be undertaken at the base of the hand-dug pit and at 1.0m intervals to completion.

Dynamic Probing (Super Heavy Dynamic Probing – DPSH) is to be carried out in accordance with BS EN ISO 22476-2.

Hand Shear Vane testing is to be carried out in suitable cohesive material to BS EN ISO 22476-9 or BS EN 1997-2 and NS to BS EN 1997-2.

Instrumentation Particular Restrictions/Relaxations

Not required.

Instrumentation Monitoring and Sampling Particular Restrictions/Relaxations

Not required.

Daily Records Particular Restrictions/Relaxations

Raw data comprising drillers logs shall be provided to the Investigation Supervisor within 24 hours of the completion of each shift.

Draft engineering logs shall be provided to the Investigation Supervisor within 3 working days of completion of each position, along with a laboratory testing schedule detailing samples taken and the depth at which they were taken.

Logging and reporting will be in accordance with BS 5930:2015. Descriptions are to include, where relevant:

- Soil name and constituents;
- Colour;
- Structure;
- Strength, consistency and / or relative density;
- Moisture content;
- Soil plasticity, sensitivity and dilatancy;
- Note of any minor constituents / contamination;

Geotechnical Laboratory Testing Particular Restrictions/Relaxations

A geotechnical laboratory testing schedule shall be provided to the Investigation Supervisor alongside the draft engineering log.



Geotechnical testing is likely to comprise, but is not limited to the following tests:

- Natural moisture content;
- Atterberg limit tests;
- BRE Digest 1: 2005 Concrete Aggressivity Suite – Suite B;
- Particle Size Distribution tests.

All laboratories used shall be UKAS accredited.

Geoenvironmental Laboratory Testing Particular Restrictions/Relaxations

No geoenvironmental testing of soil or rock samples apart from that already noted is required. However, the Contractor should be aware for the potential for contaminated material to be present. If visual, olfactory or other evidence suggests the presence of contamination, suitable environmental samples are to be taken.

Reporting Particular Restrictions/Relaxations

A Factual Report is required.

Draft engineers/drillers log to be provided to the designer within 3 days of completion of the site-works. (handwritten is fine)

A draft version of the report is to be produced within 10 working days of the completion of site works. The Contractor shall allow 5 working days for the Investigation Supervisor to review the draft report and return comments. Following receipt of comments, the Contractor shall issue the final Factual Report within 5 working days.

1 No. digital (pdf) copy of the final factual report is to be provided.

The final report is to be accompanied with a complete AGS file (AGS 4.0) containing all exploratory hole, in-situ and laboratory test data.

Key programme dates are as follows:

Activity	Timeframe
Mobilisation period	To be confirmed with AMCO GIFFEN
Site-works period	To be confirmed with AMCO GIFFEN
Submission of Draft Report	2 calendar weeks following completion of site works
Return of comments	1 calendar week following draft submission
Submission of Final Report	1 calendar week following receipt of comments



Schedule of works

Hole No.	Type	Scheduled Depth (m)	Remarks
WS01-WS02	Windowless sample	To refusal (min 10m)	Evenly spaced along the length of sea defence structures. To target eastern end of the wall where structure is to be replaced.
DCP01-DCP02	Dynamic Probing (DPSH – Super Heavy)	To refusal (min 10m)	Evenly spaced along the length of the sea defence structures, located adjacent to that of corresponding WS where applicable.
BH01-	Windowless sample with rotary core follow on (BH)	Minimum 10m	Targeting shallow coal seams and/or workings

The below figure presents an indicative exploratory hole location plan.

Figure 1 –Pwll Sea wall. Proposed GI works location plan (Subject to change).

