Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

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DUBLIN DISTRICT HEATING PROJECT

Site Investigation Works - Specification Document

MDR1597-RPS-01-SI-DH-O-Y-0001
S3 P02
03 October 2025

Document status

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Approval for issue

CB	RPS	06.10.25

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Prepared by:

RPS

Prepared for:

DCC – Dublin City Council

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Contents

SPECIFICATION

The Specification shall be the Irish Specification for ground investigation published by Engineers Ireland, with information, amendments and additions as described in the Schedules.

Schedule 1. Information and site-specific requirements

Schedule 2. Exploratory holes

Schedule 3. Investigation Supervisor's facilities

Schedule 4. Specification amendments

Schedule 5. Specification additions

SCHEDULE 1: INFORMATION AND SITE-SPECIFIC REQUIREMENTS

S1.1 Name of Contract

This Contract shall be known as “Dublin District Heating Project – Site Investigation Works”.

S1.2 Investigation Supervisor

Name:	To be confirmed upon project award.
Appointed from:	RPS
Address:	West Pier Business Campus, Dun Laoghaire, Co. Dublin A96 N6T7
Telephone:	+353 01 488 2900

S1.3 Description of site

<table>
<tr><th>Site</th><th>Description of Site</th></tr>
<tr><td>Dublin District Heating Project, Co. Dublin</td><td>
The DDH project site is located in Dublin City and starts on the west side of Poolbeg and continues through the Ringsend, Dodder River and North Dockland areas.

The total extent of the project as described in the site location map provided, has an approximate length of 6.6km. This site investigation works will be divided into the following phases.

1. Phase 1 is located in in the Poolbeg area and starts from the Dublin Waste to Energy (DWtE) plant and extends to the eastern boundary of the Irish Glass Bottle (IGB) Development. The length of the DDHP in this area is approximately 1 km. The specific works covered under Phase 1 are outlined in Table 1 below.
<table>
<tr><th></th><th>Boreholes</th><th>ST</th><th>TP</th><th>US/PAS128 (m²)</th><th>Topography (Linear m)</th></tr>
<tr><td>Phase 1</td><td>BH01 to BH15</td><td>ST01 to ST04</td><td>TP01 to TP04</td><td>9.135,76</td><td>1542</td></tr>
</table>
2. Phase 2 extends from Seán Moore Road at the western boundary of the IGB site to the North Docklands area via Bremen Road, Ringsend Park, York Road to the North Docklands as far as Spencer Dock. Phase 2 also includes works on land and within the foreshore area of the River Dodder and Rive Liffey. The length of the DDHP in this area is approximately 5.6km. The specific works covered under Phase 2 are outlined in Table 1 below.
<table>
<tr><th></th><th>Boreholes</th><th>ST</th><th>TP</th><th>US/PAS128 (m²)</th><th>Topography (Linear m)</th></tr>
<tr><td>Phase 2</td><td>BH16 to BH32</td><td>ST05 to ST27</td><td>TP05 to TP8</td><td>8.114,65</td><td>5670</td></tr>
</table>
(See also Figure 1 below).
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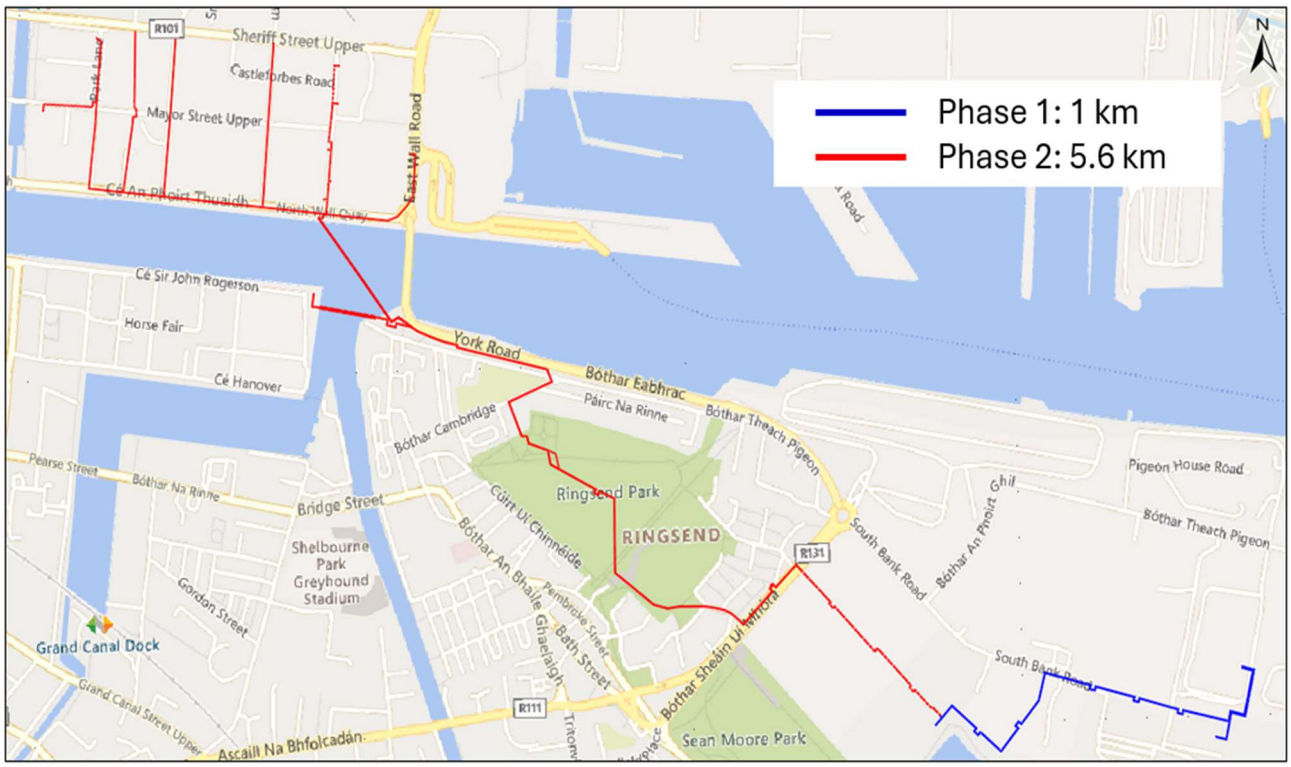

Figure 1: DDHP Overview Location Map

The works are to be carried out at as listed at locations shown on drawing MDR1597-RPS-01-M2-XX-D-C-0200 to 0204 exact locations are to be agreed with the engineer prior to commencing on site.

The purpose of this document is to outline the requirements of the Site Investigation and Utility Survey to be carried out to provide site information for the development of the Dublin District Heating Project, Co. Dublin. The development will include the installation of district heating infrastructure, pre-insulated pipe networks, connection tunnel and services. This network will be part of the district heating system of the city of Dublin.

There are no significant topographical features. In preparing a tender for the Site Investigation, the Contractor shall be deemed to have visited the site to make themselves aware of conditions to be dealt with at each location.

Access to all locations should be inspected to ensure they are all suitable for trafficking by the Contractor's proposed plant and equipment.

Should the Contractor feel there will be an issue with access, topography or other land features, it should be brought to the attention of the Investigation Supervisor and the client.

S1.4 Main works proposed and purpose of this contract

The investigation is required as part of the Dublin District Heating Systems project in order to inform design. The project comprises of use of pre-insulated pipes within Dublin docklands to supply pre-heated water heated at the Poolbeg power plant as part of the waste heat treatment processing undertaken there. The route of the pre-insulated pipes includes crossing of the Dodder and Liffey rivers.

This ground investigation is required to provide detailed information for detailed design and is primarily focused on the Dodder River crossing and gaining understanding of the ground conditions for tunnel and tunnel shaft design for this crossing. The investigation is primarily focused on geotechnical elements but includes some environmental / chemical / contamination testing to appropriately classify the ground for disposal.

S1.5 Scope of investigation

The proposed ground investigation shall be carried out in accordance with BS EN1997-2:2007 and BS 10175:2011. The non exhaustive scope of the works required under this Site Investigation Contract include the following:

- Liaison with the RPS/DCC and external bodies;
- Perform the role of PSCS;
- Shell and auger boreholes with rotary core follow on, or Geobore-S boreholes including the following pertinent information:
  - 4 no. Geobore-S boreholes overwater from jack-up barge.
  - 28 no. Geobore- boreholes from land.
  - 28 no. Shell and auger boreholes with rotary follow on from land.
  - 27 no. Slit trenches from land.
  - 8 no. Trial pit from land.
  - 2 no. Standpipe piezometers.
  - US to PAS128 (17,250.41m2)
  - Topography survey (7,212ml)
  - SPT testing or UT sampling
  - High-pressure dialatometer testing during drilling.
  - Packer testing.
  - Installations for Variable Head Permeability testing in some boreholes.
  - Installations for downhole seismic testing in some boreholes
- Slit trenching to confirm the toe of the Quay wall.
- Downhole seismic testing in 3 no. boreholes post drilling.
- In situ testing and sampling of soil and rock;
- Installation, inspection/monitoring and livestock proof marker installation for standpipes;
- Groundwater level monitoring (including use of data loggers where specified)
- Variable Head Permeability testing in selected standpipes / standpipe piezometers.
- Photography of samples to allow for permanent record of strata;
- Completion of daily field reports and detailed logs recording all exploratory hole data;
- Geotechnical and chemical laboratory testing of the samples to establish the characteristics of the underlying strata;
- Restoration of disturbed areas once operations are complete;
- Factual reporting and production of electronic data (including pdf of final reports, as-built location drawings and AGS data).
- Interpretative reporting and production of electronic data (including pdf of final reports, as-built location drawings and AGS data).

Completion of daily field reports and detailed logs recording all exploratory hole data;

The proposed location and details of investigation holes are listed in Schedule 2. The final locations should be agreed with the Investigation Supervisor prior to works on site.

The full scope of the works and obligations of the Contractor are to be ascertained by reference to the Contract as a whole including the BOQ.

	Boreholes	ST	TP	US/PAS128 (m^2)	Topography (Linear m)
Phase 1	BH01 to BH15	ST01 to ST04	TP01 to TP04	9.135,76	1542
Phase 2	BH16 to BH32	ST05 to ST27	TP05 to TP8	8.114,65	5670

Table 1: Summary of Site Investigation Works by Phase

The Contractor shall allow in his tender and work programme for difficulties associated with site restrictions, access restrictions, scheduling of works, restricted working hours and possible poor ground conditions. He/she shall fully account for these restrictions when pricing and programming the works for tender.

S1.6 Geology and ground conditions

The following general assessment of the geology of the site and ground conditions has been inferred from ground conditions expected to exist based on information available information. No assurance is given to its accuracy.

The Geological Survey Ireland (GSI) maps indicate that the bedrock geology below the site comprises of Lucan Formation limestone and shale.

The GSI maps indicate that the quaternary sediments located across the site and over the bedrock comprise of Urban soils with Made Ground. It is likely that the Marine or Alluvial deposits located nearby and described as a sand or gravel underly these layers. Glacial Till may also be present due to the close proximity.

The GSI mapping database shown in Figure 2 indicates the superficial deposits.

Figure 2: Quaternary Sediments 50k (Reference: GSI website, 2024).

S1.7 Schedule of drawing(s) and documents

The Contract includes the issue of drawings showing the locations of proposed exploratory holes. Drawings are included in Appendix A.

Table 2: List of Drawings

Document Number	Document Title
MDR1597-RPS-01-SI-DH-L-G-001	Schedules. This includes: • Boreholes Schedule • Slit Trench & Trial Pit Schedule • Utility Survey Schedule • Topography Survey Schedule
MDR1597-RPS-01-M2-XX-D-C-0200 to 0204	Site Investigation Works Drawings
MDR1597-RPS-01-M2-XX-D-C-0230 to 0233	Topography Survey Works Drawings

S1.8 General requirements (Specification Section 3) Particular restrictions/ relaxations

S1.8.1 Quality management system (Clause 3.3)

All work shall be carried out in accordance with a quality management system(s) established in accordance with IS EN ISO 9001:2015, IS EN ISO 14001:2015 and OHSAS 18001. Records to demonstrate compliance shall be made available to the Employer on request.

S1.8.2 Professional Attendance (Clause 3.5.2)

The Contractor shall be represented by a Contractor's Representative and Contractor's Supervisor, who may, for the purpose of this Contract, be one person. The above attendees must be familiar with the works requirements.

The Contractor's Representative must have a minimum of 15 years post graduate experience of ground investigation work. They shall have a degree in Civil Engineering, Engineering Geology or Geology. They must have adequate knowledge and experience in the technical direction and output required for the site operations. This Contract does not require this person(s), Contractor's Representative and Supervisor, to have a full-time presence on site.

The Contractor's Supervisor shall provide full-time on site Supervision of the works and shall be an Engineering Geologist/Geotechnical Engineer with a minimum of 7 years geotechnical experience in both field operations and reporting, who shall be approved by the Investigation Supervisor. This approval may be withdrawn at any time.

The Contractor's Representative and on site Engineering Geologist/Geotechnical Engineer shall be responsible for the technical direction and output of the whole investigation as specified in Clause 3.5.2 of the Engineer's Ireland Specification and Related Documents for Ground Investigation in Ireland (Second Edition, 2016). Their duties shall include logging samples within 2 days of completing each exploratory hole (including the provision of preliminary records) and supervision of in-situ tests and specialist sampling. They are to ensure the continuity and quality of both the description and approach to testing, while in the field and otherwise involved in the investigation. He/she shall ensure all logging is in accordance with BS5930 (2015) and the recommendations of the Engineer's Ireland Specification and Related Documentation for Ground Investigation in Ireland (Second Edition, 2016).

The Contractor shall nominate an employee who shall be responsible for traffic management. This appointment shall be subject to the approval of the Investigation Supervisor. He/she shall be a direct employee (not a sub-contractor) who shall have a demonstrated experience in traffic management.

The Contractor shall also nominate a competent person or persons to act as Health and Safety Co-Ordinator(s) in accordance with the Regulations and deliver any Safety File requirements to the Employer upon completion of the works.

S1.8.3 Provision of ground practitioners and other personnel (Clause 3.6.1 and 3.6.2)

The Contractor may be required to provide the services of ground practitioners as requested by the Investigation Supervisor during the course of the works, for advice, assistance and/or the preparation of the Ground Investigation Report and/or Geotechnical Interpretative or Design Reports as specified by the Investigation Supervisor.

S1.8.4 Hazardous ground, land affected by contamination and notifiable and invasive weeds (Clause 3.7.1 and 3.22)

The works are to be carried out at the following site as listed below at locations shown on drawing MDR1597-RPS-01-M2-XX-D-C-0200 to 0204 provided with the tender package. For details of potential ground contamination in the Poolbeg Area please refer to Appendix 3. A3-4 Environmental Information at Poolbeg Area MDR1597-RPS-01-SI-XX-O-G-0002 Environmental Information at Poolbeg Area.

In preparing a tender for the Site Investigation, the Contractor shall be deemed to have visited the site to make themselves aware of conditions to be dealt with at each location. Access to all locations should be inspected to ensure they are all suitable for trafficking by the Contractor's proposed plant and equipment.

Should the Contractor feel there will be an issue with access, it should be brought to the attention of the Investigation Supervisor and the client.

The Contractor is to inspect relevant mapping databases to inform themselves of any invasive species within the vicinity of the site. If such invasive species are encountered the Contractor must leave the area undisturbed and notify the Investigation Supervisor as per Clause 3.22 of the Engineer's Ireland Specification and Related Documents for Ground Investigation in Ireland (Second Edition, 2016).

S1.8.5 Additional information on services not shown on Contract drawings (Clause 3.7.2)

Where services are suspected, known or found to be located in close proximity to the proposed works the Contractor must ensure that the works are located the statutory safe distance from the services. If it is the case that the works must be relocated, then the Contractor must consult with the Investigation Supervisor.

Boring or probing shall not begin until the presence or otherwise of all services has been established, noted, and located. The Contractor shall be deemed to have included this in his rates, together with the full recording of strata and taking of samples and reporting as this is considered part of the exploratory hole.

The Contractor shall satisfy himself as to the exact position, depth and gradient of any underground services at each location using a Cable Avoidance Tool before investigation commences. The operator must have a valid CSCS card for carrying out the operation. All areas should be scanned prior to the commencement of work.

All boreholes and follow-on rotary cores shall start by means of a hand excavated inspection pit not less than one square metre in plan and 1.2 metres deep. Inspection pits should be dug prior to setting up of equipment. Hand operated power tools may be used to assist excavation where hard strata such as road pavements cannot be broken without the use of such tools.

The Investigation Supervisor and appropriate authority shall be notified immediately of any damage to existing public services. The Contractor shall insure themselves and the client against all loss or damage to public and private services from whatever cause arising during the period of the Ground Investigation Contract.

The client reserves the right to request the Contractor to return to the site to carry out additional SI works for a period of six months after the receipt of the final factual and interpretative reports. Any additional works carried out will be at the equivalent rates within the contractors tendered BoQ. Should the client activate this

clause the SI contractor is expected to mobilise to site within 2 weeks of instruction with additional works to be carried out and completed within 2 weeks of mobilising to site.

S1.8.6 Known/suspected mine workings, mineral extractions, etc. (Clause 3.7.3)

The Historic Mine Sites - Inventory and Risk Classification Project has not identified any mine sites in the area.

The Contractor is to inspect relevant mapping databases to inform themselves of any Historic Mine Sites in the vicinity of the sites.

S1.8.7 Protected species (Clause 3.7.4)

The OSi GeoHive database indicates that there are no National Parks and Wildlife Designated Sites at the location.

The Contractor is to inspect relevant mapping databases to inform themselves of any protected species in the vicinity of the sites.

S1.8.8 Archaeological remains (Clause 3.7.5)

The National Monuments Service Archaeological Survey database indicates that there are several nearby listed archaeological features to area. These listed features are located outside of the site boundary, so all machinery shall remain within the site boundary to ensure that these monuments are not disturbed.

An archaeological exclusion zone is marked on the drawing as there are potentially archaeological remains in the Pigeon House Road, York Road and Thorncastle St is to be further investigated in this regard.

If any archaeological remains are discovered during the works, the Investigation Supervisor shall be informed immediately, and all works at the affected location shall be suspended until further arrangements are made.

The Contractor is to inspect relevant mapping databases to inform themselves of any nearby listed archaeological features in the vicinity of the site. E.g. The National Monuments Service Archaeological Survey database. Further information on the sites will be included within the information pack if available.

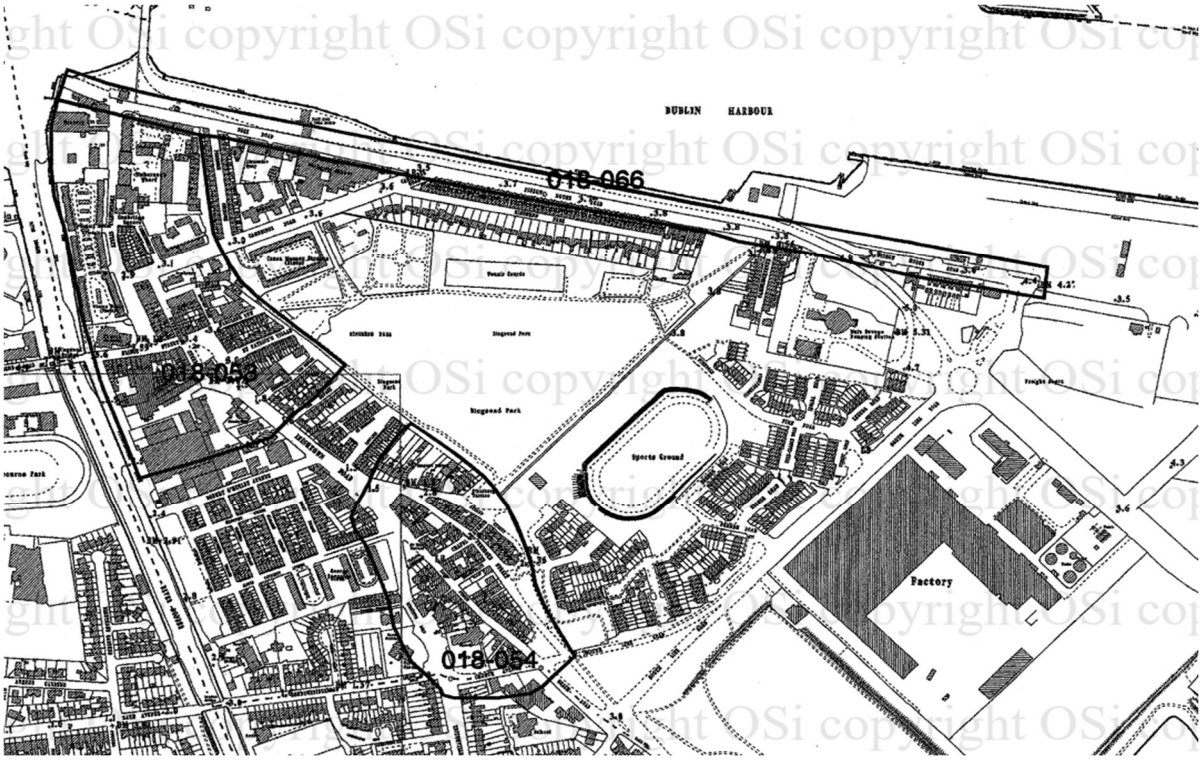

Figure 3: South Sea Wall (DU018-066), Source: DCC Heritage Record of Protected Structures

S1.8.9 Security of site (Clause 3.11)

The Contractor shall provide all lighting, fencing, hand-rails, notice boards, security personnel and other items necessary to ensure the protection and security of the works and the public throughout the duration of the Contract.

The Contractor is required to read the Preliminary Health and Safety Plan and take account of all hazards. It should be noted that the list of hazards is non-exhaustive.

The Contractor is required to submit a detailed Health and Safety Plan for these works, consistent with their responsibilities as the Project Supervisor (Construction Stage) for this ground investigation.

S1.8.10 Traffic management measures (Clause 3.12)

Where temporary traffic management schemes are required to ensure the safety of the workers and users of the road, these shall be designed and implemented in accordance with the 'Guide for the Control and Management of Traffic at Road Works' published by the Department of Transport and the National Roads Authority (2010).

The Contractor must ensure that the transportation of equipment and machinery to/from site does not negatively impact the traffic flows in the surrounding area.

S1.8.11 Restricted working hours (Clause 3.13)

The working week shall consist of the following hours:

Monday to Friday (excluding Bank Holidays):	08:00-18:00 hours
Saturday:	08:00-14:00 hours

No work shall be undertaken outside these hours unless prior written approval is received from the RPS/DCC Local Authorities/landowners affected may request further restrictions, which can be discussed when the successful Contractor contacts them.

S1.8.12 Trainee site operatives (Clause 3.14.1)

Trainee site operatives are not permitted on site.

S1.8.13 Contamination avoidance and/or aquifer protection measures required (Clause 3.15.2 and 3.15.3)

The Contractor shall develop and implement an appropriate working method to prevent the spread of any contamination encountered as a result of the works. This should include as appropriate: control of runoff and flush; protection of surfaces (e.g. using pads, boards or sheeting); reinstatement of surfaces, especially in soft landscaped areas; aquifer protection; segregation of working areas from members of the public; and measures to avoid trafficking of material both across and off site. Should any unexpected evidence of possible contamination be encountered, work should be ceased until the adequacy of the working method has been assessed and any further mitigation needed is implemented.

All site investigation plant and equipment is to be decontaminated on completion of each exploratory hole where visual or olfactory evidence of contamination has been noted. Cleaning of the plant and equipment is to be undertaken in bunded areas of hard standing where wash water can be appropriately stored then disposed of.

If significant contamination is encountered, sampling equipment and tools shall be cleaned between strata, specifically at the boundary between made ground and natural strata, in order to prevent cross contamination occurring.

Should unexpected ground conditions be encountered during site works, such as gross contamination, or the presence of cohesive geology providing a low permeability layer to retard the downward natural migration of contamination, then aquifer protection measures are to be installed in boreholes. This is to minimise the creation of new pathways for the downward migration of contamination into an underlying aquifer.

Aquifer protection measures shall be agreed with the Investigation Supervisor.

S1.8.14 Maximum period for boring, pitting or trenching through hard material, hard stratum or obstruction (Clause 2.8, 4.3 and 6.4)

Following a period of up to 30 mins, should any hard stratum or obstruction not be penetrated the Contractor shall inform the Investigation Supervisor, who may instruct the use of one or more of the following:

- continuation of appropriate techniques (e.g. chisel/ shell with additional weights.
- rotary or other approved drilling until the stratum is proved for a sufficient depth.

The termination of any boreholes prior to satisfaction of the specified criteria, on grounds other than health and safety, shall require the approval of the Investigation Supervisor, with the potential requirement for re-drill locations to be performed.

S1.8.15 Reinstatement requirements (Clause 3.16)

In addition to requirements set out in Clause 3.16 of the specification, roads are required to be excavated, inspected by the Investigation Supervisor and permanently and immediately reinstated in accordance with the Transport Infrastructure Ireland (TII) “Specifications for the Reinstatement of Openings in National Roads”, December 2013, and the “Guidelines for the Opening, Backfilling and Reinstatement of Trenches in Public Roads” published by DTTAS, September 2015 for permanent and immediate reinstatement of roadways, unless otherwise specified in the Road Opening Licence conditions.

S1.8.16 Hygiene facilities required (Clauses 2.20 and 3.16.1)

The Contractor must provide PPE and hygiene facilities which are suitable for the works for all site personnel and for use by the Investigation Supervisor.

S1.8.17 Unavoidable damage to be reinstated by Contractor (Clause 3.16.1)

The Contractor shall take all necessary precautions to avoid causing any damage to access roads, tracks, land, buildings and other features and shall deal promptly with any complaints. Unavoidable damage (e. g rutting of access routes) is required to be made good by the contractor.

Where avoidable damage occurs, reinstatement shall be wholly at the Contractor's expense. Any damage outside of agreed access routes and working areas shall be considered avoidable.

S1.8.18 Accuracy of exploratory hole locations (Clauses 3.19 and 3.20)

Boreholes shall be set out to the nearest 0.5 m or as agreed with the Investigation Supervisor.

S1.8.19 Photography requirements (Clause 3.25)

The Contractor shall carry out a photographic condition survey of the exploratory hole locations, the access/egress route including all adjacent property boundaries prior to the commencement and upon completion of any works on site.

All photography including those of trial pits and borehole core shall be provided digitally upon request by the Investigation Supervisor.

S1.8.20 Programme and timeframe requirements

The SI contractor will be required to meet the programme requirements as set out below.

Table 3: Programme timeframes

Item	Timeframe (Phase 1 - 8 weeks)
Mobilising to area	Within 1 week from date of appointment
Finalising works on site	Within 3 weeks of mobilising to site
Completion of draft reports	Within 3 weeks of finalising works on site
Completion of final reports, inc. lab results	Within 1 week of finalising works on site

Item	Timeframe (Phase 2 - 16 weeks)
Mobilising to area	Within 2 weeks from date of appointment
Finalizing works on site	Within 8 weeks of mobilising to site
Completion of draft reports	Within 4 weeks of finalising works on site
Completion of final reports, inc. lab results	Within 2 weeks of finalising works on site

Note: Activities will begin with Phase 1 and, in parallel or later, with Phase 2, depending on the technical capacity of the contractor and the coordination of the contracting party.

S1.8.21 Health and Safety

The roles of Contractor and PSCS will be fulfilled by the successful site investigations contractor. The project structure is summarised as follows:

- **Client** – DCC
- **Employer's Representative-** RPS
- **Designer** – RPS/COWI
- **Project Supervisor Design Process (PSDP)** – RPS
- **Project Supervisor Construction Stage (PSCS)** – (TBC)
- **Contractor** – (TBC)

S1.8.22 Road Opening Licence Procurement

It is the responsibility of the Contractor to obtain the relevant licences and permits for any road openings required in order to allow completion of the exploratory holes.

S1.8.23 Indemnity

The Contractor shall indemnify the **client (DCC), Local Authorities, Utility Providers** and **RPS Consulting Engineers** with respect to damage or loss to Landowners, service utilities or other third partiesarising directly or indirectly from their activities and subject to the Conditions of Contract and for the sums set out in the Form of Tender.

S1.8.24 Site Visit

In preparing a tender for the Site Investigation, the Contractor shall be deemed to have visited the site to make themselves aware of conditions to be dealt with at each location.

It should be noted that due to the topographical features of the site, namely steep slopes, there are several areas which may result in restricted access for site investigation equipment. Access to all locations should be inspected to ensure they are all suitable for trafficking by the Contractor's proposed plant and equipment.

Should the Contractor feel there will be an issue with access, it should be brought to the attention of the Investigation Supervisor and the client.

S1.8.25 Programme of Work

Within one week of the award of the works, a detailed works programme shall be provided in both pdf and Microsoft Project format by the Contractor to the Employer's Representative. The Contractor's programme must be submitted for each phase 1 and 2 and shall include the following stages as a minimum:

1. Mobilisation
2. Topographic Survey (Location and Details)
3. Utility Surveys (Field Work - Including Survey Zone)
4. Utility Surveys (Office Processing – Including Survey Zone)
5. Site Investigation Works (Field Work - Including Works Survey Zone)
6. Site Investigation Works (Office Processing - Including Works Survey Zone)
7. Complementary Geotech requirements
8. Project Float
9. Submission of Draft Topographic Investigation deliverables & report for review

10. Submission of Draft Utility Survey deliverables & report for review;
11. Submission of Draft Site Investigation Works Survey deliverables & report for review;
12. Submission of Draft Geotech requirements deliverables & report for review;
13. RPS/DCC review period.
14. Submission of Final Topographic Investigation deliverables & report for review
15. Submission of Final Ground Investigation Works Survey deliverables & report for review
16. Submission of Final Utility Survey deliverables & report for review;
17. Submission of Final Geotech requirements deliverables & report for review;
18. Project Completion

The programme shall allocate sufficient time and resources to complete the works allowing for the restrictions on available working time, space and access. The Contractor shall report on programme progress, on a weekly basis as a minimum.

S1.8.26 Extent of Work

Probing/excavation shall be stopped at any depth at which the Investigation Supervisor shall be satisfied that sufficient information has been obtained about the foundation, ground and/or groundwater conditions. The Investigation Supervisor may require that the exploratory hole is to continue to a greater depth in order to better understand the subsoil conditions.

The Employer reserves the right to discontinue the work at any time, if, in the opinion of the Investigation Supervisor, the depth is likely to be excessive or if the sub-surface conditions are such that further drilling/excavation are not necessary or would pose unnecessary risk. The Bill of Quantities contains provisional quantities, and the Contractor is entitled to no extra monies if the final measured quantities are substantially less than those shown in the Bill of Quantities.

Extra exploratory holes, samples, in-situ testing etc. may be required and these shall be carried out at the rate of the Bill of Quantities.

S1.8.27 Provisional Bill of Quantities

The prices and rates to be inserted are to be the fully inclusive value of the work described under the several items, including all cost and expenses which may be required in and for the execution of the works together with all general risks, liabilities and obligations set forth or implied in the Contract Documents.

S1.8.28 Access to Area

The area is mainly located on public land owned by the city, in cases of private sectors the client will manage together with the Contractor and authorities the respective authorization. Most of Phase 1 works will be on lands owned by Dublin Port Company.

The Contractor shall include in his rates for all access difficulties and for the reinstatement of access routes damaged during the course of the investigation. The Contractor shall include for any machinery that may be required to access areas of soft or uneven ground in order to limit rutting and gain safe access to the exploratory locations. All rutting must be made good immediately.

Any damage to fences, hedges, walls, gates or any other property due to the execution of the works shall be made good at no extra cost to the Contract. All gates must be left in their existing state (i.e. open or closed) and the site kept free of all loose stones, debris or other obstructions. The South Sea Wall (DU018-066) is historical and to be excluded from the works zone.

All surroundings shall be restored to their original state on completion of the work to satisfaction of the Investigation Supervisor.

Access to the site shall be arranged by the Contractor. Liaison between the Contractor and the client will be required. This should be included in his price for the works.

Where temporary traffic management schemes are required to ensure the safety of the workers and users of the road, these shall be designed and implemented in accordance with the 'Guide for the Control and Management of Traffic at Road Works' published by the Department of Transport and the National Roads Authority (2010).

S1.8.29 Locations and References

A drawing showing the test locations to 1:500 scale is included in the tender package showing the positions of:

1. Boreholes with follow on Rotary Cores (denoted "BH"), marked on drawing.
2. Trial Pits (denoted "TP"), marked on drawing.
3. Slit trenches (denoted "ST"), marked on drawing.

The Contractor must ensure that each exploratory hole has been sited at the position shown on the drawings and co-ordinated in Schedules, unless otherwise directed by or agreed with the Investigation Supervisor. Setting out of exploratory holes shall be undertaken in the presence of the Investigation Supervisor unless advised otherwise.

The determination of the existing ground level, setting out and surveying the final location of all exploratory holes shall be the responsibility of the Contractor.

The Contractor's report shall refer to depths below existing ground level and reduced level mOD and use the same reference numbers as provided on the plans or as subsequently agreed by the Investigation Supervisor.

The locations of any services uncovered during slit trench investigations should be recorded and illustrated with a section drawing highlighting the service material, depth below datum, location and spacing/proximity to any other services uncovered within the slit trench.

A full set of marked up drawings showing the actual location of all boreholes shall be provided by the Contractor and included within the Ground Investigation Report. All logs of boreholes shall state the national grid co-ordinates and ground level related to Malin Head Datum of the final location of each exploratory hole.

S1.8.30 Contract Datum

The datum level to be used for this Contract shall be the Malin Head datum. All depths shall be logged in meters Ordinance Datum mOD on the logs.

S1.8.31 Water for Works

The Contractor shall make his own arrangements for bringing water to the site of each borehole and shall supply all pipes, tanks, transport, etc., that he may require for this purpose.

Disposal of water shall also be the Contractor's responsibility. Unclean water shall not be allowed to flow directly into any watercourse.

S1.8.32 Fencing at Investigation Locations

Unless the Contractor obtains the Investigation Supervisor's written permission, all trial pit locations must be fenced off from the commencement of work at that location until restoration is completed.

S1.8.33 Contact with the Contractor

The Contractor shall be contactable at all times by mobile telephone and must provide emergency contact numbers to the Investigation Supervisor and the client.

S1.8.34 The Freedom of Information Act

The Freedom of Information (FOI) Act, 1997 came into operation for local authorities, on 21 October 1998. If you consider that any information supplied by you is either commercially sensitive or confidential in nature, this should be highlighted and the reasons for its sensitivity specified. In such cases, the relevant material will, in response to FOI requests, be examined in the light of the exemptions provided for in the FOI Act.

S1.8.35 Calibration of Equipment

Calibration certificates must be provided by the Contractor, upon request by the Investigation Supervisor.

S1.8.36 Staging, Platforms, Bog Mats, etc.

In soft, boggy or marshy areas, the use of bog mats may be required and the Contractor is deemed to include the use of such items in their rates.

S1.9 Percussion boring (Specification Section 4) Particular restrictions/ relaxations

S1.9.1 Permitted methods and restrictions (Clause 4.1 to 4.4)

Where impassable obstructions are encountered at a depth between existing ground level and a depth not exceeding 2.0m the exploration borehole shall be moved nearby and recommenced, logged and sampled anew from ground level. The Investigation Supervisor shall be notified of any such moves as required prior to the move. The cost associated with setting up on the second hole will not be deemed chargeable but all other costs will be paid as normal.

S1.9.2 Backfilling (Clause 4.5)

Permanent immediate pavement reinstatement is required in accordance with the Transport Infrastructure Ireland (TII) “Specifications for the Reinstatement of Openings in National Roads”, May 2019, and the “Guidelines for the Opening, Backfilling and Reinstatement of Trenches in Public Roads” published by DTTAS, April 2017, for permanent and immediate reinstatement of roadways, unless otherwise specified in the Road Opening License conditions.

S1.9.3 Dynamic sampling (Clause 4.6)

Not required.

S1.10 Rotary drilling (Specification Section 5) Particular restrictions/ relaxations

S1.10.1 Augering requirements and restrictions (Clauses 5.1)

Not required.

S1.10.2 Particular rotary drilling techniques (Clause 5.2)

Rotary coring shall be undertaken using a minimum ‘P’ size core barrel.

S1.10.3 Drilling fluid type and collection (Clause 5.3)

All drilling fluid returns shall be collected and disposed of off-site.

S1.10.4 Rotary core drilling equipment and core diameter (Clauses 5.4.1 and 5.4.2)

The ground investigation contractor shall identify and use a core diameter which will achieve the required core recovery within the anticipated ground conditions. Rotary coring shall be undertaken using a minimum 'P' size core barrel. This may however be reduced to 'H' size or another agreed diameter to form the 'pocket' lengths to undertake high-pressure dialatometer testing where required and agreed with the Investigation Supervisor.

S1.10.5 Core logging (Clause 5.4.6)

Not required.

S1.10.6 Core sub-samples for laboratory testing (Clause 5.4.7)

A minimum of 1 no. core sub-sample shall be retained from each core run from the rotary core holes following logging and photography. The method of taking, preserving and transporting the core sub-samples shall be proposed by the Contractor in their method statement for approval by the Investigation Supervisor. The core sub-samples shall be used for the rock testing scheduled in the BOQ.

S1.10.7 Address for delivery of selected cores (Clauses 5.4.8 and 5.4.9)

Delivery of selected core samples shall be to the Contractor's premises or testing laboratory unless otherwise directed by the Investigation Supervisor. The address for delivery of any selected core samples as directed by the Investigation Supervisor shall be C/- RPS, West Pier Business Campus, Dun Laoghaire, Co. Dublin A96 N6T7.

S1.10.8 Rotary open-hole drilling general requirements (Clause 5.5.1)

Not required.

S1.10.9 Rotary open-hole drilling for locating mineral seams, mine working, etc. (Clause 5.5.2)

Not required.

S1.10.10 Open-hole resonance (sonic) drilling (Clause 5.6.1)

Not required.

S1.10.11 Resonance (sonic) drilling with sampling or continuous coring (Clause 5.6.2)

Not required.

S1.10.12 Backfilling (Clause 5.7)

Not required.

S1.10.13 Core photographic requirements (Clause 5.8)

Not required.

S1.11 Pitting and trenching (Specification Section 6) Particular restrictions/ relaxations

S1.11.1 Indirect detection of buried services and inspection pits (Clauses 3.8.3 and 6.1)

The Contractor shall accurately log and measure all of the bound and unbound road pavement layers where pitting or trenching below a road.

S1.11.2 Restrictions on plant or pitting/ trenching methods (Clauses 6.2 and 6.3)

Not required.

S1.11.3 Entry of personnel (Clause 6.5)

Not required.

S1.11.4 Alternative pit and trench dimensions (Clause 6.7)

Not required.

S1.11.5 Abstracted groundwater from land affected by contamination (Clause 6.9.2)

Not required.

S1.11.6 Backfilling (Clause 6.10)

Where trial pits and/or slit trenches are required beneath road and pavement construction they shall be excavated, inspected by the Investigation Supervisor and permanently and immediately reinstated in accordance with the Transport Infrastructure Ireland (TII) “Specifications for the Reinstatement of Openings in National Roads”, December 2013, and the “Guidelines for the Opening, Backfilling and Reinstatement of Trenches in Public Roads” published by DTTAS, September 2015 for permanent and immediate reinstatement of roadways, unless otherwise specified in the Road Opening Licence conditions.

S1.11.7 Photographic requirements (Clause 6.12)

Not required.

S1.11.8 Artificial lighting (Clause 6.12.2)

Not required.

S1.11.9 Provision of pitting equipment and crew for Investigation Supervisor's use (Clause 6.13)

Not required.

S1.12 Sampling and monitoring during intrusive investigation (Specification Section 7) Particular restrictions/relaxations

S1.12.1 Address for delivery of selected geotechnical samples (Clause 7.6.1)

Delivery of all geotechnical samples shall be to the Contractor's premises or testing laboratory unless otherwise directed by the Investigation Supervisor. The address for delivery of any selected geotechnical samples where directed by the Investigation Supervisor shall be C/- RPS, West Pier Business Campus, Dun Laoghaire, Co. Dublin A96 N6T7.

S1.12.2 Retention and disposal of geotechnical samples (Clause 7.6.2)

Not required.

S1.12.3 Frequency of sampling for geotechnical purposes (Clauses 7.6.3-7.6.11)

Alternate Standard Penetration Tests (SPTs) and undisturbed sampling shall be carried out every 1m interval to 10m depth and every 1.5m thereafter in cohesive strata, with repeated SPTs in granular strata, with supplementary bulk / disturbed sampling at SPT depths and every change in strata during cable percussive boring.

Standard penetration tests (SPTs) shall be undertaken at the end of each core run, in areas of poor recovery, as instructed by the Investigation Supervisor.

S1.12.4 Open-tube and piston sample diameters (Clause 7.6.5)

Open-tube samples shall be taken by thin-walled open tube sampler or piston sample only to obtain a Class 1 sample. Sampling by thin-walled open-tuber sampler is not allowable.

S1.12.5 Retention of cutting shoe samples (Clause 7.6.5)

Soil from the cutting shoe of an open tube shall be retained and labelled as a disturbed sample.

S1.12.6 Thin walled sampling (Clause 7.6.12)

Not required.

S1.12.7 Groundwater level measurements during exploratory hole construction (Clause 7.7)

Not required.

S1.12.8 Special geotechnical sampling (Clause 7.8)

Not required.

S1.12.9 Address for delivery of selected samples (Clause 7.9.2)

Delivery of all WAC samples shall be to the Contractor's premises or testing laboratory unless otherwise directed by the Investigation Supervisor. The address for delivery of any selected WAC samples where directed by the Investigation Supervisor shall be C/- RPS, West Pier Business Campus, Dun Laoghaire, Co. Dublin A96 N6T7.

S1.12.10 Retention and disposal of contamination (WAC) samples (Clause 7.9.3)

Not required.

S1.12.11 Frequency of sampling (Clause 7.9.4)

Samples shall be taken for headspace testing and laboratory at the following intervals:

- At every change in strata both Made Ground and natural soil.
- At 1 m depth intervals within Made Ground or natural soil showing signs of potential contamination.
- At a depth of 0.5 m into natural soil below any Made Ground.
- As directed by the Investigation Supervisor.

S1.12.12 Sampling method (Clause 7.9.5)

Samples shall be taken by or under the direction of the Investigation Supervisor or Contractor's Supervisor to ensure compliance with procedures identified in BS 10175 (2011).

S1.12.13 Headspace testing (Clause 7.9.8)

Headspace testing by FID and/or PID shall be carried out on all environmental samples.

S1.13 Probing and cone penetration testing (Specification Section 8) Particular restrictions/relaxations

Not required.

S1.14 Geophysical Surveying (Specification Section 9) Particular restrictions/relaxations

S1.14.1 Geophysical survey objectives (Clause 9.1.1)

The geophysical investigation is to confirm the depth of the quay wall, it is proposed to use the parallel seismic method by drilling test boreholes adjacent to the quay wall (as close as possible, max 2m away from the wall), which extend to a depth at least 5m greater than the estimated toe of the wall (approximately 20m bgl). Seismic receivers shall be passed down the hole and seismic energy is passed through the quay wall using a small, instrumented hammer. Reading spacing shall be every 0.5 m depth or as agreed in advance with the Investigation Supervisor.

The recorded waveforms in the borehole shall be analysed to interpret the depth where there is a change in seismic velocity, related to the different material (i.e. the interface between the quay wall and the underlying formation) can be determined. For this investigation 3 No. boreholes are required along the back of the wall (land side), formed through cable percussive and rotary follow-on methods, but fitted with a PVC liner their full depth, with a minimum internal diameter of 75mm.

The contractor shall supply and operate the apparatus and to interpret the results. If the test holes are to be drilled by a separate contractor, it is important that the pressuremeter testing contractor liaises with the main works contractor prior to the commencement of the works to confirm the GI programme and requirements.

S1.14.2 Requirement for competent geophysicist (Clause 9.1.1)

A geophysicist shall be provided by the Contractor under Clause 3.6 to advise on the types and methods of geophysics to be used.

S1.14.3 Trial geophysical methods (Clause 9.1.1)

Not required.

S1.14.4 Types of geophysical methods required (Clause 9.1.1)

It is proposed to use the parallel seismic methods with receivers installed in boreholes as outlined in S1.16.12.

S1.14.5 Information provided (Clause 9.2)

The Contractor shall be provided with all information currently available on the existing wall, ground, and groundwater conditions.

S1.14.6 Horizontal data density (Clause 9.3)

Not required.

S1.14.7 Level datum (Clause 9.4)

The geophysics survey shall be undertaken to a reduced level mOD.

S1.14.8 Geophysical survey report (Clause 9.7)

As per Clause 9.7.

S1.15 In situ testing (Specification Section 10) Particular restrictions/relaxations

S1.15.1 Tests in accordance with Irish, UK or European Standards (Clause 10.3)

The following in situ tests are likely to be required:

- Standard Penetration Test (SPT).
- Vane shear strength.
- Apparent resistivity of soil.
- Redox potential.
- Variable head permeability test in boreholes and/or piezometers.
- Packer permeability test.
- Downhole seismic test in accordance with ASTM D700/D7400M-19.

S1.15.2 Hand penetrometer and hand vane for shear strength (Clause 10.4.1)

Hand penetrometer tests shall be undertaken at the base of all undisturbed samples prior to sealing or as directed by the Investigation Supervisor.

Hand Shear Vane (HSV) testing shall be carried out every 0.50m in hand dug service pits in cohesive strata.

Hand vane testing shall be undertaken on any cohesive materials encountered in pits or trenches where safe to do so.

S1.15.3 Self-boring pressuremeter and highpressure dilatometer testing and reporting (Clause 10.5.1)

A high-pressure dilatometer (HPD) shall be used in pre-bored holes (98-110mm diameter), with testing carried out in 'pocket' lengths of between 1.5 and 3.0m at various depths in the same borehole at a rate of one test per 5 m depth of borehole or as agreed with the Investigation Supervisor. HPD shall be undertaken in accordance with BS EN ISO 22476-5:2023.

The HDP shall include direct strain sensing at six points equally spaced around the centre of the expanding region. The HDP shall have better than 1 micron displacement resolution and 0.3 kPa pressure resolution and be able to apply pressures of up to 20 MPa in normal use.

The contractor is to supply and operate the apparatus and to interpret the results. If the test holes are to be drilled by a separate contractor, it is important that the pressuremeter testing contractor liaises with the main works contractor prior to the commencement of the works to confirm the GI programme and requirements.

All testing equipment shall be calibrated before use and the operator shall account for the anticipated ground conditions.

Reported results shall include the estimated material strength and stiffness calculated for each test.

S1.15.4 Driven or push-in pressuremeter testing and reporting requirements (Clause 10.5.2)

Not required.

S1.15.5 Menard pressuremeter tests (Clause 10.5.3)

Not required.

S1.15.6 Soil infiltration test (Clause 10.6)

Not required.

S1.15.7 Special in situ testing and reporting requirements (Clause 10.7)

Downhole seismic testing shall be undertaken in accordance with ASTM D7400/D7400M-19 and S1.14.

S1.15.8 Interface probes (Clause 10.8)

Not required.

S1.15.9 Contamination screening tests (Clause 10.9)

Not required.

S1.15.10 Metal detection (Clause 10.10)

Not required.

S1.16 Instrumentation (Specification Section 11) Particular restrictions/relaxations

S1.16.1 Protective covers for installations (Clause 11.2)

Heavy duty flush shall be installed for all installations.

S1.16.2 Protective fencing (Clause 11.3)

Not required.

S1.16.3 Standpipe and standpipe piezometer installations (Clauses 11.4.1 and 11.4.2)

Groundwater monitoring installations shall be 19mm slotted/plain plastic pipe with lockable flush covers, installed in accordance with Clause 11.4.1, 11.4.2 and drawing AI.1 and AI.2 within Appendix I of the Specification. Depths and response zone for the apparatus shall be confirmed by the Investigation Supervisor on review of the encountered ground conditions.

S1.16.4 Other piezometer installations (Clause 11.4.3)

Vibrating wire piezometers (Divers) shall be installed in selected boreholes. Equipment including battery capacity must be capable of recording groundwater information at 20 minute intervals for a minimum of a 1 month but ideally up to 1 year. Data should be downloaded at bi-monthly intervals.

S1.16.5 Development of standpipes and standpipe piezometers (Clause 11.4.5)

Not required.

S1.16.6 Ground gas standpipes (Clause 11.5)

Not required.

S1.16.7 Inclinometer installations (Clause 11.6)

Not required.

S1.16.8 Slip indicators (Clause 11.7)

Not required.

S1.16.9 Extensometers and settlement gauges (Clause 11.8)

Not required.

S1.16.10 Settlement monuments (Clause 11.9)

Not required.

S1.16.11 Removal of installations (Clause 11.10)

As specified in Clause 11.10 of the Specification.

S1.16.12 Other instrumentation (Clause 11.11)

Full depth PVC lining with a minimum 75mm internal diameter shall be installed in locations as specified in Schedule 2 or as directed by the Investigation Supervisor to enable downhole seismic testing.

The annulus around the PVC shall be backfilled as agreed by the Investigation Supervisor using bentonite pellets or bentonite grout to a depth near surface (c. 1.5 m depth). Backfilling above here to match surface backfilling details for standpipes as detailed in drawing AI.1 and AI.2 within Appendix I of the Specification

with top seal, gravel drainage layer and concrete plug. The top of the borehole shall be capped using a flush protective covering.

S1.17 Installation monitoring and sampling (Specification Section 12) Particular restrictions/relaxation

S1.17.1 Groundwater level readings in installations (Clause 12.2)

Standpipe piezometers (2) must be provided, installed, and delivered to measure groundwater levels. Additionally, samples (2) must be taken every two weeks from each piezometer to analyse the groundwater level, the substances present, and the concentrations of contamination. These samples must be sent to a laboratory, and a report of the results must be signed by a certified laboratory and a competent professional.

The works include site preparation, drilling, casing installation, grouting, sampling and protective enclosure.

Other technical considerations are included below:

a) Applicable Standards and References:

- BS 5930:2015 “Code of practice for ground investigations”
- BS EN ISO 14688-1&2 “Geotechnical investigation and testing – Identification and classification of soil”.
- Environment Agency (EA) R&D Technical Report P236 “Monitoring of Groundwater Levels”
- IRL/UK Water Industry Research (UKWIR) guidance on piezometer installation
- Health & Safety Executive (HSE) Regulations for Confined Space Entry and Well Operations

b) Materials and Equipment:

- Piezometer Casing and Screen
  - High-density polyethylene (HDPE) or schedule 75 PVC casing, nominal OD 90 mm, rated to 2 bar.
  - Perforated/slot-screen section (slot width 0.5 mm) length as per borehole log.
  - Solid casing riser above the screen zone to ground level.

- Gravel Pack and Sealing Materials
  - Silica sand (0.6–1.2 mm grain size) for gravel pack around screen.
  - Bentonite grout or cement-bentonite mix for annular seal above gravel pack.

c) Surface Installation and Protective Enclosure

- In situ cast concrete pad (300 mm thick, 600 × 600 mm footprint) around riser.
- Lockable manway chamber or steel-reinforced plastic (GRP) protective box, minimum internal dimensions 500 × 500 × 600 mm (height), recessed into concrete pad.
- Traffic or pedestrian-rated hinged cover with padlock hasp and rubber gasket to exclude surface water and contaminants.

d) Installation Procedure

- Site Establishment and Survey
- Verify borehole locations against site drawings and utility plans.

- Establish surface datum and mark benchmark for future level recordings.

e) Drilling and Borehole Completion

- Employ rotary drilling (mud or air) or cable percussive methods to target depth.
- Record stratigraphy continuously in a borehole log in accordance with BS 5930.
- Maintain borehole stability until casing installation.

f) Casing and Screen Installation

- Lower screen section centrally into the borehole at the design depth.
- Place graded silica sand gravel pack around the screen by tremie pipe.
- Seal annulus above gravel pack with bentonite grout to at least 2 m above screen top.
- Install solid riser to finish just above ground level (+0.05 m).

g) Surface Works and Protective Enclosure

- Excavate and install recessed manway chamber or GRP box onto concrete pad, ensuring flush finish with final ground level.
- Fit lockable cover, seal all joints to prevent water ingress.
- Affix a corrosion-resistant stainless-steel identification plate showing piezometer ID, installation date and benchmark level.

S1.17.2 Groundwater sampling from installations (Clause 12.3.1)

Not required.

S1.17.3 Purging/micro-purging (Clause 12.3.2)

Not required.

S1.17.4 Ground gas monitoring (Clause 12.4)

Not required.

S1.17.5 Sampling from ground gas installations (Clause 12.5)

Not required.

S1.17.6 Other monitoring (Clause 12.8)

Not required.

S1.17.7 Sampling and testing of surface water bodies (Clause 12.9)

Not required.

S1.18 Daily records (Specification Section 13) Particular restrictions/relaxations

S1.18.1 Information for daily records (Clause 13.1)

Not required.

S1.18.2 Special in situ tests and instrumentation records (Clause 13.4)

The time and duration of pressuremeter tests and test failure and termination pressure and displacement shall be in accordance with the contract schedule.

S1.19 Geotechnical laboratory testing (Specification Section 14) Particular restrictions/relaxations

S1.19.1 Investigation Supervisor or Contractor to schedule testing (Clause 14.1.1)

The Contractor shall supply the Investigation Supervisor with a list of samples available as an excel schedule for scheduling by the Investigation Supervisor in accordance with Clause 14.1.1.

S1.19.2 Tests required (Clause 14.1.2)

The type and estimated number of tests required is detailed in the Bill of Quantities.

S1.19.3 Specifications for tests not covered by BS 1377 and options under BS 1377 (Clauses 14.2.1 and 14.4)

Where tests are not covered by EN or British Standards they shall be performed in accordance with the procedures in the references.

S1.19.4 INAB or UKAS accreditation to be adopted (Clause 14.3)

All laboratory testing shall be undertaken by accredited laboratories (INAB or UKAS).

S1.19.5 Rock testing requirements (Clause 14.5)

Not required.

S1.19.6 Chemical testing for aggressive ground/groundwater for concrete (Clause 14.6)

Chemical testing for aggressive ground/groundwater for concrete shall comprise of:

- Suite C or,
- Suite D

S1.19.7 Laboratory testing on site (Clause 14.7)

Not required.

S1.19.8 Special laboratory testing (Clause 14.8)

S1.20 Geoenvironmental laboratory testing (Specification Section 15) Particular restrictions/relaxations

S1.20.1 Investigation Supervisor or Contractor to schedule testing (Clause 15.1)

The Contractor shall supply the Investigation Supervisor with a list of samples available as an excel schedule for scheduling by the Investigation Supervisor in accordance with Clause 15.1.

S1.20.2 Accreditation required (Clause 15.2)

All laboratory testing shall be undertaken by accredited laboratories (INAB or UKAS).

S1.20.3 Chemical testing for contamination (Clause 15.3) (Test Suites LI to L4)

Where scheduled by the Investigation Supervisor chemical testing for contamination shall comprise of Suite E or Suite J as detailed in the below tables.

Table 4: Suite E – Soil samples

Determinand (Procurer to list required determinands)	Limit of detection required/offered[1]	Test method required/offered[1]	Accreditation required/offered[1]
Arsenic			
Boron			
Cadmium			
Chromium (total)			
Chromium Hexavalent			
Copper			
Lead			
Mercury			
Nickel			
Selenium			
Zinc			
pH			
Water soluble sulphate (as SO4)			
Organic matter			
Total petroleum hydrocarbons			
Speciated polyaromatic hydrocarbons (USEPA 16 including coronene)			
Phenol			
Cyanide (total)			
Asbestos			
Total petroleum hydrocarbons			
Speciated polyaromatic hydrocarbons (USEPA 16 including coronene)			
Phenol			
Cyanide (total)			
Asbestos			
Organic matter			

Table 5: Suite J – Other Tests as directed by Investigation Supervisor

Determinand	Limit of detection required/offered[1]	Test method required/offered[1]	Accreditation required/offered[1]
Metals (Antimony, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Zinc, Boron)		CEN 10:1 Leachate & Total Pollutant Content (Solid) analysis	
Polycyclic Aromatic Hydrocarbons (PAHs) (Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(bk)fluoranthene, Benzo(a)pyrene, Indeno(123cd)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene, Coronene, Benzo(j)fluoranthene, Benzo(b)fluoranthene, Benzo(k)fluoranthene EPA sum of 6 & EPA Sum of 17)		Total Pollutant Content (Solid) analysis	
Total Petroleum HydroCarbon Working Group (TPHCWG)			
Mineral Oil		Interpretation of hydrocarbon chromatogram	
MTBE, Benzene, Toluene, Ethylbenzene, m/p-Xylene, p-Xylene			
Total 7 PCBs			
Natural Moisture Content			
Moisture Content			
Hexavalent Chromium & Chromium III			
Total Organic Carbon			
pH			
Cyanides, Total including iron cyanides			
Sulphate (as Total SO4)			
Suphide (as S)			
Sulphur (Free)			
Phenol (mono)			
Phenol			
Flouride			
Chloride		CEN 10:1 Leachate	
Sulphate			
Dissolved Organic Carbon			
Total Dissolved Solids			
Ammonia as N			
Asbestos screening & quantification			

S1.20.4 Waste characterisation (Clause 15.4)

Not required.

S1.20.5 Waste Acceptance Criteria testing (Clause 15.5) (Test Suites H and I)

WAC testing shall comprise of either Suite H or I as scheduled by the Investigation Supervisor.

S1.20.6 Laboratory testing (Clause 15.6)

Not required.

S1.20.7 Special laboratory testing (Clause 15.7)

Not required.

S1.21 Reporting (Specification Section 16) Particular restrictions/relaxations

S1.21.1 Form of exploratory hole logs (Clauses 16.1 and 16.2.1)

Where boreholes are scheduled to be drilled using cable percussive methods and rotary drilling, the borehole shall be logged as one continuous log covering both the cable percussive and rotary drilling. The log shall record the depth of the cable percussive termination and rotary follow on.

S1.21.2 Information on exploratory hole logs (Clause 16.2.2)

Fracture index or spacing is to be used on the log and whether soil classification is required.

S1.21.3 Variations to final digital data supply requirements (Clause 16.5.1)

AGS data shall be provided as AGS4 containing all fieldwork, monitoring and laboratory testing information.

S1.21.4 Preliminary digital data (Clause 16.5.3)

The Contractor shall issue preliminary AGS draft investigation logs upon completion of the fieldworks element of the works.

S1.21.5 Type(s) of report required (Clause 16.6)

The Contractor is required to prepare the following reports are required:

- Ground Investigation Factual Report.
- Geophysical Survey Report.
- Geotechnical Interpretative Report.

S1.21.6 Electronic report requirements (Clause 16.6.3)

Not required.

S1.21.7 Format and contents of Desk Study Report (Clause 16.7)

Not required.

S1.21.8 Contents of Ground Investigation Report (or specified part thereof) (Clause 16.8)

All elements of the Ground Investigation Report shall be compiled by the Contractor.

S1.21.9 Contents of Geotechnical Interpretative or Design Report (or specified part thereof) (Clauses 16.9 and 16.10)

All elements of the Geotechnical Interpretative Report shall be compiled by the Contractor.

S1.21.10 Times for supply of electronic information (Clause 16.11.1)

Interim issues of AGS data shall be issued monthly during the fieldworks elements unless agreed otherwise with the Investigation supervisor in addition to preliminary submission upon completion of the fieldworks and draft and final submission with the Ground Investigation Report (factual).

S1.21.11 Electronic information transmission media (Clause 16.11.2)

Transmission shall be via email or file sharing system.

S1.21.12 Report approval (Clause 16.12)

A singular digital copy of the draft and final reports are required in pdf format.

SCHEDULE 2: EXPLORATORY HOLES

The locations of proposed ground investigation locations are shown on the drawings included in the tender package and listed in

Table 6. These locations are preliminary based on a preliminary assumptions on ground conditions. There may be adjustment to the number, type and location of investigations if the ground conditions or other constraints require. If changes are required then these will be instructed by the Investigation Supervisor.

The percussion boreholes shall reach refusal with rotary core following on from termination depth. Boreholes shall then follow on from the percussion boreholes to the termination depth.

Additional holes may be requested by the Investigation Supervisor and are to be priced according to the rates in the Bill of Quantities.

The final location of all exploratory holes may be adjusted to accommodate site conditions and will be confirmed on site with the Investigation Supervisor.

The ground level at the exploratory holes shall be determined by the Contractor.

S2.1 Hole number

Hole numbers are listed in Table 2 and MDR1597-RPS-01-SI-DH-L-G-0001 Schedules; shown on the drawings MDR1597-RPS-01-M2-XX-D-C-0200 to 0204 - Site Investigation Works.

S2.2 Type

The following types of exploratory hole form part of this site investigation:

- BH/RC01 Shell and auger borehole with rotary core follow on;
- TP01 - Trial pit;
- ST01 - Slit Trench

S2.3 Scheduled depth

The scheduled depth given is the anticipated depth, which may be varied on site depending on the ground conditions encountered. Termination of exploratory holes shall be agreed with the Investigation Supervisor.

S2.4 National grid reference

The Contractor shall provide all information in Irish Transverse Mercator Co-ordinate (ITM) format.

The co-ordinates on the Contract Drawings are provisional, for setting out purposes. The final positions should be agreed with the Investigation Supervisor. Indicative investigation locations shown on associated drawings.

S2.5 Approximate ground level

Approximate ground levels are listed in

Table 6 to the contract datum. The Contractor shall accurately record the actual ground levels to the nearest 50 mm.

S2.6 Remarks

An indication of in situ testing, and installations is outlined under the Remarks column in

Table 6.

Table 6: Schedule of Ground Investigations

Cable Percussion Boreholes & Rotary Drilling / Geobor-S Polymer Gel Wireline Coring Drillholes							
Reference Number	Reference Drawing	Location	Type	Scheduled Depth (m)	Remarks	Coordinates (ITM Grid)	
						Easting	Northing
MDR1597 BH/RC01	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DWtE Area	CP & RC	10	Rotary core follow on required SPT, SP, DL	719,897,731	733509.186
MDR1597 BH/RC02	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DWtE Area	CP & RC	10	Rotary core follow on required SPT, SP, DL	719851.253	733428.115
MDR1597 BH/RC03	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC/UE Area	CP & RC	10	Rotary core follow on required SPT, SP, DL	719846.387	733406.679
MDR1597 BH/RC04	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC/UE Area	CP & RC	50	Rotary core follow on required SPT, SP, DL	719815.656	733386.767
MDR1597 BH/RC05	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC/UE Area	CP & RC	50	Rotary core follow on required SPT, SP, DL	719807.698	733387.404
MDR1597 BH/RC06	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC/UE Area	CP & RC	25	Rotary core follow on required SPT, SP, DL	719805.963	733380.537
MDR1597 BH/RC07	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC/UE Area	CP & RC	10	Rotary core follow on required SPT, SP, DL	719813381	733379.834
MDR1597 BH/RC08	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC/UE Area	CP & RC	10	Rotary core follow on required SPT, SP, DL	719790.497	733339.395
MDR1597 BH/RC09	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC/UE Area	CP & RC	25	Rotary core follow on required SPT, SP, DL	719780.356	733314.146
MDR1597 BH/RC10	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC South Bank	CP & RC	10	Rotary core follow on required SPT, SP, DL	719753.742	733426.043
MDR1597 BH/RC11	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC South Bank	CP & RC	10	Rotary core follow on required SPT, SP, DL	719657.659	733448.934
MDR1597 BH/RC12	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC South Bank	CP & RC	10	Rotary core follow on required SPT, SP, DL	719558.129	733473.641
MDR1597 BH/RC13	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC/ECOCEM	CP & RC	10	Rotary core follow on required SPT, SP, DL	719388.784	733404.647
MDR1597 BH/RC14	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg - DPC/Bisset	CP & RC	10	Rotary core follow on required SPT, SP, DL	719268.112	733417.523
MDR1597 BH/RC15	MDR1597-RPS-01-M2-XX-D-C-0201	Poolbeg IGB Site Area	CP & RC	10	Rotary core follow on required SPT, SP, DL	719227.531	733442.398
MDR1597 BH/RC16	MDR1597-RPS-01-M2-XX-D-C-0202	Sean Moore Road	CP & RC	10	Rotary core follow on required SPT, SP, DL	718896.532	733709.315
MDR1597 BH/RC17	MDR1597-RPS-01-M2-XX-D-C-0202	Sean Moore Road	CP & RC	10	Rotary core follow on required SPT, SP, DL	718828.043	733673.898
MDR1597 BH/RC18	MDR1597-RPS-01-M2-XX-D-C-0202	IrishTow n Parking Area	CP & RC	10	Rotary core follow on required SPT, SP, DL	718488.382	733699.481
MDR1597 BH/RC19	MDR1597-RPS-01-M2-XX-D-C-0202	Ringsend Park	CP & RC	10	Rotary core follow on required SPT, SP, DL	718481.109	733849.62
MDR1597 BH/RC20	MDR1597-RPS-01-M2-XX-D-C-0202	Ringsend Park	CP & RC	10	Rotary core follow on required SPT, SP, DL	718339.926	733918.944

Notes:

Abbreviations used for the following exploratory hole remarks:

- SPT – SPT testing / sampling or Class 1 UT sampling throughout overburden at intervals outlined in the specification and S1.12.3
- HSV – Hand shear vane testing as per the specification and S1.15.2
- HPD – High-pressure dilatometer as per the specification and S1.15.3 proposed at a rate of 1 no. per 5 m depth
- PT – Packer test in borehole. 1 no. in upper 10 m and 1 between 10 m and 20 m as agreed with Investigation Supervisor.
- SP – Standpipe piezometer or piezometer installation
- PVC75 – 75 mm PVC installation as per the specification and S1.16.12 for downhole seismic testing
- VHP – Variable Head Permeability test in piezometer
- DL – Use of data logger for groundwater monitoring.

Cable Percussion Boreholes & Rotary Drilling / Geobor-S Polymer Gel Wireline Coring Drillholes							
Reference Number	Reference Drawing	Location	Type	Scheduled Depth (m)	Remarks	Coordinates (ITM Grid)	
						Easting	Northing
MDR1597 BH/RC21	MDR1597-RPS-01-M2-XX-D-C-0202	Ringsend Park	CP & RC	10	Rotary core follow on required SPT, SP, DL	718334.033	733945.413
MDR1597 BH/RC22	MDR1597-RPS-01-M2-XX-D-C-0202	Toll Plaza Area	CP & RC	10	Rotary core follow on required SPT, SP, DL	718206.711	734137.179
MDR1597 BH/RC23	MDR1597-RPS-01-M2-XX-D-C-0203	Ringsend Rowing Club	CP & RC	35	Cable percussion with rotary coring follow on. Ground water monitoring standpipe SPT, HPD, PT, SP, VHP, DL	717950.244	734208.545
MDR1597 BH/RC24	MDR1597-RPS-01-M2-XX-D-C-0203	Dodder River	PG & RC	30	PG may continue beyong its scheduled depth up to the level where rock is found. STPs as per specification. Environmental Samples	717916.957	734213.162
MDR1597 BH/RC25	MDR1597-RPS-01-M2-XX-D-C-0203	Dodder River	PG & RC	30	PG may continue beyong its scheduled depth up to the level where rock is found. STPs as per specification. Environmental Samples	717879.297	734218.232
MDR1597 BH/RC26	MDR1597-RPS-01-M2-XX-D-C-0203	Dodder River	PG & RC	30	PG may continue beyong its scheduled depth up to the level where rock is found. STPs as per specification. Environmental Samples	717839.416	734224.556
MDR1597 BH/RC27	MDR1597-RPS-01-M2-XX-D-C-0203	Dodder River	PG & RC	30	PG may continue beyong its scheduled depth up to the level where rock is found. STPs as per specification. Environmental Samples	717839.416	734224.556
MDR1597 BH/RC28	MDR1597-RPS-01-M2-XX-D-C-0203	West Wall Quay	CP & RC	20	Cable percussion with rotary coring follow on. PVC lined full depth min internal diameter 75mm - SPT, PVC75	717827.582	734226.042
MDR1597 BH/RC29	MDR1597-RPS-01-M2-XX-D-C-0203	West Wall Quay	CP & RC	20	Cable percussion with rotary coring follow on. PVC lined full depth min internal diameter 75mm - SPT, PVC75	717829.088	734234.849
MDR1597 BH/RC30	MDR1597-RPS-01-M2-XX-D-C-0203	West Wall Quay	CP & RC	20	Cable percussion with rotary coring follow on. PVC lined full depth min internal diameter 75mm - SPT, PVC75	717829.902	734242.885
MDR1597 BH/RC31	MDR1597-RPS-01-M2-XX-D-C-0203	West Campshires	CP & RC	35	Cable percussion with rotary coring follow on. Ground water monitoring standpipe SPT, HPD, PT, SP, VHP, DL	717818.858	734224.934
MDR1597 BH/RC32	MDR1597-RPS-01-M2-XX-D-C-0203	West Campshires	CP & RC	35	Cable percussion with rotary coring follow on. Ground water monitoring standpipe SPT, HPD, PT, SP, VHP, DL	717812.742	734232.294

SITE INVESTIGATION (SLIT TRENCH & TRIAL PIT)								
Reference Number	Reference Drawing	Location	Type	Scheduled Length (m)	ITM Reference			
					Proposed Start Point		Proposed End Point	
					Easting (m)	Northing (m)	Easting (m)	Northing (m)
MDR1597 ST01	MDR1597-RPS-01-M2-XX-D-C-0201	PRIVATE AREA DWtE	Slit Trench	6	719892.4872	733481.6532	719879.1696	733422.5613
MDR1597 ST02	MDR1597-RPS-01-M2-XX-D-C-0201	PRIVATE AREA DWtE	Slit Trench	15	719860.1268	733443.7282	719855.2007	733418.8646
MDR1597 ST03	MDR1597-RPS-01-M2-XX-D-C-0201	PUBLIC ROAD	Slit Trench	6	719470.0491	733498.8528	719466.5049	733492.5789
MDR1597 ST04	MDR1597-RPS-01-M2-XX-D-C-0201	PUBLIC ROAD	Slit Trench	7	719453.2463	733504.6155	719449.7021	733498.3416
MDR1597 ST05	MDR1597-RPS-01-M2-XX-D-C-0202	SEAN MOORE ROAD	Slit Trench	5	718831.922	733670.923	718831.075	733670.145
MDR1597 ST06	MDR1597-RPS-01-M2-XX-D-C-0202	BREMEN ROAD	Slit Trench	5	718760.505	733605.022	718761.254	733604.25
MDR1597 ST07	MDR1597-RPS-01-M2-XX-D-C-0202	IRISHTOWN LEASURE PARKING	Slit Trench	5	718522.438	733671.378	718521.998	733672.25
MDR1597 ST08	MDR1597-RPS-01-M2-XX-D-C-0202	RINGSEND PARK	Slit Trench	7	718484.912	733717.813	718484.111	733716.54
MDR1597 ST09	MDR1597-RPS-01-M2-XX-D-C-0202	RINGSEND PARK	Slit Trench	10	718335.082	733931.078	718336.14	733931.45
MDR1597 ST10	MDR1597-RPS-01-M2-XX-D-C-0202	CAMBRIDGE ROAD	Slit Trench	5	718292.358	734059.676	718292.31	734058.4
MDR1597 ST11	MDR1597-RPS-01-M2-XX-D-C-0202	YORK ROAD	Slit Trench	5	718325.904	734105.685	718326.65	734104.85
MDR1597 ST12	MDR1597-RPS-01-M2-XX-D-C-0202	TOLL PLAZA	Slit Trench	5	718212.581	734130.193	718211.365	734254.56
MDR1597 ST13	MDR1597-RPS-01-M2-XX-D-C-0202	YORK ROAD	Slit Trench	5	718132.523	734148.786	718133.65	734147.63
MDR1597 ST14	MDR1597-RPS-01-M2-XX-D-C-0203	RINGSEND ROWING CLUB	Slit Trench	5	718030.602	734190.916	718031.25	734032.14
MDR1597 ST15	MDR1597-RPS-01-M2-XX-D-C-0203	RINGSEND ROWING CLUB	Slit Trench	5	717988.6	734192.606	717987.52	734192.99
MDR1597 ST16	MDR1597-RPS-01-M2-XX-D-C-0203	WEST WALL QUAY	Slit Trench	3	717941.523	734200.776	717942.25	734201.36
MDR1597 ST17	MDR1597-RPS-01-M2-XX-D-C-0203	WEST GARDEN QUAY	Slit Trench	5	717828.269	734226.333	717828.289	734225.88
MDR1597 ST18	MDR1597-RPS-01-M2-XX-D-C-0203	WEST GARDEN QUAY	Slit Trench	5	717809.964	734240.304	717809.065	734241.65
MDR1597 ST19	MDR1597-RPS-01-M2-XX-D-C-0203	JOHN ROGERSON QUAY ROAD	Slit Trench	5	717805.702	734258.761	717806.05	734258.995
MDR1597 ST20	MDR1597-RPS-01-M2-XX-D-C-0204	CASTLEFORBES ROAD	Slit Trench	5	717712.207	734587.377	717713.45	734885.96
MDR1597 ST21	MDR1597-RPS-01-M2-XX-D-C-0204	CASTLEFORBES ROAD	Slit Trench	5	717722.486	734719.354	717723.85	734719.54
MDR1597 ST22	MDR1597-RPS-01-M2-XX-D-C-0204	NEW WAPPING STREET	Slit Trench	5	717722.486	734719.354	717731.85	734719.65
MDR1597 ST23	MDR1597-RPS-01-M2-XX-D-C-0204	NEW WAPPING STREET	Slit Trench	5	717501.23	734681.706	717502.4	734682.56
MDR1597 ST24	MDR1597-RPS-01-M2-XX-D-C-0204	NORTH WALL QUAY	Slit Trench	5	717433.966	734454.224	717433.74	734455.36
MDR1597 ST25	MDR1597-RPS-01-M2-XX-D-C-0204	NORTH WALL QUAY	Slit Trench	5	717348.213	734462.88	717349.58	734463.22
MDR1597 ST26	MDR1597-RPS-01-M2-XX-D-C-0204	PARK LINE ROAD	Slit Trench	5	717328.805	734584.215	717329.65	734584.55
MDR1597 ST27	MDR1597-RPS-01-M2-XX-D-C-0204	PARK LINE ROAD	Slit Trench	5	717335.439	734678.667	717336.59	734679.11

SITE INVESTIGATION (SLIT TRENCH & TRIAL PIT)								
Reference Number	Reference Drawing	Location	Type	Scheduled Length (m)	ITM Reference			
					Proposed Start Point		Proposed End Point	
					Easting (m)	Northing (m)	Easting (m)	Northing (m)
MDR1597 TP01	MDR1597-RPS-01-M2-XX-D-C-0201	PRIVATE AREA DWtE	Trial Pit	1	719893.324	733521.876	-	-
MDR1597 TP02	MDR1597-RPS-01-M2-XX-D-C-0201	DPC / PUBLIC ROAD	Trial Pit	1	719906.272	733522.2024	-	-
MDR1597 TP03	MDR1597-RPS-01-M2-XX-D-C-0201	DPC / PUBLIC ROAD	Trial Pit	1	719380.952	733508.9848	-	-
MDR1597 TP04	MDR1597-RPS-01-M2-XX-D-C-0201	DPC/RICHARD NOLAN	Trial Pit	1	718508.0409	733703.6177	-	-
MDR1597 TP05	MDR1597-RPS-01-M2-XX-D-C-0202	IRISHTOWN LEASURE PARKING	Trial Pit	1	718483.669	733704.301	-	-
MDR1597 TP06	MDR1597-RPS-01-M2-XX-D-C-0202	DCC RINGSEND PARK	Trial Pit	1	718274.943	733986.837	-	-
MDR1597 TP07	MDR1597-RPS-01-M2-XX-D-C-0203	RINGSEND ROWING CLUB	Trial Pit	1	717977.591	734204.71	-	-
MDR1597 TP08	MDR1597-RPS-01-M2-XX-D-C-0203	WEST GARDEN QUAY	Trial Pit	1	717815.973	734262.916	-	-

Notes:

Abbreviations used for the following exploratory hole remarks:

- SPT – SPT testing / sampling or Class 1 UT sampling throughout overburden at intervals outlined in the specification and S1.12.3
- HSV – Hand shear vane testing as per the specification and S1.15.2
- HPD – High-pressure dilatometer as per the specification and S1.15.3 proposed at a rate of 1 no. per 5 m depth
- PT – Packer test in borehole. 1 no. in upper 10 m and 1 between 10 m and 20 m as agreed with Investigation Supervisor.
- SP – Standpipe piezometer or piezometer installation
- PVC75 – 75 mm PVC installation as per the specification and S1.16.12 for downhole seismic testing
- VHP – Variable Head Permeability test in piezometer
- DL – Use of data logger for groundwater monitoring.

SCHEDULE 3: INVESTIGATION SUPERVISOR'S FACILITIES

Not required.

SCHEDULE 4: SPECIFICATION AMENDMENTS

Not required.

SCHEDULE 5: SPECIFICATION ADDITIONS

Table 7: Schedule of Ground Investigations

The following clauses are added to the Specification		
Section number	**Clause number**	**Clause wording**
2	2.25	**Jack Up Barge** A jack-up barge, also known as a self-elevating platform, is a floating barge with retractable legs that can be lowered to the seabed and then raised to lift the barge above the water, creating a stable working platform for tasks like drilling or construction in relatively shallow waters
3	3.27	**Works from Jack Up Barge** The Contractor is responsible for provision, management and operation of an appropriately sized Jack Up Barge or approved alternative vessel to undertaken the proposed over water boreholes while providing sufficient working space for all operatives. The Contractor shall ensure all legislation is following and permitting is applied for in addition to liaising with relevant parties. The Contractor shall ensure all operatives are appropriately trained and are supplied with the necessary H&S equipment in order to undertake the works while meeting all the other specification requirements. The over-water works should be overseen by an appropriately qualified H&S representative.