

OCSC

O'CONNOR · SUTTON · CRONIN

MULTIDISCIPLINARY CONSULTING ENGINEERS

Z040: BLACKGLEN ROAD LRD

CONSTRUCTION & ENVIRONMENTAL MANAGEMENT PLAN

For
Zolbury Ltd

19 December 2024

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1 INTRODUCTION

1.1 APPOINTMENT

O'Connor Sutton Cronin & Associates (OCSC) have been appointed by Zolbury Ltd. to prepare this Outline Construction & Environmental Management Plan (CEMP) with respect to the proposed residential development comprising the design of 192 no. residential units, associated resident amenity facilities and a childcare facility at Blackglen Road, Sandyford.

1.2 ADMINISTRATIVE JURISDICTION

The proposed development is located in the jurisdiction of Dun Laoghaire Rathdown County Council (DLRCC).

1.3 STUDY AREA

The subject site is located at lands at Blackglen Road in Sandyford, Co. Dublin as shown in the figure overleaf.

The proposed development site is immediately bound by:

- Residential properties to the east & west;
- Blackglen Road to the north;
- Woodside Road to the south; and
- Diswellstown Road, to the east.



Figure 1: Site Location

1.4 DEVELOPMENT DESCRIPTION

Zolbury Ltd., intend to apply to Dun Laoghaire Rathdown County Council for permission for development for a Large Scale Residential Development (LRD) on a site of approx. 3.86ha on lands at Blackglen Road, Sandyford, Dublin 18.

The development will consist of 192 no. residential units ranging from 2-5 storeys in height, associated resident amenity facilities, a childcare facility, all boundary treatment and landscaping works, site services connections and all site development works to include:

(a) Construction of 192 no. residential units, in the form of 6 no. new apartment buildings (A1 – B4), 40 duplexes (C1, C2, C2A) and 14 houses (D1 & D2), to include 33 no. 1-beds, 84 no. 2 -beds, 61 no. 3-beds and 14 no. 4-beds as follows:

- Block A1 (4 storeys) comprising 15 no. apartments (3 no. 1 bed units, 6 no. 2 bed units & 6 no. 3 bed units); a crèche facility of approx. 378.2 sq. m with associated outdoor play space of approx. 170 sq. m; and resident amenity facilities of approx. 31.6 sq. m.
- Block A2 (3-4 storeys) comprising 26 no. apartments (2 no. 1 bed units, 20 no. 2 bed units and 4 no. no. 3 bed units) and resident amenity facilities of approx. 353.6 sq. m.
- Blocks B1 and B2 (2-5 storeys) comprising 51 no. apartments (15 no. 1 bed units, 29 no. 2 bed units, 7 no. 3 bed units).
- Blocks B3 and B4 (2-5 storeys) comprising 46 no. apartments (13 no. 1 bed units, 23 no. 2 bed units and 10 no. 3 bed units).
- Duplex Units C1 (4 storeys), C2 and C2A (3 storeys) comprising 40 duplexes (6 no. 2 bed units, 20 no. 3 bed units and 14 no. 4 bed units).
- House Units D1 and D2 (2 storeys) comprising 14 houses (14 no. 3 bed units).

(b) Total Open space (approx. 10,854 sq. m) is proposed in the form of public open space (approx. 8, 686 sq. m), and residential communal open space (approx. 2,168 sq. m). Each residential unit is afforded with associated private open space in the form of a garden/terrace/balcony.

(c) The development will be served via a new vehicular access via Blackglen Road. This will be designed as a priority junction with pedestrian and cycle crossings where required to tie in with the Blackglen Road Improvement Scheme.

(d) A new toucan crossing is proposed across Blackglen Road just to the east of the new vehicular access. This toucan crossing has been designed as per TL607 of the Cycle Design Manual to allow crossing of pedestrians and cyclists to the northern side of Blackglen Road for improved public transport access.

(e) Emergency access only is proposed via Woodside Road.

(f) A dedicated wildlife corridor is proposed to the east/south-east side of the site and a public open space (approx. 307 m in length) tree trail to the west/north-west side of the site.

(g) Basement/Podium car park areas are proposed below Blocks B1, B2, B3 and B4. A total of 226 no. car parking spaces are proposed, which includes 2 no. car club spaces, 12 no. accessible spaces and 47 no. EV charging spaces (198 no. long-stay spaces, 18 no. visitor space & 10 no. car parking spaces for creche use), in addition to 9 no. motorcycle spaces.

(h) A total of 484 no. bicycle spaces are proposed in the form of 442 no. long stay bicycle spaces 42 short-term stay visitor parking.

(i) 2 no. ESB substations at surface level.

(j) Bin Storage areas for the Duplex blocks are proposed at ground level adjacent to the Duplex blocks.

(k) All associated site and infrastructural works to include provision for water services; foul and surface water drainage and connections; internal roads, attenuation proposal; permeable paving; all landscaping works including green infrastructure zones; green roofs; and general plant areas; photovoltaic panels; landscaped boundary treatment; footpaths; public lighting; and electrical services.

2 OVERVIEW OF THE CEMP

This document serves to inform the planning process in respect of the proposed development. It is intended that this Construction Management Plan will be an interim assessment, and it is not intended to be a final version to cover the eventual construction of any permitted development. A detailed Construction Management Plan will be prepared in future. This document will be updated continuously to take account of any necessary changes on foot of the planning process and throughout any phased construction period.

The Construction Management Plan, to be agreed upon with the Local Authority before the commencement of any construction works, will ultimately include details on the following:

- Daily and weekly working hours;
- Agreed haul routes for incoming materials;
- Licensed hauliers to be used;
- Disposal sites;
- Travel arrangements for construction personnel;
- Appropriate on-site parking arrangements for construction personnel to prevent overspill parking on the local road network;
- Temporary construction entrances to be provided;
- Wheel wash facilities if required;
- Road cleaning and sweeping measures to be put in place if required;
- Temporary construction signage to be put in place and maintained;
- Any proposed traffic management measures such as temporary traffic lights and signage on any public roads.

The primary responsibilities of the Project Ecologist/Ecological Clerk of Works (PE/ECoW) are as follows:

- Act as the contact for the Planning Authority and agree the frequency and number of site inspections and monitoring programme for the implementation of the biodiversity related mitigation of including the EcIA, CEMP and also the Landscape Plan.
- Act as the primary on-site ecological contact for the PC and SM regarding implementation of the Biodiversity related mitigation of the EcIA, CEMP and also the Landscape Plan;
- Ensure compliance with all Biodiversity related mitigation of all documents of the Planning file including the EcIA, CEMP and also the Landscape Plan;
- Request relevant records and documentation from the SM where necessary;
- Attend routine meetings with the SM;
- Keep detailed records of any ecological incidents and the remedies required and implemented. Report these to the PC and Planning Authority;

- The PE/ECoW shall produce the staged monitoring reports in agreement with the Planning Authority on the implementation of Biodiversity related mitigation of the EcIA, CEMP and also the Landscape Plan. The PE / ECoW shall submit these directly to the Planning Authority and to the PC.
- The PE / ECoW shall also act as overall technical advisor to the PC and SM regarding the implementation of all Biodiversity related mitigation of the EcIA, CEMP, and also the Landscape Plan.

No modifications to the CEMP can be made post planning permission that will alter the outcomes of the ecological assessments in terms of significance of impacts. Therefore, no modifications can be made without prior agreement with the Planning Authority of DLRCC and no modifications will be proposed that will negatively impact biodiversity.

3 CHARACTERISTICS OF THE DEVELOPMENT

3.1 DEVELOPMENT OVERVIEW

The proposed LRD development will consist of the following elements:

192 no. residential units, associated resident amenity facilities and a childcare facility as follows:

- 138 no. apartments;
- 40 no. duplexes;
- 14 no. houses; and
- A crèche facility of approx. 378 sq. m.

The proposed site layout plan is shown in the figure below.



Figure 2: Proposed Site Layout

3.2 SITE ACCESSIBILITY

The proposed vehicular access to the site will be via Blackglen Road. This was designed as a priority junction with pedestrian and cycle crossings where required, based on the outcome of this analysis. The proposed entrance has been designed in accordance with the requirements of DMURS, particularly with respect to sightline requirements (Section 4.4.5), corner radii (Section 4.3.3) and pedestrian infrastructure (Section 4.3).

The site will also feature access on the southwestern side, on Woodside Road; however, it should be noted that this access will only be used as emergency access. This access will be closed off with retractable bollards spaced less than 2m apart to prevent cars from entering. The bollards will be managed by the concierge, with the ability to lower the bollards in case of emergency. It should however be noted that this access has only been provided as an alternative access for a situation where the main spine road is blocked or access to the upper hillside is restricted. In most instances, the main access will be used for emergencies.

This access will also serve as a pedestrian and cycle access to provide permeability through the site. The site will include an access road with minor roads branching off as shown in the figure below:



Figure 3: Development Access and Road Layout

The proposed link roads and streets together with the junctions, footpaths and cycle facilities will be designed per the requirements of the Design Manual for Urban Roads and Streets (DMURS) and the National Cycle Manual (NCM). DMURS is the design philosophy used in the design of all new residential roads and urban streets and the key objective of DMURS is to achieve safe, attractive, and vibrant streets by balancing the needs of all users and prioritising alternatives to car journeys. The subject site will be fully consistent with this recommended approach whilst also facilitating efficient and secure internal movement. The proposed site layout encourages permeability through the site, connecting to the wider area via pedestrian links and cycleways and seeks to prioritise pedestrians and cyclists under the policies set out in DMURS.

4 SITE ESTABLISHMENT

4.1 SITE ACCESS

The site is currently accessed off an informal access located on Woodside Road. It is proposed to provide a new site entrance on Blackglen Road for construction traffic to use during the construction stage as construction will not be able to use the Woodside Road access.



Figure 4: Initial Access and Site Set-Up Area

4.2 HOARDING

Perimeter hoarding will be provided to prevent unauthorised access to the site. Controlled access points will also be provided. Hoarding will be maintained to a high standard and painted or covered as appropriate.

Temporary hoarding will be provided as necessary within the site as safety restrictions to prevent public access. The locations of this temporary hoarding will vary as work progresses across the site.

4.3 TREE PROTECTION

Appropriate measures will be put in place to protect any trees on the site which are designated for protection or retention under any granted planning permission for the development. Refer to the Enviroguide Arboricultural report submitted under separate cover for more detail about these measures.

4.4 ARCHAEOLOGY

Appropriate arrangements will be made with a licensed archaeologist to monitor soil stripping and other development works as may be conditioned in any planning permission for the proposed development. Refer to the archaeological report submitted under a separate cover.

4.5 WORKS ON THE PUBLIC ROAD

Access to the site will be from the proposed site entrance via Blackglen Road.

All works on the public road, where relevant, will be subject to agreed Road Opening Licences with Dún Laoghaire-Rathdown County Council and all works will be carried out per DLRCC and HSA guidelines for working on public roads.

5 BASEMENT & SUPERSTRUCTURE CONSTRUCTION

Please note that the site investigation report has been included with this report as *Appendix A.*

5.1 CONSTRUCTION SEQUENCE

The construction will follow a logical and simple sequence as follows:

1. An initial clearance will be made with a temporary access road and a compound set up on the site to manage the construction and provide welfare facilities for the workers on site.

2. The spine infrastructure will be commenced with the access road and below ground infrastructure constructed to be used as a base for construction traffic entering and exiting the site.

3. The houses will be delivered row by row. Upside roads, utilities and preparing the base of each house will be the first activities completed. This will be followed by the main structures, roof and facade and subsequently internal trades to completion. It is intended that the houses will be built at a reasonable pace and the completion of them will align with the completion of the apartments.

4. The apartments will be started prior to the houses as there is a longer lead time from the commencement of the construction of an apartment to its completion, than that of a house.

5. Where the apartments have basements, these will be excavated first (methodology outlined separately below). The ground investigation report confirms that the excavated material is of high quality and where possible it will be reused on site in the construction of the spine road (notable Ch 060 to Ch 120 and Ch 200 to 290 as shown on the drawing titled "*Road Longsections Sheet 1 of 3*").

6. On completion of the basement excavation the ground works crew will proceed to the next basement to excavate and will be replaced with a team for cast in situ concrete, and the basement and super structure will be constructed from the bedrock up. As there is good quality rock found on the site it is expected that the foundations will be bearing directly on the rock and thus eliminating the need for piling these structures. This crew will be maintained to complete all in situ concrete for each block of apartments. It is expected that the construction methodology will utilise a cast in situ frame to first floor level with a precast super structure above this.

7. The excavation and construction of each basement and superstructure will take approximately 4-5 months per building with the super structure being completed in an additional 5-7 months per building.

8. As the lower floors are completed, the fenestration and cladding will be added allowing for the weatherproofing of the lower floors, which will in turn allow the internal trades to commence their construction activities. It will take the internal trades approximately 9-12 months to fit out a building.

9. As the buildings are finished the external areas will also be finished in parallel to ensure that the high-quality finishes are completed together, and the development is finished to a high standard.

10. It is noted that the timelines noted above and set out in the below construction schedule are subject to revision on the commencement of construction. Construction durations and sequences can change due to factors such as availability of key resources, utility requirements and weather to name but a few. It is the intention of the client to appoint an experienced construction management team who will reassess and manage the construction sequence to maximise efficiency and minimise construction durations to ensure that the project is completed in as timely a manner as possible.

5.2 INDICATIVE PROJECT TIMELINE

	2026												2027												2028												2029					
	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June
Compound																																									
Spine Road																																									
Apartments																																									
Building A1																																									
Building A2																																									
Building B1-B2																																									
Building B3-B4																																									
Housing																																									
Finishes and Snagging																																									

Legend

Compound Set up and Demolition		Ground Works/ In Situ Structure		Internal Trades and finishes	
Clearance/ Earthworks/ Roadworks		Main Structure		Finishes and Snagging	

5.3 ENABLING WORKS

- Secure site and set up contractor welfare facilities and site accommodation;
- Locate and terminate existing live services;
- Install tree protection and remove trees that are required to be felled;
- Excavate and remove material to the required formation. This will require a bulk excavation and removal from the site;
- Maintain existing entrances and incorporate new roads and hardstanding as required;
- Make good and install any finished boundary treatments that can be installed at this stage.

5.4 BASEMENT CONSTRUCTION METHODOLOGY

1. Site Preparation

Survey and Planning: Each excavation will be carefully set out to ensure that the extents of the works are well understood and the adequate planning on access routes and safety measures are made in advance of any works. This will allow the proper space planning of the excavation works and ensure that perimeter drainage can be installed in advance of the main excavation.

2. Excavation Method

Open Excavation and Hydraulic splitting: The overburden and the top metre of bedrock is excavatable with a tracked excavator (based on evidence of doing so in the Ground Investigation carried out on the site by GII). This upper part of the excavation will be carried out in this manner. The reminder of the excavation will be traditional method rock excavation with low-noise vibratory hammers. It is of note that while the exact ground conditions can vary a very comprehensive site investigation has been carried out in advance of planning. Based on this investigation OCSC have estimated the total volume of excavation and the total volume of rock excavation within each basement. As can been seen the vast majority of the excavation is in areas where the base of the excavation is within 1 metre of the expected bedrock level. This is likely to mean that there will be most of the rock which will be excavated by means of ripping with a ditching bucket. There will however be some areas of the rock excavation that will require vibratory hammers to be used. These and all other activities on site will be subject to the measures for the minimisation for noise and vibration as set out in the noise and vibration mitigation strategy prepared by Enfonic and submitted under separate cover (*LRD Blackglen Road – Noise Impact Assessment*). An extract of the mitigation measures is recreated under Section 5.9. The table overleaf contains the quantum of excavation along with the likely quantum of rock excavation likely to be required based on the interpretation of the results of the Ground Investigation Report.

Table 1: Excavation Details

Basement	FFL (AOD)	Structural Depth	Base of Dig (AOD)	Average EGL per block	Average Depth of Excavation	Average Depth of Bedrock	Average Depth of Hard Excavation	Volume of Excavation	Likely Volume of Rock Excavation
B3-B4	142	0.9	141.1	142.5	1.4	1.2	0.2	3400	486
B1-B2	143	0.9	142.1	146	3.9	1.5	2.4	7800	4800
A1	141	0.9	140.1	142	1.9	1.6	0.3	1184	187
A2	140.5	0.9	139.6	139	-0.6	1.8	-2.4	15	60

3. Dewatering Strategy

- **Well Points**: Install well points around the excavation site to lower the groundwater level. These points will pump out water to keep the excavation dry.
- **Sump Pumps**: Place sump pumps at strategic locations within the excavation to collect and remove water that accumulates.
- **Water Management:**
  - **Sedimentation Tanks**: Direct the pumped water to sedimentation tanks to remove silt and debris.
  - **Filtration Systems**: The use of filtration systems to further clean the water before discharge or reuse will be considered and if water quality warrants it this will occur.
  - **Discharge**: Ensure that the discharge of treated water complies with local environmental regulations.

4. Groundwater Recharge

- **Recharge Wells**: Construct recharge wells around the site to return a portion of the treated water back into the groundwater system.
- **Permeable Paving**: Use permeable paving materials in surrounding areas to facilitate natural groundwater recharge.

5. Safety and Monitoring

- **Noise and Vibration Monitoring**: Continuously monitor noise and vibration levels to ensure they remain within acceptable limits.
- **Structural Monitoring**: Monitor the structural integrity of nearby buildings to prevent damage from excavation activities.
- **Worker Safety**: Implement strict safety protocols, including the use of personal protective equipment (PPE) and regular safety briefings.

5.5 SUPERSTRUCTURE

The entire development comprises medium rise buildings. In this regard it is not considered that any specialised construction techniques will need to be applied on the site.

5.6 CONCRETE BREAKING

In all cases the most efficient and environmentally sensitive methodologies will be used. Concrete munchers will be used instead of a rock breaker. This is a much quieter piece of equipment and generates significantly less noise. Where munchers cannot be used i.e. for in-situ reinforced slabs, then multi-head concrete breakers will be used.

5.7 HEALTH & SAFETY

Health & Safety issues will be a primary concern for the Main Contractor. This will apply in respect of persons working on the site and in respect of passing pedestrians, motorists, or other transport carriers. In this regard the highest possible care will be taken in providing properly designed scaffolding.

Given the location of the site in a live city environment, special care will be taken to provide suitable protection for passing pedestrians.

The following general principles will apply:

- Watertight toe boards will be provided;
- There will be no lifting of materials over live footpaths or roadways;
- A sloped fan will be provided at second floor level and will move upwards as construction advances (where necessary);
- Debris netting will be provided for the full scaffolded perimeter;
- Fully recorded inspections will be carried out of the scaffolding for the full duration of construction.

5.8 SEQUENCING

The Main Contractor will engage with the professional design team to reach early agreement on an acceptable construction sequence. The building will be made watertight.

5.9 MITIGATION MEASURES

The impact assessment conducted for the construction activity during the construction phase has highlighted that the predicted construction noise levels are within the adopted criterion for almost all NSLs. However, the following mitigation measures may be considered during certain construction activities in order to further reduce the noise and vibration impact to nearby noise sensitive areas.

As part of these mitigation measures it is recommended that the Contractor should compile a Noise and Vibration Management Plan (NVMP) which will deal specifically with management processes and strategic mitigation measures to remove or reduce significant noise and vibration impacts, and cumulative noise and vibration impacts from the construction works. The Plan will also define noise and vibration monitoring and reporting. The NVMP will also include method statements for each phase of the works, the associated specific measures to minimise noise and vibration in so far as is reasonably practicable for the specific works covered by each plan and a detailed appraisal of the resultant construction noise and vibration generated.
Best practice noise and vibration control measures will be employed by the contractor during the demolition phase in order to control noise and vibration impacts at the nearest noise sensitive locations. All works on site shall comply with BS 5228 2009+ A1 2014 (Parts 1 & 2) which gives detailed guidance on the control of noise and vibration from construction activities. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- Selection of quiet plant;
- Noise control at source;
- Screening and;
- Liaison with the public.

The following key forms of noise control for the site are set out below:

- Site compounds will be located away from noise sensitive boundaries within the site constraints;
- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system and avoid idling of engines when not in use.
- For percussive tools, a number of noise control measures include fitting a muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines are sealed. Erection of localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- The use of a high quality construction site hoarding will be included around all noise sensitive boundaries.
- For all materials handling, ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For all materials handling, ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.
- All site staff shall be briefed on noise mitigation measures and the application of best practicable means to be employed to control noise.
- Use of electric vehicles and plant should be used where possible.

The following key forms of vibration control for the site are set out below:

- Controlled drilling: If drilling is necessary, use controlled and engineered techniques to minimize the vibration impact. Precise timing and small charges can help reduce vibrations significantly.
- Modify construction techniques: Implement construction techniques that generate less vibration. For example, using different equipment or methods that create fewer vibrations can be beneficial.
- Construction sequencing: Plan the construction activities in a way that minimizes the impact on nearby receptors. For instance, schedule the noisiest and most vibration-intensive tasks at times when the receptors are least affected.
- Communication with neighbours: Keep nearby residents and stakeholders informed about the construction activities and potential vibrations. Address any concerns they may have promptly.
- Real-time adjustments: Based on the monitoring data, be prepared to make real-time adjustments to construction operations to keep vibrations within acceptable levels.
- Real-time adjustments: Based on the monitoring data, be prepared to make real-time adjustments to construction operations to keep vibrations within acceptable levels.
- Post-construction assessment: After the construction is complete, conduct a post-construction assessment of vibration data to ensure that no excessive vibration was generated.

5.10 MONITORING

During the demolition phase, spot check noise monitoring may be required where the construction noise thresholds have the potential to be exceeded at noise sensitive locations. The monitoring shall be carried out by the contractor and used to inform the requirement for any control measures on site to reduce construction noise levels.

Noise monitoring will be conducted in accordance with the International Standard ISO 1996-2:2017 - Description, measurement, and assessment of environmental noise - Part 2: Determination of sound pressure levels.

Where required, or requested by the local authority, unattended external noise monitoring will be undertaken at locations on the site boundary closest to sensitive locations. It is considered that it will be appropriate to amend the monitoring program and location as the works progress. Accordingly, monitors may be added, removed, or relocated as necessary.

The noise monitoring terminals should provide the following at minimum:

- Logging at hourly intervals; and
- Remote access for information download.

Where required, or requested by the local authority, vibration monitoring will be installed at the site boundary to monitor Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions, in accordance with BS ISO 4866: 2010: Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures.

The mounting of the transducer to the vibrating structure will need to comply with BS EN ISO 5348: 1998: Mechanical vibration and shock – Mechanical mounting of accelerometers. In summary, the following ideal mounting conditions apply:

- The transducer and its mountings should be as rigid as possible;
- The mounting surfaces should be as clean and flat as possible;
- Simple symmetric mountings are best, and;
- The mass of the mounting should be small in comparison to that of the structure.

6 CONSTRUCTION TRAFFIC

6.1 SITE ACCESS

As noted earlier, the site will be accessed via the proposed site entrance on Blackglen Road. All construction traffic will enter and leave the site through this access.

6.2 CONSTRUCTION TRAFFIC ROUTING

It is proposed that all construction traffic will use Blackglen Road via Hillcrest Road and Leopardstown Road to the M50 interchange motorway and continue along the M50 to a suitable disposal site. Similarly, all deliveries will approach the site via the M50 and Blackglen Road. This will remove construction traffic from the residential areas to the north and northwest of the site.



Figure 5: Construction Haul Route

The exact location of batching plants and disposal sites will be established once a contractor has been appointed. However, the route outlined in the figure above will be the preferred access and egress route for the site. Details of all routes will be agreed upon with the Transportation Department of DLRCC before the commencement of work. The impact on locals will be negligible.

6.3 SITE PARKING

A limited amount of on-site parking will be provided for construction workers and visitors. A separate parking and staging area will be constructed alongside the Site Compound and will be maintained for the duration of the construction period.

6.4 STAFF WELFARE

Appropriate welfare facilities will be provided on-site for construction staff and will include, inter alia:

- Canteen facilities;
- Toilet Facilities;
- Office accommodation;
- Tool storage areas.

6.5 CONSTRUCTION TRAFFIC MITIGATION MEASURES

Measures will be put in place to keep public roads free of muck and debris. This will include providing a wheel wash on-site and undertaking regular road sweeping by a mechanical sweeper.

7 SEGREGATION OF WASTE STREAMS

7.1 WASTE STORAGE & SEGREGATION

Waste materials generated will be segregated on-site. This will allow for the maximum possible degree of recycling. Where on-site segregation of certain waste types is not practical, off-site segregation will be carried out. Skips and receptacles will be provided to facilitate segregation at the source.

All waste receptacles leaving the site will be covered or enclosed. The on-site waste storage area will be secured within the overall site which will be hoarded off from the public and unauthorised access.

The appointed waste contractor will collect and transfer the waste as receptacles are filled. Any soil removed off-site will be carried by contractors licensed under the Waste Management Acts 1996 - 2008, the Waste Management (Collection Permit) Regulations 2007 and Amendments and the Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments.

7.2 NON-RECYCLABLE WASTE

C&D waste which is not suitable for reuse or recovery will be placed in separate skips or other receptacles. This will include polystyrene, some cardboard and plastic which are deemed unsuitable for recycling.

Before removal from the site, the non-recyclable waste skip/receptacle will be examined by a member of the waste team to determine if recyclable materials have been misplaced. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

An outline Layout Plan for a site-based waste segregation compound is shown in the figure overleaf.



Figure 6: Proposed C&D Waste Storage Area - Outline Layout Plan (NTS)

8 ENVIRONMENTAL MANAGEMENT

8.1 POLLUTION PREVENTION

Only sediment-free run-off is to leave the site. A suitably sized detention basin or settlement area will be installed at the lowest point before discharge where excess run-off must leave the site. Silt curtains or earth berms will be used to channel run-off to locations where it can be controlled. These may take the form of an open detention area or, where the need arises, a portable skip/s, or similar, where inflow passes through straw bales, gravel etc.

The Site Manager will be responsible for the pollution prevention programme and will ensure that at least daily checks are carried out to ensure compliance. A record of these checks will be maintained.

As shown in Figure 6 earlier, the site compound will include a dedicated bund for the storage of dangerous substances including fuels, oils etc. Refuelling of vehicles/machinery will only be carried out within the bunded area. The site compound will display emergency contact details for Inland Fisheries Ireland, the National Parks and Wildlife Service, the Dún Laoghaire-Rathdown Council and the Environmental Protection Agency in the event of a pollution incident or environmental emergency. Adequate spill kits will be available in the event of a spill of oil or other hazardous substances.

8.2 TRAINING

All site personnel will be trained in the importance of good environmental practices including reporting to the site manager when pollution, or the potential for pollution, is suspected.

8.3 PROTECTION OF TREES

As noted previously, appropriate measures will be put in place to protect any trees on the site which are designated for protection or retention under any granted planning permission for the development. The appointed contractor shall have regard to the Tree Survey Report prepared by the Site Arborist for the project.

8.4 RHODODENDRON CONTROL AND REMOVAL

An Invasive Species Management Plan (IASMP) has been prepared for the Site by INVAS Biosecurity and is appended to this CEMP under *Appendix B*. The measures in the IASMP will be followed to treat and control any invasive plant species present at the Site and ensure they are disposed of correctly.

Prior to site works commencing an invasive alien species (IAS) survey of the Site will be carried out by a suitably qualified IAS specialist. This survey will identify the current status of IAS on Site and make appropriate recommendations as to their removal and control. The IASMP will be referred to for the locations of all invasive plant species at the Site.

Rhododendron seedlings were recorded in the south of the Site in November 2023 by the Enviroguide Ecologist. Rhododendron is listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended), making it an offence under Regulation 49 of that instrument to plant, disperse, allow or cause to grow this plant. Rhododendron is one of 47 species listed for Ireland as at risk of high impact (O'Flynn et al., 2014).



Figure 7: Rhododendron Observed on Site

The following is extracted from the Traffic Infrastructure Ireland (TII) guidance document titled "The Management of Invasive Alien Plant Species on National Roads – Technical Guidance - GE-ENV-01105" (TII, 2020):

8.4.1 CONTROL INFORMATION

It is recommended that a suitably qualified ecologist or horticulturalist with sufficient training, experience and knowledge in the control of IAPS should be employed to assist in the planning and execution of control measures in relation to Rhododendron. In addition, those involved in the control of Rhododendron may be advised to have access to the advice of a Registered Pesticide Advisor on the register established by the Minister for Agriculture, Food and the Marine pursuant to Regulation 4 of the Sustainable Use of Pesticides Regulations. All pesticide users must be registered and have the appropriate training necessary to carry out the proposed method of control.

Rhododendron grows vigorously when cut and the tiny seeds may be unintentionally spread by machinery, on clothes, boots, or other PPE. Hence, biosecurity measures must be put in place to prevent further spread of the plant when undertaking any control works. Regular follow-up is required to deal with re-growth and seedling germination, irrespective of the control method employed.

8.4.2 COMBINED CHEMICAL AND PHYSICAL CONTROL

With isolated plants (> 1m tall) or small infestations, effective control can be achieved by cutting the plant to the stump and immediately treating the latter with herbicide. Any cut material will need to be removed from the site to avoid resprouting or suckering, which will produce new plants and potential infestations. Mulching is a good option for disposal and the mulch may be left on site if no seeds are present.

8.4.3 RECOMMENDED MANAGEMENT APPROACH FOR THE SITE

Considering the nature of Rhododendron on Site, and the fact that the species is only present in small seedling plants, effective control may be achieved by:

1. Manual pulling of plants that are less than 20cm high ensuring all of the roots are removed.
2. For plants too big to manually pull, with a stem diameter less than 2cm, the stem can be broken at the base ensuring that it is not fully severed, and a concentrated solution of herbicide immediately applied. For plants greater than 2cm in diameter, notches can be cut in the stem using a hatched or saw (referred to as feathering) and a concentrated solution of herbicide immediately applied.
3. Any herbicide application should be carried out by a suitably qualified and registered professional. Professional users of pesticides must be registered pursuant to Regulation 4 of the Sustainable Use of Pesticides Regulations and must have the appropriate training (with associated certificates) required to perform the necessary treatment to suitably manage the targeted IAPS. Chemical treatments must always be used in compliance with the product label (TII, 2020).
4. Herbicide can be applied by spraying, weed-wiping, injection or painting directly onto stumps. The appropriate measure shall be chosen by a suitably qualified professional.

5. An inert dye should be mixed with the herbicide to ensure that no stumps are missed.
6. Herbicide application should be carried out in dry weather, with a 6 to 24-hour rain-free period following the treatment.
7. It is important that the herbicide has access to the plant's transport system, which is just inside the bark. This type of treatment is effective all year round, although it is deemed to be most effective when conducted during the plant's active growth period while transpiration is readily occurring. This will help the herbicide spread through the plants' transport system. This treatment should be carried out in late Spring or Summer.
8. Any cut material will be bagged and removed from the Site to avoid resprouting or suckering which will produce new plants and potential infestations.
9. The movement of plant material of any plants listed on the Third Schedule requires a licence from the NPWS under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended).
10. Mulching is a possible option for the disposal of small stands provided they have not produced seed. Considering Rhododendrons, these are plants less than 10 years old. The mulch may be left on Site, provided no seeds are present.
11. Should any seed-producing plants be evident on Site and where bare soil remains, the soil should be mulched (covered with a natural or synthetic barrier, such as wood chip, straw, geo-textile, or other appropriate material) and planted at the earliest opportunity with appropriate native replacement vegetation to stabilize the soil and deter subsequent re-invasion by IAS (TII, 2020).
12. As part of the clearance programme, follow-up surveys will be required to ensure that the above control measures are effective. Rhododendron seeds remain viable in soil for up to three years (TII, 2020) and as such these surveys may be required to be undertaken at the end of the growing season following herbicide treatment (i.e., September – October) for a period of three years or until the Site is clear of Rhododendron and no longer under threat of reinvasion.
13. Any soil removal scheduled to occur involving mature seed-producing Rhododendron must be done so under approval from the NPWS and disposed of at a registered and approved waste treatment facility. Soils that contain seeds of Third Schedule plants are considered vector materials for the spread of invasive species and may only be transported under licence from the NPWS. The IAS specialist will advise on whether any mature plants exist on the Site based on their pre-commencement survey.
14. Machinery operating within an area of IAS should be treated according to TII (2020) guidelines before entering and exiting the Site. This should involve designated power washing areas to prevent the spread of seed on machinery. Similarly, PPE and clothing should be removed and changed when exiting the Site.
15. The treatment programme will be carried out by a suitably qualified person who has experience in treating invasive species and will be carried out in line with the herbicide manufacturer's instructions.
16. If found to be present during the pre-commencement survey, any larger stands of Rhododendron should be inspected for breeding birds during the bird nesting season (1st March to 31st August) before any removal takes place.

8.5 NOISE CONTROL

Measures will be implemented to minimise the impact of noise emissions at sensitive locations during the construction phase. A Noise Impact Assessment was conducted by Enfonic and submitted under separate cover. The assessment states that the predicted construction noise levels are within the adopted criterion for almost all noise-sensitive locations (NSLs). A number of mitigation measures are also proposed which include:

- It is recommended that the Contractor compile a Noise and Vibration Management Plan (NVMP) which will deal specifically with management processes and strategic mitigation measures to remove or reduce significant noise and vibration impacts, and cumulative noise and vibration impacts from the construction works. The Plan will also define noise and vibration monitoring and reporting. The NVMP will also include method statements for each phase of the works, the associated specific measures to minimise noise and vibration in so far as is reasonably practicable for the specific works covered by each plan and a detailed appraisal of the resultant construction noise and vibration generated.
- The contractor will provide proactive community relations and will notify the public and vibration-sensitive premises before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works.
- The contractor will distribute information circulars informing people of the progress of works and any likely periods of significant noise and vibration.
- With regard to potential mitigation measures during construction activities, the
- standard planning condition typically issued by BS5228 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:
  - selection of quiet plants;
  - control of noise sources;
  - screening;
  - hours of work;
  - liaison with the public, and;
  - monitoring
- Noise control measures that will be considered include the selection of quiet plants, enclosures, and screens around noise sources, limiting the hours of work and carrying out noise/vibration monitoring as required.
- A suitable site hoarding would protect the residents immediately adjacent to the construction site.

8.6 VIBRATION CONTROL

The Noise Impact Assessment states that without a detailed construction plan, it is prudent to assess the likely vibration levels at the nearby dwellings from this most severe test as all other sources of vibration will be below this level. The report sets out vibration limits for Disturbance and Cosmetic Damage respectively.

8.7 DUST CONTROL

The main activities that may give rise to dust emissions during construction include the following:

- Materials handling and storage; and
- Movement of vehicles (particularly HGVs) and mobile plants.

The following mitigation measures will be implemented on-site during the construction phase, as required:

- Site roads shall be regularly cleaned and maintained as appropriate;
- Hard surface roads shall be swept to remove mud and aggregate materials from their surface as a result of the development works;
- Any un-surfaced roads shall be restricted to essential site traffic only;
- Any road that has the potential to give rise to fugitive dust may be regularly watered, as appropriate, during extended dry and/or windy conditions;
- On-site speed limits will be stipulated to prevent the unnecessary generation of fugitive dust emissions;
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to the wind;
- A complaints register will be maintained on-site and any complaints relating to dust emissions will be immediately dealt with;
- In periods of dry weather when dust emissions would be greatest, a road sweeper, which would also dampen the road, will be employed in order to prevent the generation of dust;
- Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods; and
- If appropriate, dust monitoring will be carried out during the construction phase of the scheme. If the level of dust is found to exceed 350mg/m2day in the vicinity of the site, further mitigation measures will be incorporated into the construction of the proposed scheme.

9 COMPLAINTS MANAGEMENT PROPOSALS

9.1 PRIOR TO THE COMMENCEMENT OF WORKS

The following is proposed prior to the commencement of the works:

9.1.1 APPOINTMENT OF A PUBLIC LIAISON OFFICER (PLO)

A Public Liaison Officer (PLO) will be appointed at the outset of the project. The PLO will be responsible for establishing and maintaining a positive relationship between the project team and the surrounding residents and/or business owners. This role will ensure clear and consistent communication throughout the project, addressing concerns as they arise.

9.1.2 DEDICATED PUBLIC CONTACT LINE

A dedicated public contact number will be set up for the project. This number will be managed by the PLO, ensuring that any inquiries, concerns, or complaints from residents and business owners are handled promptly and effectively.

9.1.3 INITIAL LETTER DROP

At the start of the project, an initial letter drop will be carried out to notify residents and business owners within the vicinity of the upcoming works. The letter will provide essential details about the project, including the expected timeline, scope of the works, and the contact information for the PLO. The public contact number will also be included to allow stakeholders to reach out with any questions or concerns.

9.1.4 ONGOING COMMUNICATION (FURTHER LETTER DROPS)

To maintain ongoing communication, additional letter drops will be carried out before any scheduled activities are set to begin in specific areas. These letters will provide updated information about the works and remind residents and business owners of the public contact number, ensuring they are kept informed and able to voice any concerns ahead of time.

9.2 COMPLAINTS PROCEDURE

The complaints management procedure is outlined below.

1. **Submission of Complaints:** Residents and business owners will be encouraged to raise any complaints or concerns using the dedicated public contact number. The PLO will be the primary point of contact for logging and addressing these issues in a timely manner.
2. **Acknowledgment and Initial Contact:** Upon receiving a complaint, the PLO will promptly contact the individual to acknowledge their concern. During this initial contact, the PLO will work to fully understand the nature of the issue, gather any necessary details, and ensure the complainant feels heard and supported.
3. **Collaboration for Resolution:** Once the complaint is understood, the PLO will discuss the matter with the Contract Representative and other relevant members of the project team to explore possible solutions. The aim will be to resolve the issue in a way that satisfies the complainant while remaining within the scope of the project.
4. **Feedback and Follow-Up:** The PLO will provide feedback to the complainant, explaining the steps that will be taken to resolve the issue. If required, a meeting will be scheduled between the complainant and the Contract Representative to further discuss the concern and ensure a clear understanding of the resolution.
5. **Record of Complaints and Resolutions:** All complaints and their resolutions will be documented in a complaint register. This will ensure transparency, help track recurring issues, and enable the team to identify trends that may require proactive attention.
6. **Monthly Distribution of the Complaint Register:** The complaint register will be reviewed and distributed monthly to key stakeholders. This will allow the project team to stay informed of any ongoing concerns and take necessary actions to address them as the project progresses.

10 HOURS OF WORKING

Construction operations will be carried out in accordance with any granted planning conditions. It is expected that normal working hours will be from 07:00 – 19:00 Monday to Friday and from 08:00 – 14:00 on Saturdays.

It may be necessary for some specific construction activities to take place outside of these times and in those cases, a specific derogation will be sought from the Planning Authority, Dún Laoghaire-Rathdown County Council.

Deliveries to the site will be arranged to arrive within normal working hours as set out above.

There may, again, be specific deliveries which need to arrive outside of these hours e.g. in respect of wide loads. In all such cases, the applicant will again liaise and agree to any necessary derogations with the Planning Authority.

11 ECOLOGICAL MITIGATION MEASURES

The planned mitigation measures for the environmental impacts, as detailed in the Ecological Impact Assessment Report (EcIA) prepared by the Enviroguide Ecologist, are shown in the table below:

Table 2: Ecological Mitigation Measures

Ecological Receptor	Mitigation Measure	Rationale
Habitats	Mitigation 1: Pre-Clearance Invasive Species Survey	**A pre-clearance survey of the Site will be conducted by a suitable qualified Ecologist before any clearance of vegetation or soil strip takes place.** This survey will identify any locations of invasive plant species, in particular the rhododendron and cherry laurel plants recorded along the southern Site boundary. The Ecologist and Site manager will consult the IASMP prepared by INVAS Biosecurity (2024) and the Enviroguide EcIA Report for recorded locations of invasive species on Site.
	Mitigation 2: Invasive Plant Species Management	**Low-Medium Impact Invasive Species** The Ecologist and Site manager will consult the IASMP prepared by INVAS Biosecurity (2024) for the recommended management/control measures for each of the invasive plant species on Site. • Butterfly-bush. • Himalayan Honeysuckle. • Cotoneaster sp. • Winter Heliotrope. These plants will be removed as per the species-specific guidance for each species included in the IASMP and the Traffic Infrastructure Ireland (TII) guidance document titled "The Management of Invasive Alien Plant Species on National Roads – Technical Guidance - GE-ENV-01105" (TII, 2020). As per the Enviroguide EcIA, sycamore is not considered to pose a risk of spread or impacts at the Site or off Site and does not require a specific removal approach; it can be removed as per normal tree removal protocol if required. **High Impact Invasive Species Management** As detailed in Section 8.4 in this CEMP Report, Rhododendron seedlings were recorded in the south of the Site by Enviroguide. Rhododendron is listed in the Third Schedule of the European Communities (Birds and Natural Habitats)

Ecological Receptor	Mitigation Measure	Rationale
		Regulations, 2011 (as amended), **making it an offence under Regulation 49 of that instrument to plant, disperse, allow or cause to grow this plant.** Considering the nature of rhododendron on Site, and the fact that the species is only present in small seedling plants, effective control may be achieved by: 1. Manual pulling of plants that are less than 20cm high ensuring all of the roots are removed. 2. For plants too big to manually pull, with a stem diameter less than 2cm, the stem can be broken at the base ensuring that it is not fully severed, and a concentrated solution of herbicide immediately applied. For plants greater than 2cm in diameter, notches can be cut in the stem using a hatched or saw (referred to as feathering) and a concentrated solution of herbicide immediately applied. 3. Any herbicide application should be carried out by a suitably qualified and registered professional. Professional users of pesticides must be registered pursuant to Regulation 4 of the Sustainable Use of Pesticides Regulations and must have the appropriate training (with associated certificates) required to perform the necessary treatment to suitably manage the targeted IAPS. Chemical treatments must always be used in compliance with the product label (TII, 2020). 4. Herbicide can be applied by spraying, weed-wiping, injection or painted directly onto stumps. The appropriate measure shall be chosen by a suitably qualified professional. 5. An inert dye should be mixed with the herbicide to ensure that no stumps are missed. 6. Herbicide application should be carried out in dry weather, with a 6 to 24 hour rain free period following the treatment. 7. It is important that the herbicide has access to the plant's transport system, which is just inside the bark. This type of treatment is effective all year-round, although it is deemed to be most effective when conducted during the plant's active growth period while transpiration is readily occurring. This will help the herbicide spread through the plants transport system. This treatment should be carried out in late Spring or Summer. 8. Any cut material will be bagged and removed from the Site to avoid resprouting or suckering which will produce new plants and potential infestations. 9. **The movement of plant material of any plants listed on the Third Schedule <u>requires a licence</u> from the NPWS under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended).**

Ecological Receptor	Mitigation Measure	Rationale
		10. Mulching is a possible option for the disposal of small stands provided they have not produced seed. Considering rhododendron, these are plants of less than 10 years old. The mulch may be left on Site, provided no seeds are present. 11. Should any seed producing plants be evident on Site and where bare soil remains, soil should be mulched (covered with a natural or synthetic barrier, such as wood chip, straw, geo-textile, or other appropriate material) and planted at the earliest opportunity with appropriate native replacement vegetation to stabilize the soil and deter subsequent re-invasion by this species (TII, 2020). 12. As part of the clearance programme, follow up surveys will be required to ensure that the above control measures are effective. Rhododendron seed remain viable in soil for up to three years (TII, 2020) and as such these surveys may be required to be undertaken at the end of the growing season following herbicide treatment (i.e., September – October) for a period of three years or until the Site is clear of rhododendron and no longer under threat of reinvasion. 13. Any soil removal scheduled to occur involving mature seed producing rhododendron must be done so under approval from the NPWS and disposed of at a registered and approved waste treatment facility. Soils that contain seed of Third Schedule plants are considered vector materials for the spread of invasive species and may only be transported under licence from the NPWS. The IAS specialist will advise on whether any mature plants exist on Site based on their pre-commencement survey. 14. Machinery operating within an area of IAS should be treated according to TII (2020) guidelines before entering and exiting the Site. This should involve designated power washing areas to prevent the spread of seed on machinery. Similarly, PPE and clothing should be removed and changed when exiting the Site. 15. The treatment programme will be carried out by a suitably qualified person who has experience of treating invasive species and will be carried out in line with the herbicide manufacturer's instructions. 16. If found to be present during the pre-commencement survey, any larger stands of Rhododendron should be inspected for breeding birds during the bird nesting season (1*st* March to 31*st* August) before any removal takes place.
Trees & Wildlife Corridor	Mitigation 3: Tree Protection Measures & Wildlife Refuge Protection	Robust tree protection fencing will be put in place along the southern and eastern boundaries and **will be set back an additional amount to account for the wildlife refuge to be maintained there**. The location of the fencing will be agreed with the Site Manager, Ecologist and Arborist to ensure it accurately protects the wildlife refuge. This will ensure that no construction

Ecological Receptor	Mitigation Measure	Rationale
		activity, vehicle movement or stockpiling of materials occur within this sensitive area. Protective tree fencing in compliance with BS 5837:2012 'Trees in relation to design, demolition, and construction – Recommendations' will be erected prior to any Construction works being undertaken to prevent damage to the canopy and root protection areas of existing trees to be retained at the Site. The project Arborist will be instructed **prior to commencement on Site**; to ensure that appropriate tree protection measures are in place. These measures will entail robust fencing around the root protection zones of all trees and hedgerows being retained on Site. An adequate level of signage will also be provided to highlight 'no work zones' and ensure that Site creep and damage to retained habitats does not occur. The wildlife refuge in particular must be sufficiently protected for the duration of the Construction Phase to maximise its ecological value in the final landscape plan. The set aside and protection of the area designated for the wildlife refuge will occur **at the beginning of the Construction Phase,** with the area defined as per the relevant landscape plans and protected by robust fencing e.g., a combination of heras fencing and wooden posts where ground conditions allow. This fencing will include clear signage noting the area as a wildlife refuge to ensure construction staff are aware of its presence and importance. Clear signage will be placed at regular intervals along this wildlife refuge fencing e.g., '*Protected Wildlife Corridor'* or similar, to alert Site operatives that the fences are not to be moved. The fencing will be signed off by a qualified arborist prior to Construction to ensure it has been properly erected. No ground clearance, earthworks, stockpiling or machinery movement will be undertaken within these areas. This fencing will be maintained for the duration of the Construction Phase and checked regularly by the contractor and the Ecological Clerk of Works (ECoW) to ensure it is operational and effective in protecting the wildlife refuge. The Site-side of the wildlife refuge i.e., its internal boundary, will be delineated by a combination of new dense native hedgerow planting, and robust dog-proof wire fencing. A low berm/ditch combination may also be appropriate depending on spatial constraints. Machinery movement and activity within the wildlife refuge area will be avoided and any works required will be carried out from the adjacent main Site area.

Ecological Receptor	Mitigation Measure	Rationale
		Within the wildlife refuge area itself, minimal work is needed to create or 'set-up' the refuge. In its current condition it already contains a variety of habitats, with areas of deer-grazed grassland, bracken, scrub and exposed ground already present. The creation of the wildlife refuge will largely comprise of the fencing off and protection of its extent, along with some native tree and shrub planting, however it must be ensured that the refuge is not overly planted, and that a patchwork of vegetated and open areas is maintained for a variety of wildlife to benefit from. Please refer to the Wildlife Refuge and Biodiversity Management Plan (Enviroguide, 2024b) for details on the creation and management of the wildlife refuge. The project Arborist, the project Ecologist and the Site Manager will work together to ensure these sections of habitat are protected for the duration of the works.
Birds	Mitigation 5: Timing Of Vegetation Clearance	To ensure compliance with the Wildlife Act 1976 as amended, the removal of areas of vegetation **will not take place** within the nesting bird season (March 1st to August 31st inclusive) to ensure that no significant impacts (i.e., nest/egg destruction, harm to juvenile birds) occur as a result of the Proposed Development. Should nesting birds be found, then the area of habitat in question will be noted and suitably protected until the ecologist confirms the young have fledged. The preferred period for vegetation clearance is **within the months of September and October**. Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected animals potentially present (e.g., hedgehog). Where this seasonal restriction cannot be observed, a check will be carried out immediately prior to any Site clearance by an appropriately qualified ecologist and repeated as required to ensure compliance with legislative requirements.
Mammals	Mitigation 7: Construction Site Management for Wildlife	As a precaution, **a pre-construction mammal survey** of the Site will be conducted by a suitably qualified Ecologist **prior to any clearance of scrub, cutting back of hedgerows/woodland taking place**; to confirm whether mammals e.g., badger have occupied the Site between the time of the mammal survey that informed the EcIA Report and the commencement of works on Site.
		As best-practice all construction-related rubbish on Site e.g., plastic sheeting, netting etc. will be kept in a designated area and kept off ground level so as to prevent small mammals such as hedgehogs from entrapment and death.
		Trenches/pits must be either covered at the end of each working day or include a means of escape for any animal falling in e.g., a plank or objects placed in the corner of an excavation (Species such as badgers will continue to use established paths across a site even when construction work has started).

Ecological Receptor	Mitigation Measure	Rationale
		Any temporarily exposed open pipe system will be capped in such a way as to prevent animals gaining access as may happen when contractors are off Site.
Bats	Mitigation 4: Construction Phase Lighting	Any night-time lighting required during the Construction Phase for security etc., will be directed away from the boundary vegetation at the Site (i.e., away from hedgerows and treelines), and will not be directed skyward. Lighting will be focused into the centre of the Site and only on equipment and machinery that needs to be illuminated. The Project Ecologist acting as ECoW for the project will review the Construction Phase lighting with the Contractor regularly during their site visits and make recommendations as required to ensure the lighting is maintained as bat friendly for the duration of the works.
	Mitigation 6: Bat Precautions When Felling Trees	A pre-felling check will be conducted by a suitably qualified Ecologist of all trees to be felled at the Site prior to felling taking place; to ensure that no changes have occurred and that no individual bats will be harmed. Any PRF-I trees identified by the Ecologist will be soft felled as per their guidance. In the unlikely event that a roosting bat is found, no felling of the tree in question will take place and a derogation licence will be obtained from the NPWS to proceed. The Area around the tree will be protected with an appropriate buffer to prevent disturbance of the bat(s).
Amphibians	Mitigation 8: Pre-construction Amphibian Survey & Mitigation	Amphibian surveys will be carried out by a suitably qualified Ecologist during the appropriate season (Spring) and prior to any works taking place on Site. These surveys will update the results of the rapid amphibian assessment carried out outside of the recommended survey period in July 2024 and will inform the mitigation approach for the Site clearance works. **Clearance works will occur between September and February** with an amphibian 'safe zone' agreed with between the ECoW and the Site Manager and located within the wildlife refuge along the Site's eastern and southern boundaries. This area will be protected with one way amphibian fencing required around the safe zone. Any amphibians encountered during the construction works will be carefully collected and moved to within the safe zone. Amphibians here will have access to the existing transient pool and the new wildlife ponds as they become available. A **one-way appropriate exclusion barrier** will be installed as the main feature of the safe zone (SeeFigure 8 and Figure 9). This fencing would permit frogs to access the safe zone themselves while prevent entry into the construction works zone.

Ecological Receptor	Mitigation Measure	Rationale
		General amphibian protection measures are as follows: • Institute and adhere to a code of best practice when operating in the areas identified as common frog breeding habitat. • Retain a suitably qualified and licenced ECoW during the Construction Phase. • Create and maintain a safe zone with associated pond feature for the resident frog population for the duration of the works. • Install one-way fencing and exclusion barriers and/or temporary landscaping to divert the frogs away from the works and into the safe zone. • Work from the middle of the site outwards with controlled removal of the scrub areas and hedgerows i.e., sequentially rather than all at once. • A monitoring programme for a minimum of two breeding seasons post construction works should be established to ensure net benefits occur for amphibians. • Installation of "amphibian ladders" in any gully pot or lined surface water drains that are connected to the surface water sewers.



Figure 8: An example of an Amphibian Safe Zone with one way fencing preventing amphibian access to the construction works area once they enter the safe zone.

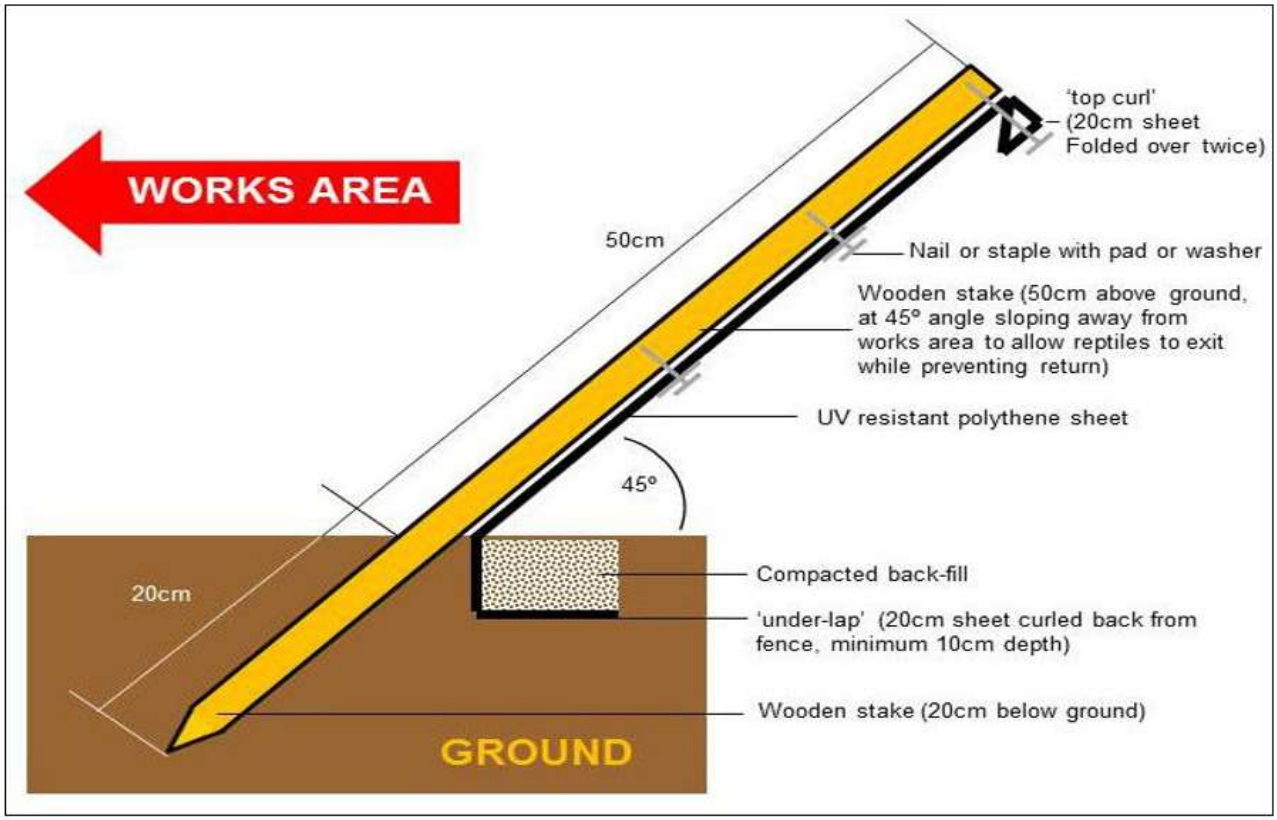

Figure 9: An example of a one-way Amphibian fencing. the frogs climb in from the works area and fall within the safe zone and are unable to re-enter the works area.

12 ECOLOGICAL MONITORING MEASURES

The pre-construction and construction phase monitoring for the Site has been taken from the EcIA prepared by Enviroguide. The schedule of monitoring is provided in Table 3 below.

12.1 ECOLOGICAL CLERK OF WORKS (ECOW)

A suitably qualified ECoW will be employed before commencement and for the duration of the Construction Phase; to provide ecological advice and input to the construction team. The ECoW will be responsible for guiding the Site Manager in the implementation of the **Wildlife Refuge and Biodiversity Management Plan** prepared by Enviroguide for the Site.

NOTE: The ECoW will be employed several weeks before commencement of works on Site; to allow time for the scope of ECoW works to be reviewed by the ecologist and any necessary pre-construction surveys to be carried out.

The schedule of pre-construction and construction phase monitoring for the Site is taken from the EcIA prepared by Enviroguide and is shown below.

Table 3: Schedule of Ecological Monitoring to be carried out during the Construction Phase

Ecological Receptor	Relevant stage of the Proposed Development	Monitoring Type	Details
Mammals	Pre-Construction Phase	ECoW	The ECoW will be required to carry out mammal surveys of the Site prior to the commencement of works on site; to ensure that no change in mammal activity at the Site has occurred.
Birds	Construction Phase	ECoW	The ECoW will be required to work closely with the Site Manager; to arrange to carry out pre-clearance surveys of any vegetation present on Site, especially if clearance during the period March 1st – August 1st (i.e., the breeding bird nesting season) is required. It is noted that clearance will be avoided during this period wherever possible through good management of the construction timeline.
Amphibians	Pre and during Construction Phase	ECoW	The ECoW will be required to carry out a pre-commencement survey and watching brief for amphibians prior to and during the Construction Phase as required; to ensure that no change in amphibian activity at the Site has occurred since the surveys conducted as part of the EcIA. If amphibians are found, the NPWS will be consulted by the ECoW as to the most appropriate protection/relocation approach if required.
	Construction Phase	ECoW	The ECoW will be consulted by the Site Manager with regard the locations and layout of the wildlife ponds proposed for the Site. The ECoW will advise on the habitat measures to be in place at the pond to

Ecological Receptor	Relevant stage of the Proposed Development	Monitoring Type	Details
			make it most suited to amphibian usage such as common frog and smooth newt.
Mammals	Construction Phase	ECoW	The ECoW will also liaise with the Site Manager to ensure that mammal escape measures are in place across the construction site in terms of excavations such as trenches, basements, foundations i.e., that planks or objects are being left in place at a suitable corner of any excavations each night.
Bats	Construction Phase	ECoW	A suitable qualified ecologist will be required to assess the lighting measures in place for the Construction Phase; to ensure that they will not cause any impacts to local bats during the nighttime. The ECoW will consult the Bat Report (Bat Eco Services, 2022) provided with this application to understand the priority areas for bat commuting/foraging at the Site and make recommendations where required. The ecologist will supervise the installation of the Bat Box Scheme at the Site, advising on the location and orientation of the 4no. rocket boxes to be installed on site.

13 VERIFICATION

This report was compiled and verified by:

Wian Marais BEng (Civil), BEng Hons (Transportation), CEng MIEI
Chartered Civil Engineer
O'Connor Sutton Cronin & Associates

Appendix A SITE INVESTIGATION REPORT

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Ground Investigations Ireland

Blackglen Road

OCSC

Ground Investigation Report

July 2021

Directors: Fergal McNamara (MD), James Lombard, Conor Finnerty, Aisling McDonnell & Barry Sexton
Ground Investigations Ireland Limited | Registered in Ireland Company Regsitration No.: 405726

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B	Final	J McDowell	D Maglochlainn	C Finnerty	Dublin	22 July 2021

Ground Investigations Ireland Ltd. present the results of the fieldworks and laboratory testing in accordance with the specification and related documents provided by or on behalf of the client The possibility of variation in the ground and/or groundwater conditions between or below exploratory locations or due to the investigation techniques employed must be taken into account when this report and the appendices inform designs or decisions where such variation may be considered relevant. Ground and/or groundwater conditions may vary due to seasonal, man-made or other activities not apparent during the fieldworks and no responsibility can be taken for such variation. The data presented and the recommendations included in this report and associated appendices are intended for the use of the client and the client's geotechnical representative only and any duty of care to others is excluded unless approved in writing.

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1.0 Preamble

On the instructions of OCSC Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd. between April and May 2021 at the site of the proposed residential development on Blackglen road, South County Dublin. A second visit to site was undertaken in June 2021 to complete additional trial pits and testing.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services, access roads and car parking at the proposed site. The site is currently greenfield however there is a quarry shown on the northern portion of the site in the historic mapping available on the OSI website. In the Aerial photograph from c. 2000 there looks to be archaeological trenching or earthworks being completed over the majority of the site. A portion of the site has a sewer passing through, parallel with the northern boundary of the site along the Grange Road and there are some Made Ground deposits associated with this service. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant. Rock excavation may be required in parts of the site due to the shallow bedrock which is visible over a portion of the site.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 14 No. Trial Pits & 2 No Trenches to a maximum depth of 2.3m BGL
- Carry out 6 No. In-situ Plate Bearing Tests within each trial pit
- Carry out 3 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Carry out 2 Days of. Dynamic Probes to determine soil strength/density characteristics
- Carry out 8 No additional trial pits to verify bedrock/shallow DPH refusal
- Carry out 4 No. Rotary Core Boreholes to a maximum depth of 8.50m BGL
- Installation of 4 No. Groundwater monitoring wells
- Groundwater monitoring with continuous data loggers
- Chemical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Trial Pits

The trial pits were excavated using an 8T & a 3T tracked excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered, and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report. Some additional trial pits were completed demonstrate the shallow refusal on many of the probes over the southern portion of the site were due to shallow bedrock, and not boulders or stiff glacial till.

3.3. Slit Trenching

The slit trenches were excavated using an 8T tracked excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The soil was slowly stripped using a spotter on the trench to alert the driver if any services were seen, to avoid damage to any underlying services. The slit trenches were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the slit trench records which are provided in Appendix 2 of this Report.

3.4. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

3.5. Dynamic Probing

The dynamic probe tests (DPH) were carried out at the locations shown in the location plan in Appendix 1 in accordance with B.S. 1377: Part 9 1990. The test consists of mechanically driving a cone with a 50kg weight in 100mm intervals and monitoring the number of blows required. An equivalent Standard Penetration Test (SPT) 'N' value may be calculated by dividing the total number of blows over a 300mm drive length by 1.5. The dynamic probe logs are provided in Appendix 4 of this Report. Where shallow rock was expected to lead to a shallow refusal on the dynamic probe, a trial pit was excavated to prove the depth to shallow bedrock and to increase the confidence in the dynamic probing results.

3.6. Insitu Plate Bearing Test

The plate bearing tests were carried out using a 450mm diameter plate at the locations shown on the site plan in Appendix 1. The plate was loaded in increments using a hydraulic jack and an excavator to provide a reaction and the

displacement was monitored in accordance with BS1377 Part 9 using independently mounted digital strain gauges. The constrained modulus and equivalent CBR are calculated in accordance with HD29/75 and are provided on the test reports in Appendix 5 of this Report.

3.7. Rotary Boreholes

The rotary coring was carried out by a track mounted T41 Beretta rig at the locations shown on the location plan in Appendix 1.

The T41 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T41 Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the “overshoot” recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit, and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids. It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 6 of this Report.

3.8. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.

Environmental & Chemical testing as required by the specification, including the Rilta Suite, pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK. The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.

The results of the laboratory testing are included in Appendix 7 of this Report.

3.9. Surveying

The exploratory hole locations have been recorded using a Trimble R10 GNSS System which records the coordinates and elevation of the locations to ITM or Irish National Grid as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.10. Groundwater Monitoring Installations

Groundwater Monitoring Installations were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm uPVC/HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report. The groundwater monitoring is included in Appendix 8 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were variable across the site and are generally comprised;

- Topsoil
- Made Ground
- Cohesive Deposits
- Weathered Bedrock
- Bedrock

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.30m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil at the locations of TP01 and TP03 and were present to a depth of between 1.30m and 2.30m BGL. These deposits were described generally as *brown sandy gravelly Clay with occasional angular to subangular cobbles, some boulders and contained occasional fragments of concrete, wire and glass.* The presence of a historic quarry over a portion of the site may explain the presence of this material in TP01.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Topsoil and Made Ground where present and were described typically as *soft or soft to firm reddish brown/brown sandy gravelly CLAY with occasional angular to subangular cobbles and some boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the cohesive matrix. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

WEATHERED BEDROCK: In some of the exploratory holes weathered rock was encountered which was diggable with the large excavator to a depth of up to 1.0m below the top of the stratum. The trial pits were terminated upon encountering the more competent bedrock, in which further excavation became more difficult. This material was recovered typically as fine to coarse angular to subangular gravel and cobbles of Granite, however there was some variability in the fracture spacing and the ease at which the excavator could progress. Some clay and sand were also present with the rock mass either from weathering or as infilling to fractures which were opened upon excavation.

BEDROCK: The rotary core boreholes recovered Medium strong to strong massive grey coarsely crystalline GRANITE, partially to distinctly weathered.
The depth to rock varies from 1.10m BGL in RC03 in the western portion of the site, to a maximum of 4.20m BGL in RC04, located in the southern portion of the site. RC01 & RC02 in the northern portion of the site show rock level to be between 2.30m and 2.60m BGL. The total core recovery is good, typically 100% with some of the uppermost runs dropping to 80 or 90%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth in each of the boreholes. In RC02 between 6.0m and 8.0m BGL the rock is weathered to such an extent that Total Core Recovery (44% and 52%) and the associated indices reduced, with the driller noting the material partially recovered as a sand.

4.2. Insitu Strength Testing

The correlated DPH blow counts indicate that the overburden deposits are soft or soft to firm to depths of 1.0m to 3.6m BGL and become firm or firm to stiff with depth. Many probes refused at shallow depths indicating the presence of bedrock or large boulders. DP01 & DP3 had low blow counts in the presumed Made Ground deposits to a depth of 2.3 to 3.2m BGL while DP9, PD16, DP20 and DP38 all had deep overburden deposits with soft or soft to firm strengths indicated by the blow counts.

4.3. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred and where possible drilling was suspended for twenty minutes to allow the subsequent rise in groundwater to be recorded. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors. For this reason, standpipes were installed in RC01, RC02 RC03 and RC04 to allow the equilibrium groundwater level to be determined. The groundwater monitoring is included in Appendix 8 of this Report.

4.4. Laboratory Testing

4.4.1. Chemical Laboratory Testing

The pH and sulphate testing carried out indicate that pH results are near neutral and that the water soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1.

4.4.1. Environmental Laboratory Testing

A number of samples was analysed for a suite of parameters which allows for the assessment of the sampled material in terms of total pollutant content for classification of materials as *hazardous* or *non-hazardous*. The suite also allows for the assessment of the sampled material in terms of suitability for placement at licenced landfills (inert, stable non-reactive, hazardous etc.). The parameter list for the suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen.
The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.
As part of the suite a leachate is generated from the solid sample which is analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS).
While the laboratory report provides a comparison with the waste acceptance criteria limits it does not provide a waste classification of the material sampled nor does it comment on any potentially hazardous properties of the materials tested. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present or the previous site use or location indicate a risk of environmental variation. A waste classification report is recommended to be carried out on material which will be disposed of off site.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

An allowable bearing capacity of 125 kN/m^2 is recommended for conventional strip or pad foundations on the firm to stiff cohesive deposits at the depths indicated in the table below. Where the soft cohesive/made ground deposits are deeper, such as at the location of DP1, DP3, DP7, DP8, DP9, DP16, DP20, DP21, DP22, DP38 & DP39 lean mix trench fill to the depths indicated in the table below are proposed to achieve a presumed allowable bearing capacity of 200 kN/m^2 on the weathered/intact rock. Generally these are where the soft deposits / Made Ground were noted and the weathered rock is assumed to be present where the probing indicated refusal, however boulders or inclusions sin the Made Ground may be responsible for these terminations. A higher allowable bearing capacity is available on the intact rock where present.

In any part of the site, should part of the foundation be on rock we would recommend that all the foundations of the unit in question be lowered to the competent rock stratum to avoid differential settlement.

The possibility for variation in the depth of the made ground in the vicinity of these foundations should be considered and foundation inspections should be carried out. Any soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

A ground bearing floor slab is recommended to be based on the firm to stiff cohesive deposits or weathered bedrock with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014 +A1:2016 and/or NRA SRW CL808 Type E granular stone fill. Where the depth of Made Ground/Soft deposits exceeds 0.9m then suspended floor slabs should be considered.

	Allowable Bearing Capacities (ABC) kN/m2						
Trial Pit	**ABC**	**Depth**	**Comment**	**Trial Pit**	**ABC**	**Depth**	**Comment**
No.	**kN/m2**	**m BGL**		**No.**	**kN/m2**	**m BGL**	
DP01	200	2.3	**Refusal**	**DP020**	125	1.9	**Cohesive**
DP02	200	0.5	**Refusal**	**DP021**	200	1.7	**Refusal**
DP03	125	3.2	**Cohesive**	**DP022**	200	1.8	**Refusal**
DP04	125	0.7	**Cohesive**	**DP023**	200	0.7	**Refusal**
DP05	200	1.2	**Refusal**	**DP024**	200	0.7	**Refusal**
DP06	200	0.7	**Refusal**	**DP025**	200	0.7	**Refusal**
DP07	200	1.7	**Refusal**	**DP026**	200	0.7	**Refusal**

DP08	80	2.0	**Cohesive**	**DP027**	200	0.7	**Refusal**
DP08	200	2.6	**Refusal**	**DP28**	200	0.7	**Refusal**
DP09	200	3.2	**Refusal**	**DP29**	200	0.7	**Refusal**
DP010	200	1.2	**Refusal**	**DP030**	200	0.7	**Refusal**
DP011	200	0.7	**Refusal**	**DP031**	200	0.7	**Refusal**
DP012	200	1.4	**Refusal**	**DP033**	200	0.7	**Refusal**
DP013	200	0.7	**Refusal**	**DP034**	200	0.7	**Refusal**
DP014	200	0.7	**Refusal**	**DP035**	200	0.7	**Refusal**
DP015	200	0.7	**Refusal**	**DP036**	200	0.7	**Refusal**
DP016	200	3.2	**Refusal**	**DP037**	200	0.7	**Refusal**
DP017	200	0.7	**Refusal**	**DP038**	200	3.8	**Cohesive**
DP018	200	0.7	**Refusal**	**DP039**	1.25	1.5	**Cohesive**
DP019	200	0.7	**Refusal**	**DP040**	200	0.9	**Refusal**

The pH and sulphate testing completed on samples recovered from the exploratory holes indicates the pH results are near neutral and the sulphate results are low, when compared to the guideline values from BRE Special Digest 1:2005. No special precautions are required for concrete foundations to prevent sulphate attack. The samples tested were below the limits of DS1 in the BRE Special Digest 1:2005.

5.3. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendices of this Report. The low CBR test results indicate that a capping layer or a sufficient depth of crushed stone fill may be required. Plate bearing tests are recommended at the time of construction to verify the design assumptions for the proposed pavement make up and to verify adequate compaction has been achieved.

The use of a geogrid and separation membrane may improve the performance of the proposed pavement and enable a more economical pavement design to be achieved, a specialist supplier is recommended to advise of the required strength, depth and type of geotextile for the proposed design.

5.4. Excavations

Excavations in the Made Ground, Peat or soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits.

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Any excavations which penetrate the granular weathered rock deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report.

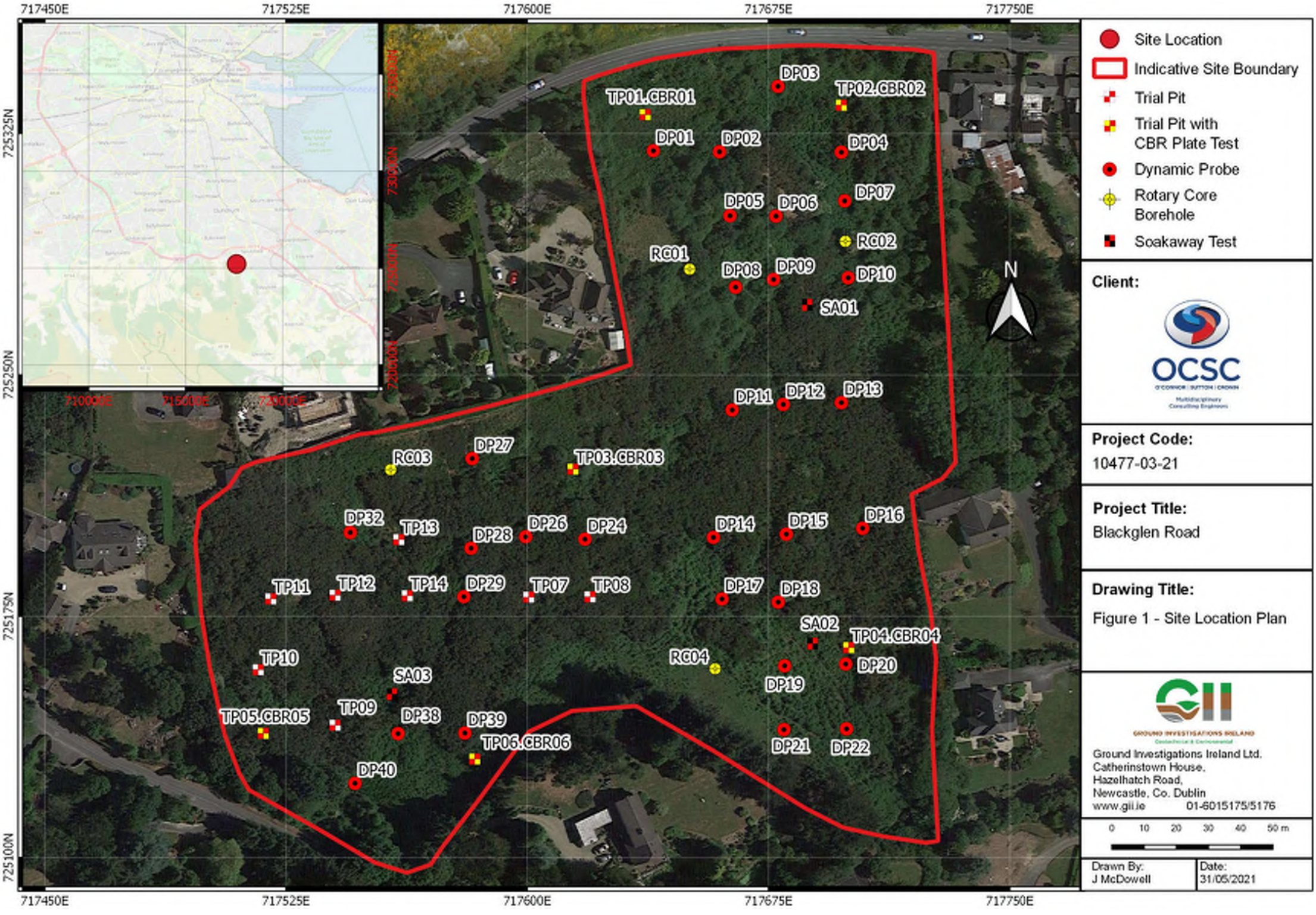
The groundwater and stability noted on the trial pit logs should be consulted when determining the most appropriate construction methods for excavations.

Excavations in the upper cohesive and weathered rock deposits are expected to be excavatable with conventional excavation equipment, with zones of more intact bedrock below this depth requiring rock breaking techniques. Based

on the fracture spacing, the rock strength descriptions (estimated) and Pettifer & Fookes (1994) Revised Excavatability Graph, the Granite ranges from hard digging to extremely hard ripping. The 8T excavator was generally able to excavate to depths of 0.3m to 1.0m below the top of the weathered rock, and became difficult to excavate within the confines of the trial pit on encountering the more competent rock.
Any waste material to be removed off site should be disposed of to a suitably licenced landfill.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Site Location Plan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717525E
717600E
717675E
717750E
725325N
725250N
725175N
725100N
730000N
725500N
721000N
710000E
715000E
720000E
TP01.CBR01
TP02.CBR02
TP03.CBR03
TP04.CBR04
TP05.CBR05
TP06.CBR06
DP01
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DP20
DP21
DP22
DP24
DP26
DP27
DP28
DP29
DP32
DP38
DP39
DP40
RC01
RC02
RC03
RC04
SA01
SA02
SA03
TP07
TP08
TP09
TP10
TP11
TP12
TP13
TP14
N
Site Location
Indicative Site Boundary
Trial Pit
Trial Pit with CBR Plate Test
Dynamic Probe
Rotary Core Borehole
Soakaway Test
Client:
OCSC
O'CONNOR | SUTTON | CRONIN
Multidisciplinary Consulting Engineers
Project Code:
10477-03-21
Project Title:
Blackglen Road
Drawing Title:
Figure 1 - Site Location Plan
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176
0 10 20 30 40 50 m
Drawn By:
J McDowell
Date:
31/05/2021



Legend

- Trial Pit
- Slit Trenches

Client:

OCSC
O'CONNOR SUTTON CRONIN
Multidisciplinary Consulting Engineers

Project Code:

10477-03-21

Project Title:

Blackglen Road Environmental Pits

Drawing Title:

Figure 1 Site Location

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0 10 20 30 40 m

Drawn By:	Date:
EB	18/06/2021

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd
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Site Blackglen Road			**Trial Pit Number** TP01
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 3.50m x 0.85m x 2.30m (L x W x D)	**Ground Level (mOD)** 142.36	**Client** OCSC	**Job Number** 10477-03-21
	Location 717636.5 E 725330.6 N	**Dates** 01/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL: Brown sandy gravelly Clay with rootlets. Gravel is subangular to subrounded fine to coarse.		
				142.06	0.30			
0.50	B				(0.70)	MADE GROUND: Brown sandy gravelly Clay with old pipe and wire fragments and occasional angular to subangular cobbles and some subangular boulders. Gravel is angular to subrounded fine to coarse. (Soft).		
1.00	B			141.36	1.00			
					(1.30)	MADE GROUND: Brown sandy gravelly Clay with plastic, old fencing and wire fragments and occasional angular to subangular cobbles and some subangular boulders. Gravel is angular to subrounded fine to coarse. (Firm). OBSTRUCTION at 2.30m BGL due to presumed bedrock or boulder.		
				140.06	2.30	Complete at 2.30m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 2.30m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP01

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Site Blackglen Road			**Trial Pit Number** TP02
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 3.20m x 0.85m x 2.20m (L x W x D)	**Ground Level (mOD)** 139.19	**Client** OCSC	**Job Number** 10477-03-21
	Location 717697.4 E 725333.6 N	**Dates** 01/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL: Dark brown sandy gravelly Clay with rootlets. Gravel is subangular to subrounded fine to coarse.		
				138.89	0.30			
0.50	B				(0.60)	Soft to firm light grey mottled brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse.		
				138.29	0.90			
1.20	B				(1.00)	Firm light brown mottled grey slightly sandy gravelly CLAY with occasional angular to subangular cobbles. Gravel is angular to subrounded fine to coarse.		
				137.29	1.90			
2.00	B				(0.30)	WEATHERED ROCK: Brownish grey clayey sandy angular to subangular fine to coarse Gravel with occasional angular to subangular cobbles. OBSTRUCTION at 2.20m BGL due to presumed bedrock or boulder.		
			slow seepage(1) at 2.20m.	136.99	2.20	Complete at 2.20m		▽1

Plan

Remarks

Groundwater encountered at 2.20m (slow seepage).
Side walls stable.
Trial pit terminated at 2.20m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP02

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Site Blackglen Road			**Trial Pit Number** TP03
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.90m x 0.85m x 1.30m (L x W x D)	**Ground Level (mOD)** 150.93	**Client** OCSC	**Job Number** 10477-03-21
	Location 717614.1 E 725220.4 N	**Dates** 01/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL: Dark brown sandy gravelly Clay with rootlets. Gravel is subangular to subrounded fine to coarse.		
				150.73	0.20			
					(0.25)	MADE GROUND: Greyish brown slightly sandy gravelly Clay with some subangular cobbles. Gravel is angular to subrounded fine to coarse.		
				150.48	0.45			
0.50	B				(0.25)	MADE GROUND: Brownish black very sandy slightly gravelly Clay with concrete blocks and glass fragments. Gravel is angular to subrounded fine to coarse.		
				150.23	0.70			
1.00	B				(0.60)	POSSIBLE MADE GROUND: Reddish brown very sandy gravelly Clay with occasional angular to subangular cobbles and some subangular boulders. Gravel is angular to subrounded fine to coarse. (Soft to firm). OBSTRUCTION at 1.30m BGL due to presumed bedrock or boulder.		
				149.63	1.30	Complete at 1.30m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 1.30m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP03

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Site Blackglen Road			**Trial Pit Number** TP04
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 3.50m x 0.85m x 1.60m (L x W x D)	**Ground Level (mOD)** 140.31	**Client** OCSC	**Job Number** 10477-03-21
	Location 717699.8 E 725164.9 N	**Dates** 01/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL: Dark brown sandy gravelly Clay with organic matter and rootlets. Gravel is angular to subrounded fine to coarse.		
				140.11	0.20			
0.50	B				(0.70)	Soft Reddish brown mottled grey sandy gravelly CLAY with some angular to subangular cobbles and rare subangular boulders. Gravel is angular to subangular fine to coarse.		
				139.41	0.90			
1.10	B				(0.70)	Greyish brown/yellow slightly clayey sandy angular to subangular fine to coarse Gravel with occasional angular to subangular cobbles and rare subangular boulders. OBSTRUCTION at 1.60m BGL due to presumed bedrock or boulder.		
				138.71	1.60	Complete at 1.60m		

Plan

Remarks

Groundwater encountered at 0.90m BGL (medium seepage).
Side walls spalling at 0.40m BGL.
Trial pit terminated at 1.60m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP04

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Site Blackglen Road			**Trial Pit Number** TP05
Machine : 8 Tonne Track Excavator **Method :** Trial Pit	**Dimensions** 1.70m x 0.85m x 0.70m (L x W x D)	**Ground Level (mOD)** 157.49	**Client** OCSC	**Job Number** 10477-03-21
	Location 717517.8 E 725138.3 N	**Dates** 01/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				157.39	(0.10) 0.10	TOPSOIL: Brown sandy gravelly Clay. Gravel is angular to subangular fine to medium.		
					(0.60)	Soft brown sandy gravelly CLAY with angular to subangular cobbles and rootlets. Gravel is angular to subangular fine to coarse.		
0.50	B			156.79	0.70	OBSTRUCTION at 0.70m BGL due to presumed bedrock or boulder.		
						Complete at 0.70m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 0.70m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP05

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Site Blackglen Road				**Trial Pit Number** TP06
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.30m x 1.10m x 1.10m (L x W x D)	**Ground Level (mOD)** 154.12	**Client** OCSC	**Job Number** 10477-03-21
	Location 717583.5 E 725130.3 N	**Dates** 01/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				154.02	(0.10) 0.10	TOPSOIL: Brown sandy gravelly Clay. Gravel is angular to subangular fine to medium.		
0.50	B				(1.00)	Soft light brown sandy very gravelly Clay with occasional angular to subangular cobbles and some angular to subangular boulders. Gravel is angular to subangular fine to coarse.		
				153.02	1.10	OBSTRUCTION at 1.10m BGL presumed bedrock or boulder. Complete at 1.10m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 1.10m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP06

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Site Blackglen Road			**Trial Pit Number** TP07
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 1.30m x 1.00m x 0.60m (L x W x D)	**Ground Level (mOD)** 153.61	**Client** OCSC	**Job Number** 10477-03-21
	Location DP25	**Dates** 09/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				153.51	(0.10) 0.10	TOPSOIL: Dark brown sandy gravelly Clay with rootlets. Gravel is angular to subrounded fine to coarse.		
					(0.50)	Soft light brown sandy gravelly CLAY with occasional angular to subrounded cobbles. Gravel is subangular to subrounded fine to coarse. OBSTRUCTION at 0.60m BGL due to presumed bedrock or boulder.		
				153.01	0.60	Complete at 0.60m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 0.60m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP07

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Site Blackglen Road			**Trial Pit Number** TP08
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 1.40m x 1.00m x 0.15m (L x W x D)	**Ground Level (mOD)** 151.37	**Client** OCSC	**Job Number** 10477-03-21
	Location (dGPS) DP23	**Dates** 09/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				151.22	(0.15) 0.15	TOPSOIL: Dark brown sandy gravelly Clay with rootlets. Gravel is angular to subrounded fine to coarse. OBSTRUCTION at 0.15m BGL due to presumed bedrock or boulder. Complete at 0.15m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 0.15m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP08

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Site Blackglen Road			**Trial Pit Number** TP09
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 1.70m x 1.00m x 0.50m (L x W x D)	**Ground Level (mOD)** 155.19	**Client** OCSC	**Job Number** 10477-03-21
	Location (dGPS) DP37	**Dates** 09/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				155.09	(0.10) 0.10	TOPSOIL: Dark brown sandy gravelly Clay with rootlets. Gravel is angular to subrounded fine to coarse.		
					(0.40)	Soft brown sandy gravelly CLAY with occasional angular to subangular cobbles. Gravel is angular to subangular fine to coarse. OBSTRUCTION at 0.50m BGL due to presumed bedrock or boulder.		
				154.69	0.50	Complete at 0.50m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 0.50m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP09

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Site Blackglen Road			**Trial Pit Number** TP10
Machine : 155.187 **Method :** Trial Pit	**Dimensions** 1.60m x 1.00m x 0.60m (L x W x D)	**Ground Level (mOD)** 153.61	**Client** OCSC	**Job Number** 10477-03-21
	Location (dGPS) DP35	**Dates** 09/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL: Dark brown sandy gravelly Clay with some angular cobbles.		
				153.21	0.40			
					(0.20)	Soft light brown sandy gravelly CLAY with frequent angular to subangular cobbles. Gravel is angular to subrounded fine to coarse.		
				153.01	0.60	Complete at 0.60m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 0.60m BGL due to presumed bedrock or boulder.
Trail pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP10

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Site Blackglen Road			**Trial Pit Number** TP11
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 1.40m x 1.00m x 0.45m (L x W x D)	**Ground Level (mOD)** 158.90	**Client** OCSC	**Job Number** 10477-03-21
	Location (dGPS) DP34	**Dates** 09/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL: Dark brown sandy gravelly Clay with some angular cobbles.		
				158.70	0.20	Soft grey slightly sandy gravelly CLAY with occasional angular to subangular cobbles. Gravel is angular to subrounded fine to coarse.		
					(0.25)			
				158.45	0.45	Complete at 0.45m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 0.45m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP11

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Site Blackglen Road			**Trial Pit Number** TP12
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 1.60m x 1.00m x 0.20m (L x W x D)	**Ground Level (mOD)** 157.56	**Client** OCSC	**Job Number** 10477-03-21
	Location (dGPS) DP33	**Dates** 09/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				157.46	(0.10) 0.10	TOPSOIL: Dark brown sandy gravelly Clay with some angular cobbles.		
				157.36	(0.10) 0.20	Soft greyish brown sandy gravelly CLAY. Gravel is angular to subangular fine to coarse. OBSTRUCTION at 0.20m BGL due to presumed bedrock or boulder.		
						Complete at 0.20m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 0.20m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP12

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Site Blackglen Road			**Trial Pit Number** TP13
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 1.50m x 1.00m x 1.10m (L x W x D)	**Ground Level (mOD)** 153.14	**Client** OCSC	**Job Number** 10477-03-21
	Location (dGPS) DP30	**Dates** 09/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				153.04	(0.10) 0.10	TOPSOIL: Dark brown sandy gravelly Clay with some angular cobbles.		
						WEATHERED ROCK: Brown/yellow sandy slightly clayey angular to subangular fine to coarse Gravel with frequent angular to subangular cobbles.		
					(1.00)			
						OBSTRUCTION at 1.10m BGL due to presumed bedrock or boulder.		
				152.04	1.10	Complete at 1.10m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 1.10m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP13

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Site Blackglen Road			**Trial Pit Number** TP14
Machine : 8 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 1.50m x 1.00m x 1.00m (L x W x D)	**Ground Level (mOD)** 153.76	**Client** OCSC	**Job Number** 10477-03-21
	Location (dGPS) DP31	**Dates** 09/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL: Brown sandy gravelly Clay with rootlets. Gravel is angular to subangular fine to coarse.		
				153.46	0.30	Soft brown mottled grey sandy gravelly CLAY with occasional angular to subangular cobbles. Gravel is angular to subangular fine to coarse.		
					(0.70)	OBSTRUCTION at 1.00m BGL due to presumed bedrock or boulder.		
				152.76	1.00	Complete at 1.00m		

Plan

Remarks

No groundwater encountered.
Side walls stable.
Trial pit terminated at 1.00m BGL due to presumed bedrock or boulder.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10477-03-21.TP14

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Site Blackglen Road			**Trial Pit Number** ENV TP01
Machine : 8T Tracked Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 138.73	**Client** OCSC	**Job Number** 10477-03-21
	Location 717709.9 E 725341.2 N	**Dates** 17/06/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	EN				(0.30)	Dark brown slightly sandy slightly gravelly TOPSOIL		
				138.43	0.30	MADE GROUND: Grey/brown slightly sandy gravelly Clay		
					(0.65)			
				137.78	0.95	MADE GROUND: Grey/brown slightly sandy gravelly Clay with some angular cobbles and boulders		
1.00-1.70	EN				(0.45)			
				137.33	1.40	Grey/white angular fine to coarse GRAVEL with some cobbles and boulders of Granite		▽1
			Slow seepage(1) at 1.50m.		(0.30)			
				137.03	1.70	Terminated due to rock		
						Complete at 1.70m		

Plan

Remarks

Trial Pit stable
Groundwater encountered at 1.50m BGL as slow seepage
Trial Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	EB	10477-03-21.ENV TP01

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Site Blackglen Road			**Trial Pit Number** ENV TP02
Machine : 8T Tracked Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 139.21	**Client** OCSC	**Job Number** 10477-03-21
	Location 717699.1 E 725346.7 N	**Dates** 17/06/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	EN				(0.80)	MADE GROUND: Reddish brown slightly sandy gravelly Clay		
				138.41	0.80			
1.00-2.00	EN				(1.20)	MADE GROUND: Grey mottled brown slightly sandy gravelly Clay with occasional subangular to subrounded cobbles and boulders		
2.00-3.00	EN			137.21	2.00			
3.00-3.60	EN		Fast ingress(1) at 3.00m.		(1.60)	Grey slightly clayey very sandy fine to coarse rounded GRAVEL with many cobbles and boulders		▽1
				135.61	3.60	Terminated due to ingress Complete at 3.60m		

Plan

Remarks

Trial Pit collapsing from surface
Groundwater encountered at 3.00m BGL as fast ingress
Trial Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	EB	10477-03-21.ENV TP02

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Site Blackglen Road			**Trial Pit Number** ENV TP03
Machine : 8T Tracked Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 139.44	**Client** OCSC	**Job Number** 10477-03-21
	Location 717676 E 725342.2 N	**Dates** 17/06/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	EN				(0.20)	Brown slightly sandy slightly gravelly TOPSOIL		
				139.24	0.20	MADE GROUND: Grey mottled brown slightly sandy gravelly Clay with occasional subangular to subrounded cobbles and boulders		
					(1.00)			
1.00-2.00	EN			138.24	1.20	Grey slightly clayey very sandy fine to coarse subrounded to rounded GRAVEL with some cobbles and boulders		
					(2.10)			
			Fast ingress(1) at 3.20m.					▽1
				136.14	3.30	Grey slightly clayey very sandy fine to coarse subangular to subrounded GRAVEL with many cobbles and boulders		
					(0.50)			
				135.64	3.80	Terminated due to ingress		
						Complete at 3.80m		

Plan

Remarks

Trial Pit collapsing from surface
Groundwater encountered at 3.20m BGL as fast ingress
Trial Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	EB	10477-03-21.ENV TP03

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Site Blackglen Road			**Trial Pit Number** ENV TP04
Machine : 8T Tracked Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 139.65	**Client** OCSC	**Job Number** 10477-03-21
	Location 717693.6 E 725311.6 N	**Dates** 17/06/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	EN			139.45	(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL		
						MADE GROUND: Reddish brown slightly sandy slightly gravelly Clay with occasional granite cobbles		
				138.75	(0.70) 0.90	Grey fine to coarse angular GRAVEL of Granite		
			Slow seepage(1) at 1.50m.	138.15	(0.60) 1.50	GRANITE		▽1
				138.05	(0.10) 1.60	Terminated due to rock		
						Complete at 1.60m		

Plan

Remarks

Trial Pit stable
Groundwater encountered at 1.50m BGL as slow seepage
Trial Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	EB	10477-03-21.ENV TP04

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Site Blackglen Road			**Trial Pit Number** ENV TP05
Machine : 8T Tracked Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 139.67	**Client** OCSC	**Job Number** 10477-03-21
	Location 717710.5 E 725271.7 N	**Dates** 17/06/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	EN				(0.30)	Brown slightly sandy slightly gravelly TOPSOIL		
				139.37	0.30	MADE GROUND: Reddish brown slightly sandy slightly gravelly Clay		
					(0.70)			
1.00-2.00	EN			138.67	1.00	Soft greyish brown slightly sandy gravelly CLAY with occasional cobbles		
					(0.80)			
				137.87	1.80	Soft greyish brown slightly sandy gravelly CLAY with some cobbles and boulders of Granite		
					(0.70)			
			Moderate ingress(1) at 2.50m.	137.17	2.50	Complete at 2.50m		▽1

Plan

Remarks

Trial Pit spalling from 1.80m BGL
Groundwater encountered at 2.50m BGL as moderate ingress
Trial Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	EB	10477-03-21.ENV TP05

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Site Blackglen Road			**Trial Pit Number** ENV TP06
Machine : 8T Tracked Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 142.39	**Client** OCSC	**Job Number** 10477-03-21
	Location 717686.1 E 725294.6 N	**Dates** 17/06/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				142.34	0.05	Dark brown TOPSOIL		
				142.33	0.06	GRANITE Terminated due to rock		
						Complete at 0.06m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	EB	10477-03-21.ENV TP06

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Site Blackglen Road			**Trial Pit Number** ENV TP07
Machine : 8T Tracked Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 147.93	**Client** OCSC	**Job Number** 10477-03-21
	Location 717631.3 E 725205.6 N	**Dates** 17/06/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	EN				(0.90)	MADE GROUND: Reddish brown slightly slightly gravelly Clay with occasional cobbles and boulders of Granite		
				147.03	0.90	Brown very clayey slightly sandy fine to coarse angular to subrounded GRAVEL with occasional cobbles and boulders		
					(0.40)			
				146.63	1.30	Competent GRANITE		
					(0.10)			
				146.53	1.40	Terminated due to rock		
						Complete at 1.40m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	EB	10477-03-21.ENV TP07

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Site Blackglen Road			**Trial Pit Number** ENV TP08
Machine : 8T Tracked Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 148.65	**Client** OCSC	**Job Number** 10477-03-21
	Location 717636.8 E 725236 N	**Dates** 17/06/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	EN				(0.50)	MADE GROUND: Brown slightly sandy slightly gravelly Clay with rootlets		
				148.15	0.50	Firm reddish brown slightly sandy slightly gravelly CLAY with occasional cobbles of Granite		
					(0.50)			
				147.65	1.00	Competent GRANITE		
				147.55	(0.10) 1.10	Terminated due to rock		
						Complete at 1.10m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	EB	10477-03-21.ENV TP08

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E 717709.926
N 725343.030
Z 138.704

ENV ST02

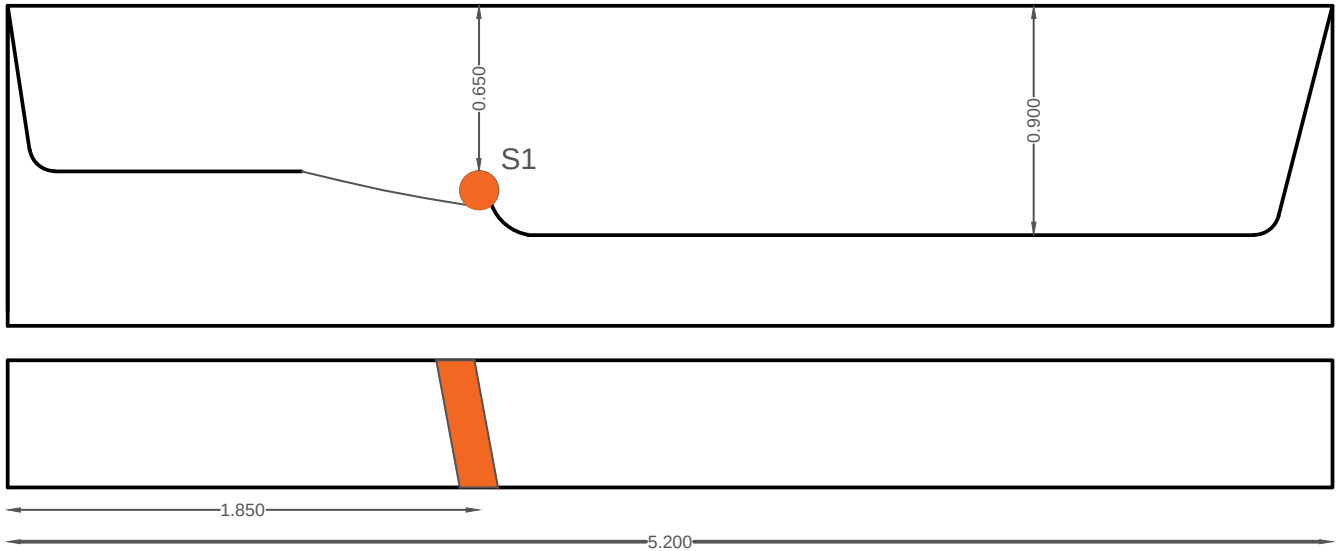
E 717710.239
N 725348.276
Z 138.551

A

B

S

N



From (m)	To (m)	Description
0.00	0.30	Dark brown slightly sandy slightly gravelly TOPSOIL
0.30	0.50	MADE GROUND: Dark brown slightly sandy slightly gravelly Clay
0.50	0.90	MADE GROUND: Grey slightly sandy gravelly Clay with occasional cobbles and boulders

Service No	ø (mm)	Colour-Material	Utility	Angle to trench
S1	0 15	Orange Wavin	Foul	100

Sample depth	Sample type

Surface from/to		Surface type
0.00	5.20	Topsoil

Groundwater	Y/N	Depth
Slow	Y	0.8

DATE OF EXCAVATION : 17/06/2021

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

PROJECT:	Blackglen Road
DRAWING No.:	10477-03-21 ENV ST02
DATE:	JUNE 2021
CLIENT:	OCSC
SCALE:	NTS @ A4

Version: No.	Date: Initials	Drawn By: Initials	Checked: Initials
A	18/06/2021	EB	CF

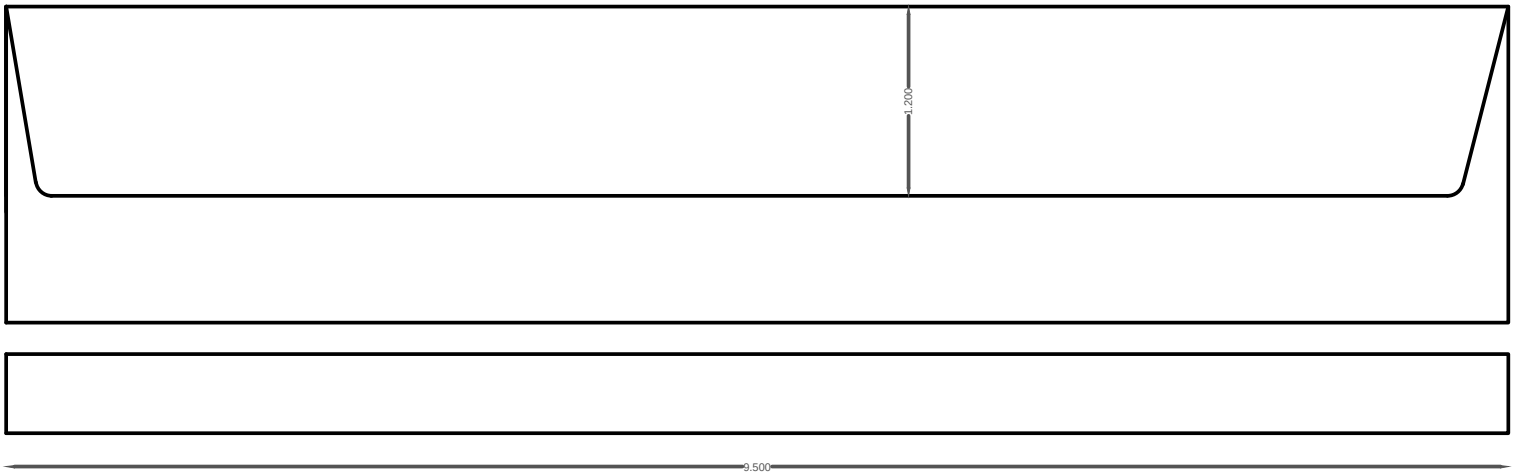
E 717628.011
N 725334.259
Z 142.120

ENV ST01

E 717629.547
N 725324.878
Z 142.940

A

S



B

N

From (m)	To (m)	Description
0.00	0.20	Brown slightly sandy slightly gravelly TOPSOIL
0.20	2.00	MADE GROUND: Brown slightly sandy slightly gravelly Clay with occasional cobbles and boulders and concrete fragments

Service No	ø (mm)	Colour-Material	Utility	Angle to trench

Surface from/to		Surface type
0.00	9.50	Topsoil

Groundwater	Y/N	Depth
	N	

Sample type	Sample depth
EN	0.00-1.00
EN	1.00-2.00

DATE OF EXCAVATION : 17/06/2021

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

PROJECT:	Blackglen Road
DRAWING No.:	10477-03-21 ENV ST01
DATE:	JUNE 2021
CLIENT:	OCSC
SCALE:	NTS @ A4

Version:	Date:	Drawn By:	Checked:
No.	Initials	Initials	Initials
A	18/06/2021	EB	CF

Blackglen Road Trial Pit Photographs.



TP01



TP01



TP01



TP02



TP02



TP02



TP03



TP03



TP03



TP04



TP04



TP04



TP05



TP05



TP05



TP06



TP06



TP06

Blackglen Road Photographs
17.06.21



ENV
TP01



ENV
TP01



ENV
TP01



ENV
TP02



ENV TP02



ENV TP03



ENV
TP03



ENV
TP03



ENV
TP03



ENV
TP04



ENV
TP04



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TP04



ENV
TP05



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TP05



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TP06



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TP07



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TP08



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TP08



ENV TP08



ENV
ST01



ENV
ST01



ENV
ST01



ENV
ST01



ENV
ST01



ENV
ST01



ENV
ST02



ENV ST02

APPENDIX 3 –Soakaway Records

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
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D22 YD52

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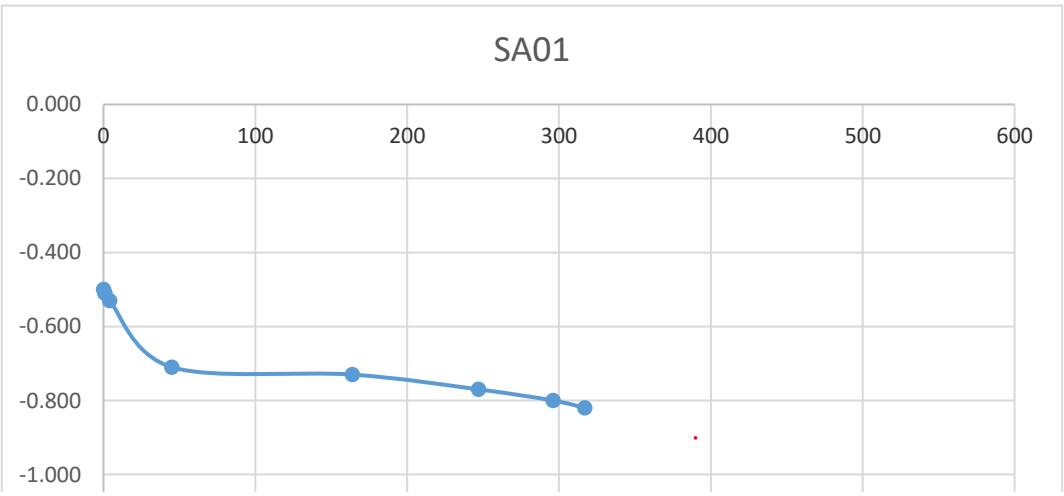
Email: info@gii.ie
Web: www.gii.ie

SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.80m x 0.60m 1.20m (L x W x D)

Date	Time	Water level (m bgl)
09/04/2021	0	-0.500
09/04/2021	1	-0.510
09/04/2021	4	-0.530
09/04/2021	45	-0.710
09/04/2021	164	-0.730
09/04/2021	247	-0.770
09/04/2021	296	-0.800
09/04/2021	317	-0.820

Start depth	Depth of Pit		Diff	75% full	25%full
0.50	**1.200**		**0.700**	**0.675**	**1.025**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
1.700	0.600			0.350	0.36
Tp75-25 (from graph) (s)		**32700**		50% Eff Depth	ap50 (m2)
				0.350	2.63
f =	**4.151E-06**	**m/s**			



GROUND INVESTIGATIONS IRELAND
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Tel: 01 601 5175 / 5176
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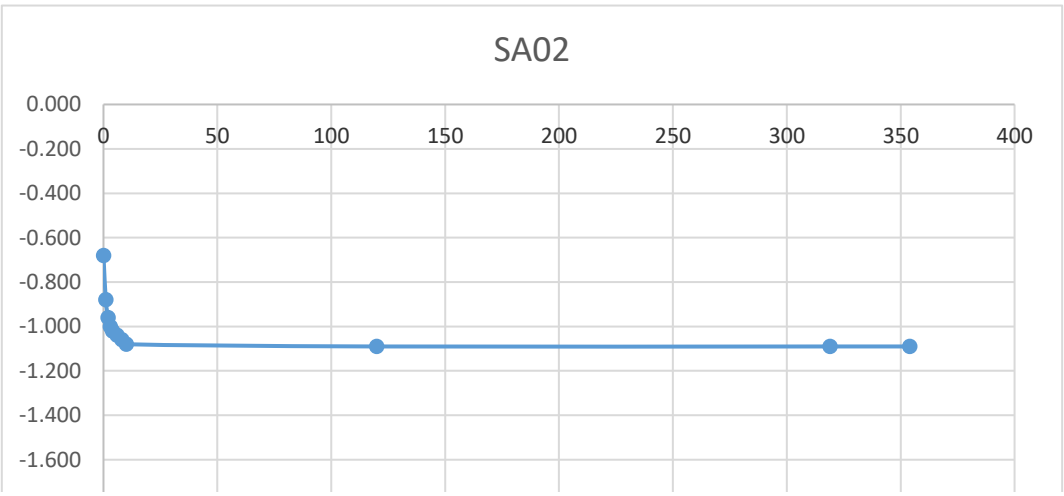
Web: www.gii.ie

SA02

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.60m x 0.60m 1.20m (L x W x D)

Date	Time	Water level (m bgl)
09/04/2021	0	-0.680
09/04/2021	1	-0.880
09/04/2021	2	-0.960
09/04/2021	3	-1.000
09/04/2021	4	-1.020
09/04/2021	6	-1.040
09/04/2021	8	-1.060
09/04/2021	10	-1.080
09/04/2021	120	-1.090
10/04/2021	319	-1.090
11/04/2021	354	-1.090

Start depth	Depth of Pit		Diff	75% full	25%full
0.68	**1.200**		**0.520**	**0.81**	**1.07**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
1.700	0.600			0.260	0.27
Tp75-25 (from graph) (s)		**7200**		50% Eff Depth	ap50 (m2)
				0.260	2.216
f =	**1.662E-05**	**m/s**			



GROUND INVESTIGATIONS IRELAND
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Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
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Web: www.gii.ie

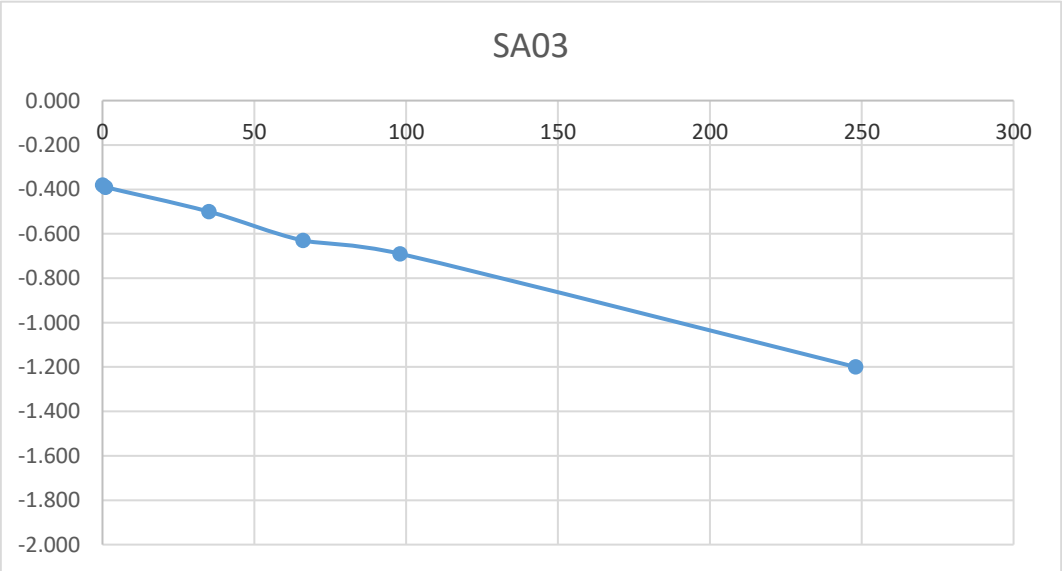
SA03

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.70m x 0.60m 1.20m (L x W x D)

Date	Time	Water level (m bgl)
09/04/2021	0	-0.380
09/04/2021	1	-0.390
09/04/2021	35	-0.500
09/04/2021	66	-0.630
09/04/2021	98	-0.690
09/04/2021	248	-1.200

Start depth	Depth of Pit		Diff	75% full	25%full
0.38	**1.200**		**0.820**	**0.585**	**0.995**

Length of pit (m)	Width of pit (m)		75-25Ht (m)	Vp75-25 (m3)
1.700	0.600		0.410	0.42
Tp75-25 (from graph) (s)		**9000**	50% Eff Depth	ap50 (m2)
			0.410	2.906
f =	**1.599E-05**	**m/s**		



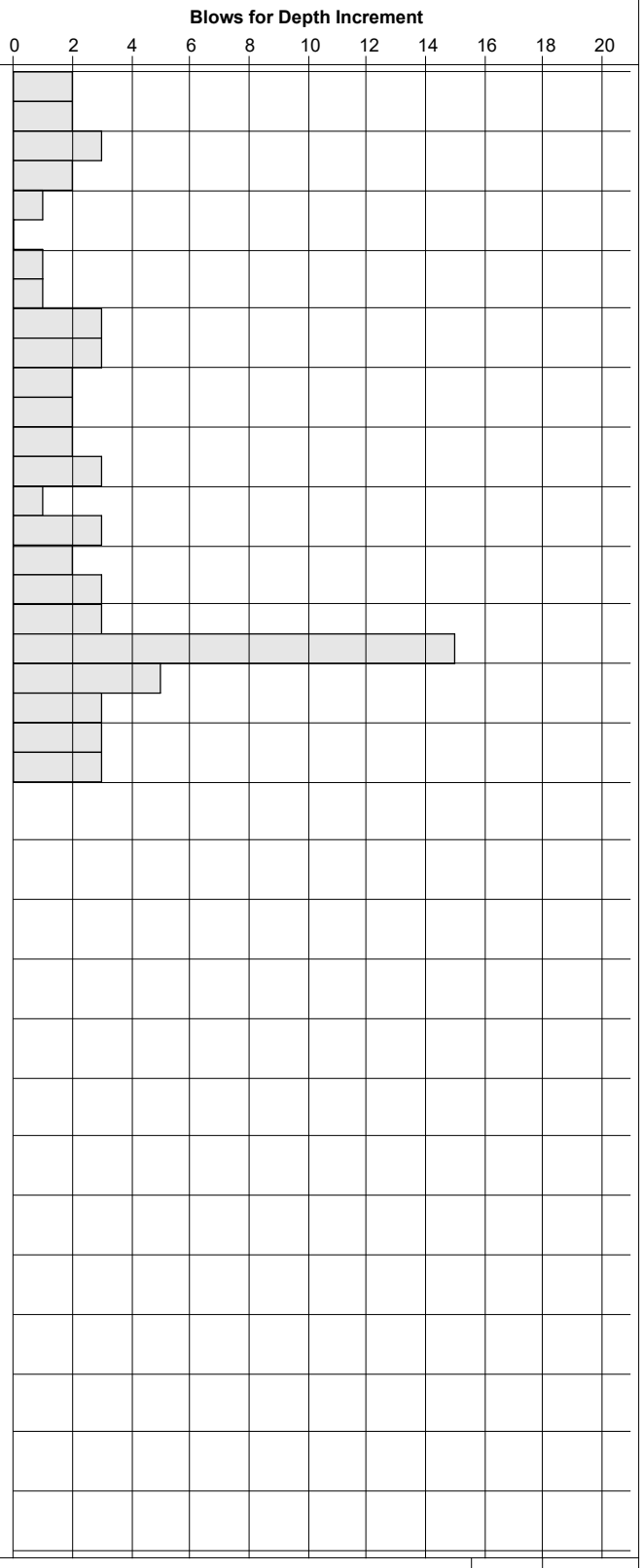
APPENDIX 4 –Dynamic Probing Records

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Blackglen Road	DPH01

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	143.22	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717639.2 E 725319.8 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		143.22	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	2			
0.40-0.50	1			
0.50-0.60	0		142.72	0.50
0.60-0.70	1			
0.70-0.80	1			
0.80-0.90	3			
0.90-1.00	3			
1.00-1.10	2		142.22	1.00
1.10-1.20	2			
1.20-1.30	2			
1.30-1.40	3			
1.40-1.50	1			
1.50-1.60	3		141.72	1.50
1.60-1.70	2			
1.70-1.80	3			
1.80-1.90	3			
1.90-2.00	15			
2.00-2.10	5		141.22	2.00
2.10-2.20	3			
2.20-2.30	3			
2.30-2.40	3			
			140.72	2.50
			140.22	3.00
			139.72	3.50
			139.22	4.00
			138.72	4.50
			138.22	5.00



Remarks
Refusal at 2.40m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH01

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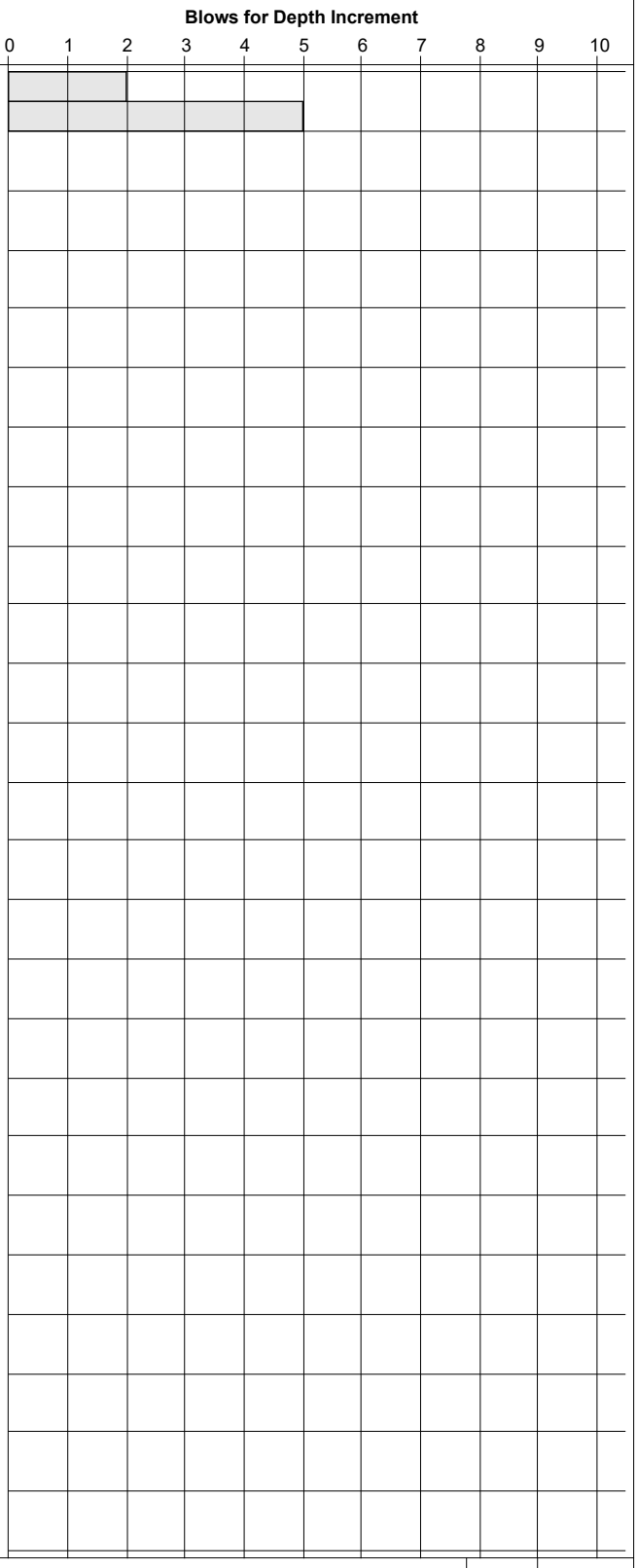
Site	Probe Number
Blackglen Road	DPH02

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	143.17	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717659.7 E 725319.5 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		143.17	0.00
0.10-0.20	5			
			142.67	0.50
			142.17	1.00
			141.67	1.50
			141.17	2.00
			140.67	2.50
			140.17	3.00
			139.67	3.50
			139.17	4.00
			138.67	4.50
			138.17	5.00



Remarks
Refusal at 0.20m BGL 25 blows for 50mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH02

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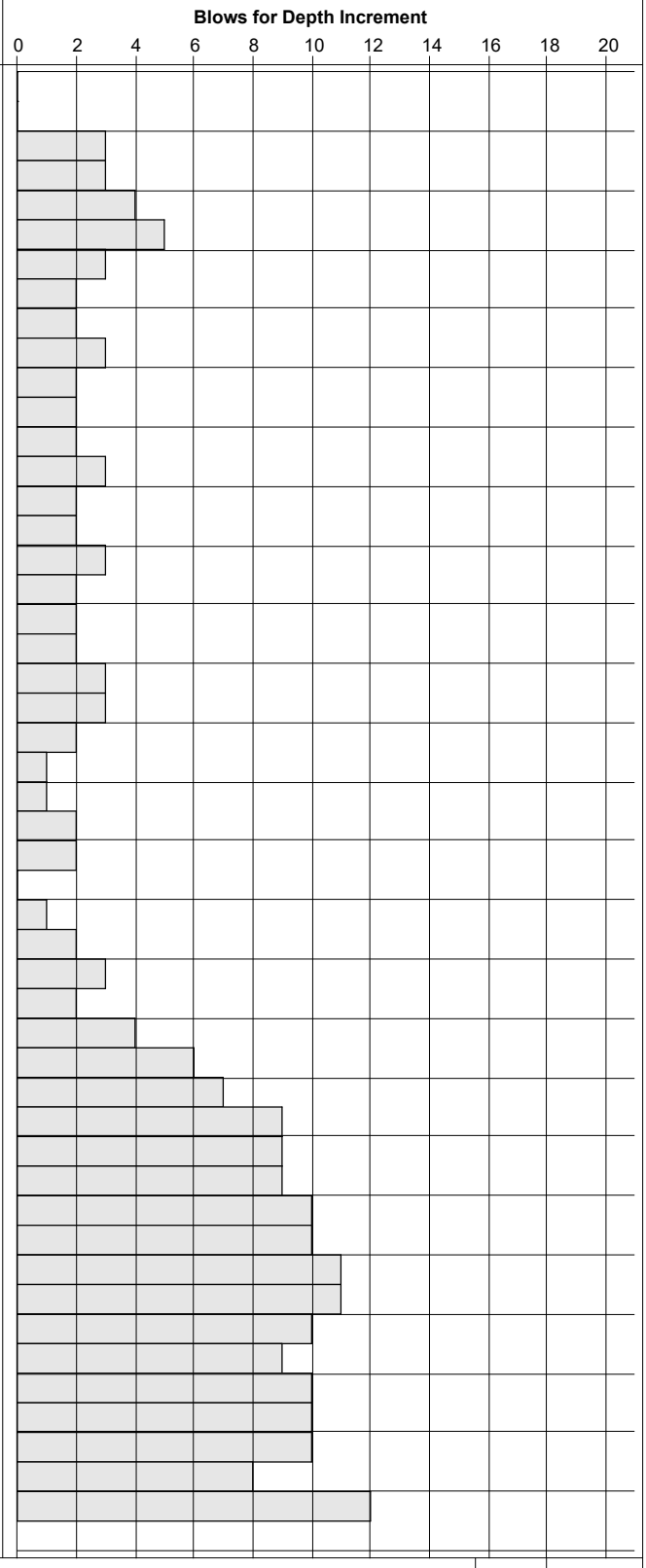
Site	Probe Number
Blackglen Road	DPH03

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	139.32	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717677.9 E 725339.8 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	0		139.32	0.00
0.10-0.20	0			
0.20-0.30	3			
0.30-0.40	3			
0.40-0.50	4			
0.50-0.60	5		138.82	0.50
0.60-0.70	3			
0.70-0.80	2			
0.80-0.90	2			
0.90-1.00	3			
1.00-1.10	2		138.32	1.00
1.10-1.20	2			
1.20-1.30	2			
1.30-1.40	3			
1.40-1.50	2			
1.50-1.60	2		137.82	1.50
1.60-1.70	3			
1.70-1.80	2			
1.80-1.90	2			
1.90-2.00	2			
2.00-2.10	3		137.32	2.00
2.10-2.20	3			
2.20-2.30	2			
2.30-2.40	1			
2.40-2.50	1			
2.50-2.60	2		136.82	2.50
2.60-2.70	2			
2.70-2.80	0			
2.80-2.90	1			
2.90-3.00	2			
3.00-3.10	3		136.32	3.00
3.10-3.20	2			
3.20-3.30	4			
3.30-3.40	6			
3.40-3.50	7			
3.50-3.60	9		135.82	3.50
3.60-3.70	9			
3.70-3.80	9			
3.80-3.90	10			
3.90-4.00	10			
4.00-4.10	11		135.32	4.00
4.10-4.20	11			
4.20-4.30	10			
4.30-4.40	9			
4.40-4.50	10			
4.50-4.60	10		134.82	4.50
4.60-4.70	10			
4.70-4.80	8			
4.80-4.90	12			
4.90	0		134.32	5.00



Remarks
Refusal at 4.90m BGL 25 blows for 50mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH03

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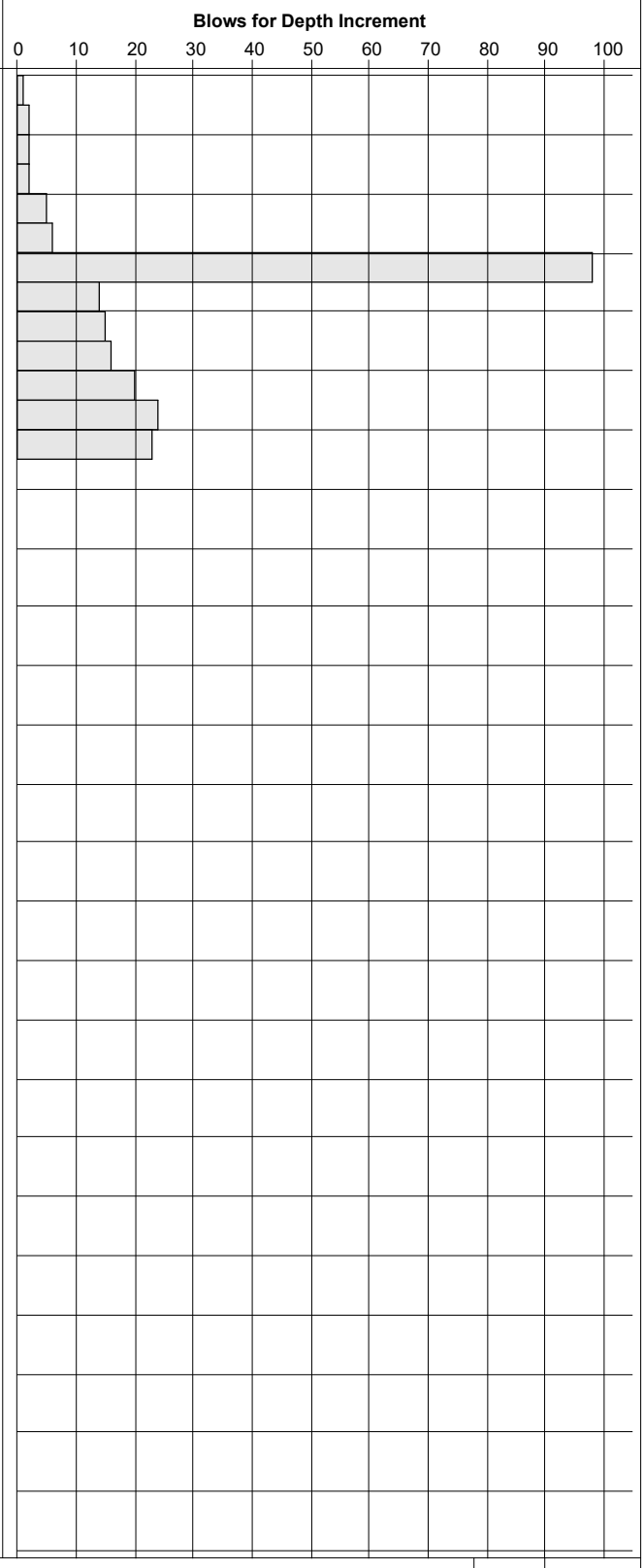
Site	Probe Number
Blackglen Road	DPH04

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	139.55	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717697.6 E 725319.4 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		139.55	0.00
0.10-0.20	2			
0.20-0.30	2			
0.30-0.40	2			
0.40-0.50	5			
0.50-0.60	6		139.05	0.50
0.60-0.70	98			
0.70-0.80	14			
0.80-0.90	15			
0.90-1.00	16			
1.00-1.10	20		138.55	1.00
1.10-1.20	24			
1.20-1.30	23			
			138.05	1.50
			137.55	2.00
			137.05	2.50
			136.55	3.00
			136.05	3.50
			135.55	4.00
			135.05	4.50
			134.55	5.00



Remarks

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH04

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Ground Investigations Ireland Ltd
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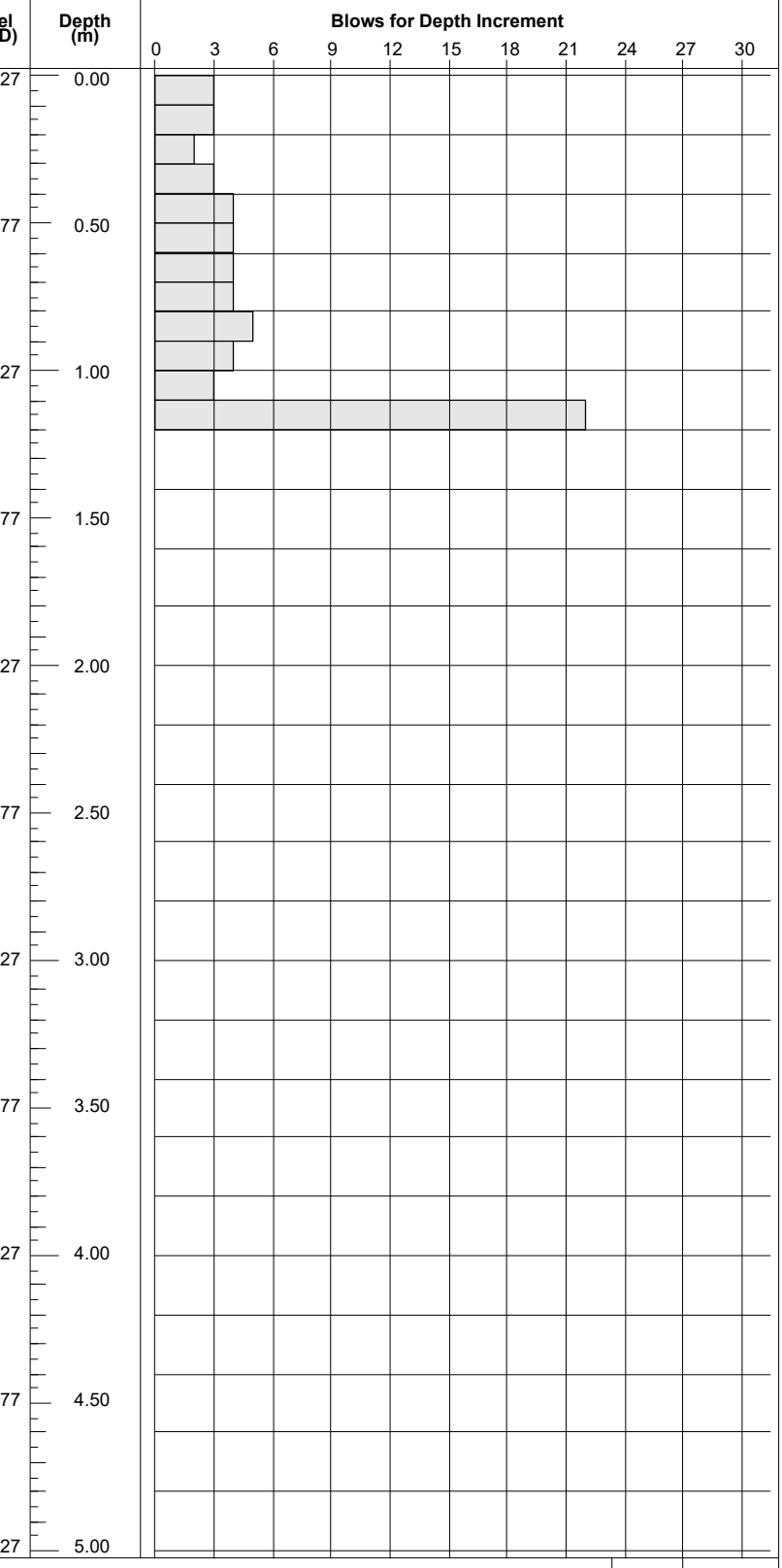
Site	Probe Number
Blackglen Road	DPH05

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	145.27	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717663 E 725299.6 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	3	
0.10-0.20	3	
0.20-0.30	2	
0.30-0.40	3	
0.40-0.50	4	
0.50-0.60	4	
0.60-0.70	4	
0.70-0.80	4	
0.80-0.90	5	
0.90-1.00	4	
1.00-1.10	3	
1.10-1.20	22	



Remarks
Refusal at 1.20m BGL 25 blows for 50mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH05

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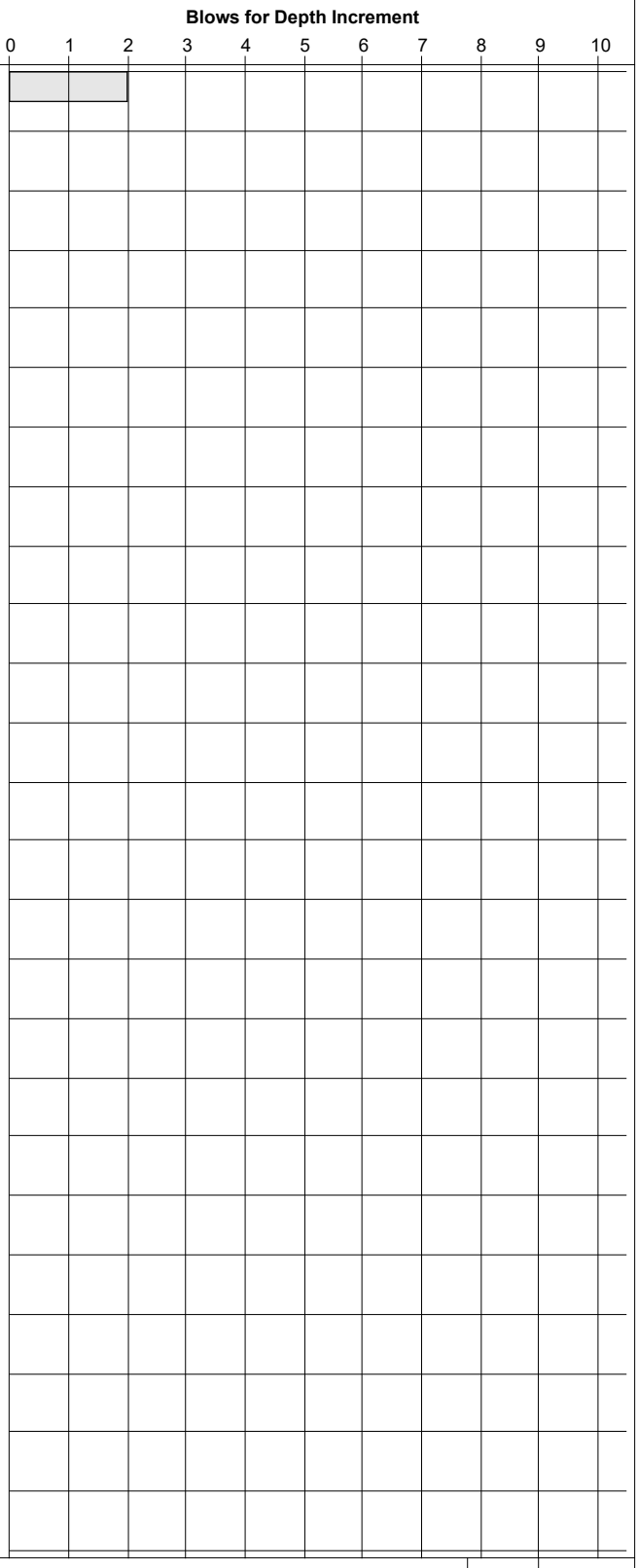
Site	Probe Number
Blackglen Road	DPH06

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	144.41	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717677.3 E 725299.5 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		144.41	0.00
			143.91	0.50
			143.41	1.00
			142.91	1.50
			142.41	2.00
			141.91	2.50
			141.41	3.00
			140.91	3.50
			140.41	4.00
			139.91	4.50
			139.41	5.00



Remarks
Refusal at 0.10m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH06

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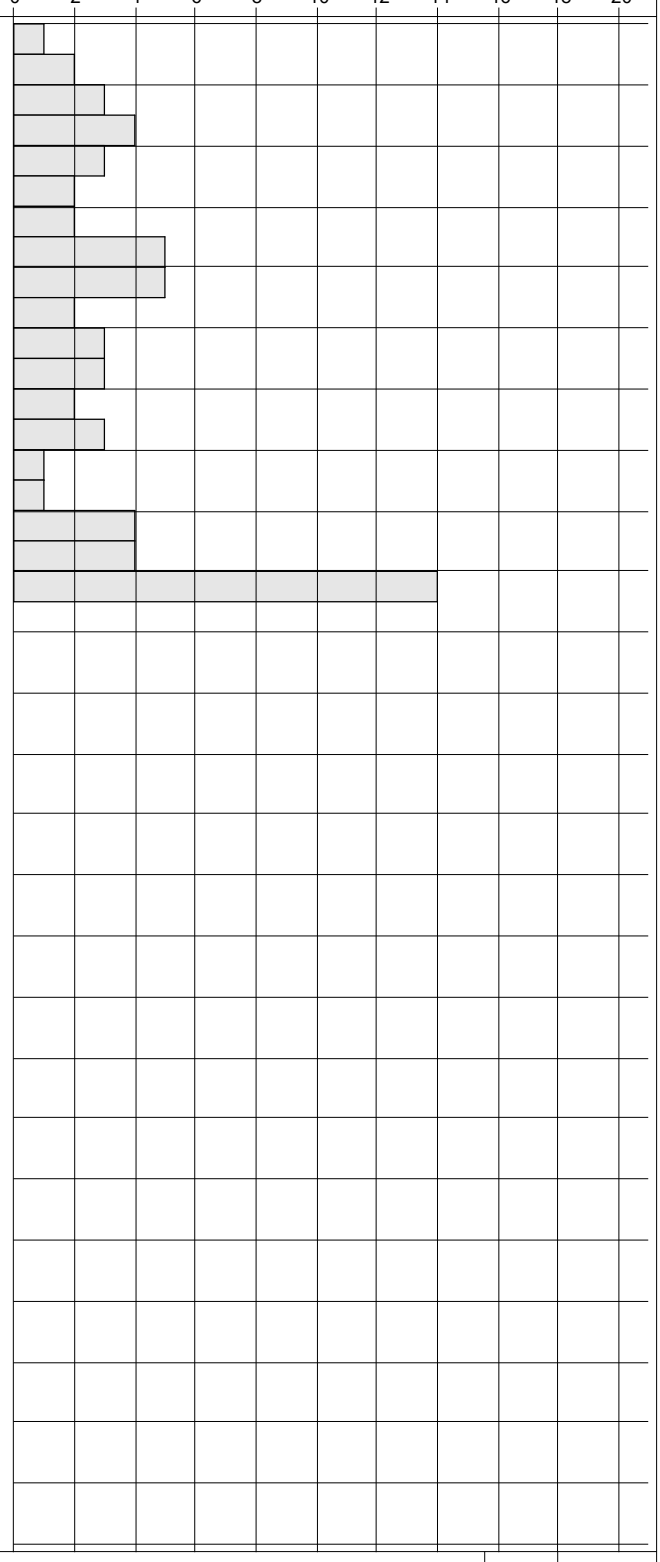
Site	Probe Number
Blackglen Road	DPH07

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	139.44	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717698.6 E 725304.3 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		139.44	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	4			
0.40-0.50	3			
0.50-0.60	2		138.94	0.50
0.60-0.70	2			
0.70-0.80	5			
0.80-0.90	5			
0.90-1.00	2			
1.00-1.10	3		138.44	1.00
1.10-1.20	3			
1.20-1.30	2			
1.30-1.40	3			
1.40-1.50	1			
1.50-1.60	1		137.94	1.50
1.60-1.70	4			
1.70-1.80	4			
1.80-1.90	14			
			137.44	2.00
			136.94	2.50
			136.44	3.00
			135.94	3.50
			135.44	4.00
			134.94	4.50
			134.44	5.00



Remarks
Refusal at 1.90m BGL for 29 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH07

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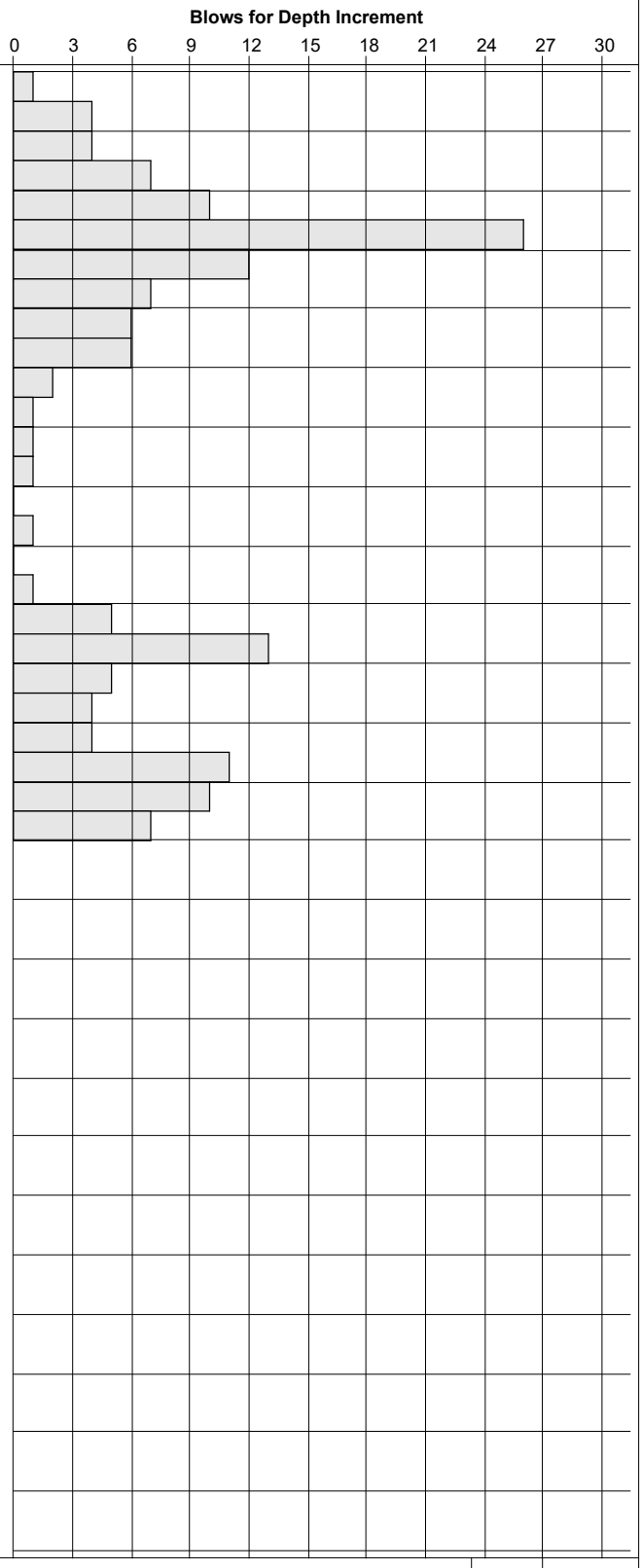
Site	Probe Number
Blackglen Road	DPH08

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	145.78	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717664.8 E 725277.4 N	08/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		145.78	0.00
0.10-0.20	4			
0.20-0.30	4			
0.30-0.40	7			
0.40-0.50	10			
0.50-0.60	26		145.28	0.50
0.60-0.70	12			
0.70-0.80	7			
0.80-0.90	6			
0.90-1.00	6			
1.00-1.10	2		144.78	1.00
1.10-1.20	1			
1.20-1.30	1			
1.30-1.40	1			
1.40-1.50	0			
1.50-1.60	1		144.28	1.50
1.60-1.70	0			
1.70-1.80	1			
1.80-1.90	5			
1.90-2.00	13			
2.00-2.10	5		143.78	2.00
2.10-2.20	4			
2.20-2.30	4			
2.30-2.40	11			
2.40-2.50	10			
2.50-2.60	7		143.28	2.50
			142.78	3.00
			142.28	3.50
			141.78	4.00
			141.28	4.50
			140.78	5.00



Remarks
Refusal at 2.60m BGL 25 blows for 10mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH08

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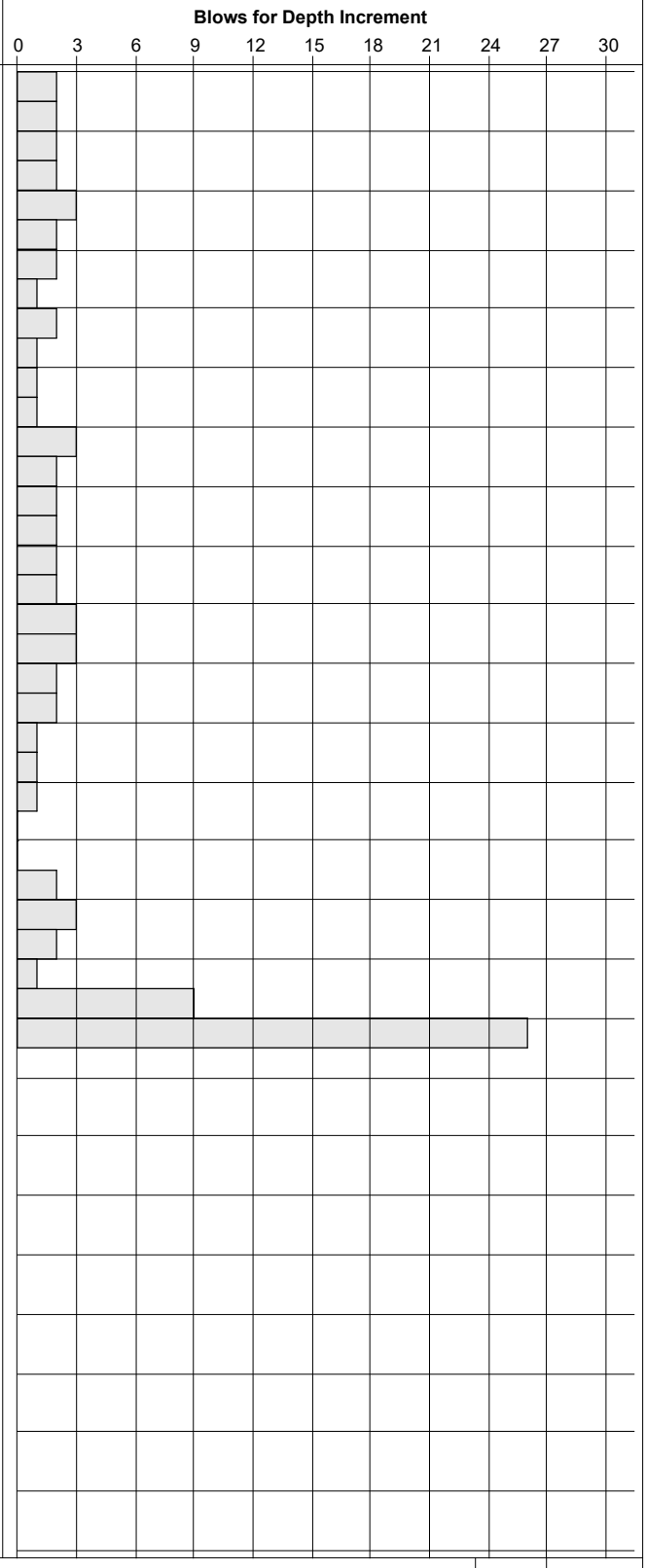
Site	Probe Number
Blackglen Road	DPH09

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	144.46	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717676.6 E 725279.8 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	2	
0.20-0.30	2	
0.30-0.40	2	
0.40-0.50	3	
0.50-0.60	2	
0.60-0.70	2	
0.70-0.80	1	
0.80-0.90	2	
0.90-1.00	1	
1.00-1.10	1	
1.10-1.20	1	
1.20-1.30	3	
1.30-1.40	2	
1.40-1.50	2	
1.50-1.60	2	
1.60-1.70	2	
1.70-1.80	2	
1.80-1.90	3	
1.90-2.00	3	
2.00-2.10	2	
2.10-2.20	2	
2.20-2.30	1	
2.30-2.40	1	
2.40-2.50	1	
2.50-2.60	0	
2.60-2.70	0	
2.70-2.80	2	
2.80-2.90	3	
2.90-3.00	2	
3.00-3.10	1	
3.10-3.20	9	
3.20-3.30	26	

Level (mOD)	Depth (m)
144.46	0.00
143.96	0.50
143.46	1.00
142.96	1.50
142.46	2.00
141.96	2.50
141.46	3.00
140.96	3.50
140.46	4.00
139.96	4.50
139.46	5.00



Remarks
Refusal at 3.30m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH09

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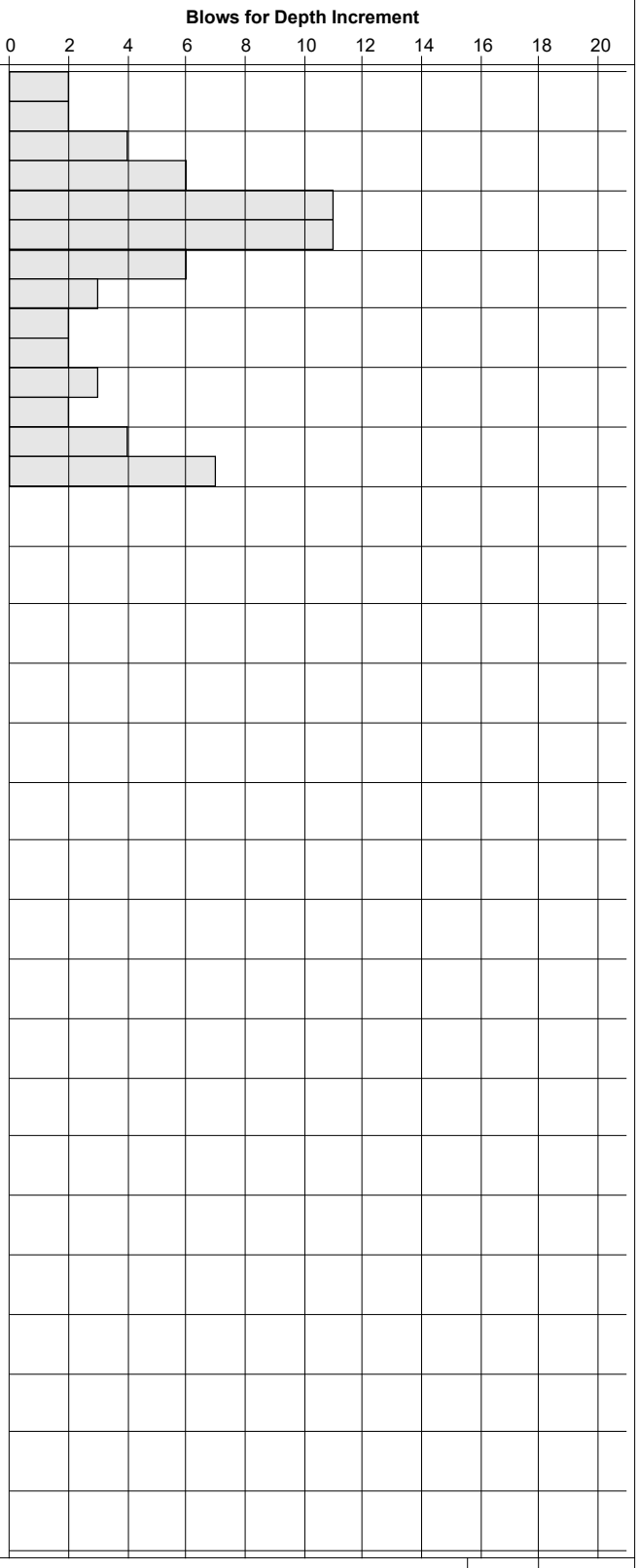
Site	Probe Number
Blackglen Road	DPH10

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	140.30	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717699.8 E 725280.3 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		140.30	0.00
0.10-0.20	2			
0.20-0.30	4			
0.30-0.40	6			
0.40-0.50	11			
0.50-0.60	11		139.80	0.50
0.60-0.70	6			
0.70-0.80	3			
0.80-0.90	2			
0.90-1.00	2			
1.00-1.10	3		139.30	1.00
1.10-1.20	2			
1.20-1.30	4			
1.30-1.40	7			
			138.80	1.50
			138.30	2.00
			137.80	2.50
			137.30	3.00
			136.80	3.50
			136.30	4.00
			135.80	4.50
			135.30	5.00



Remarks
Refusal at 1.40m BGL BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH10

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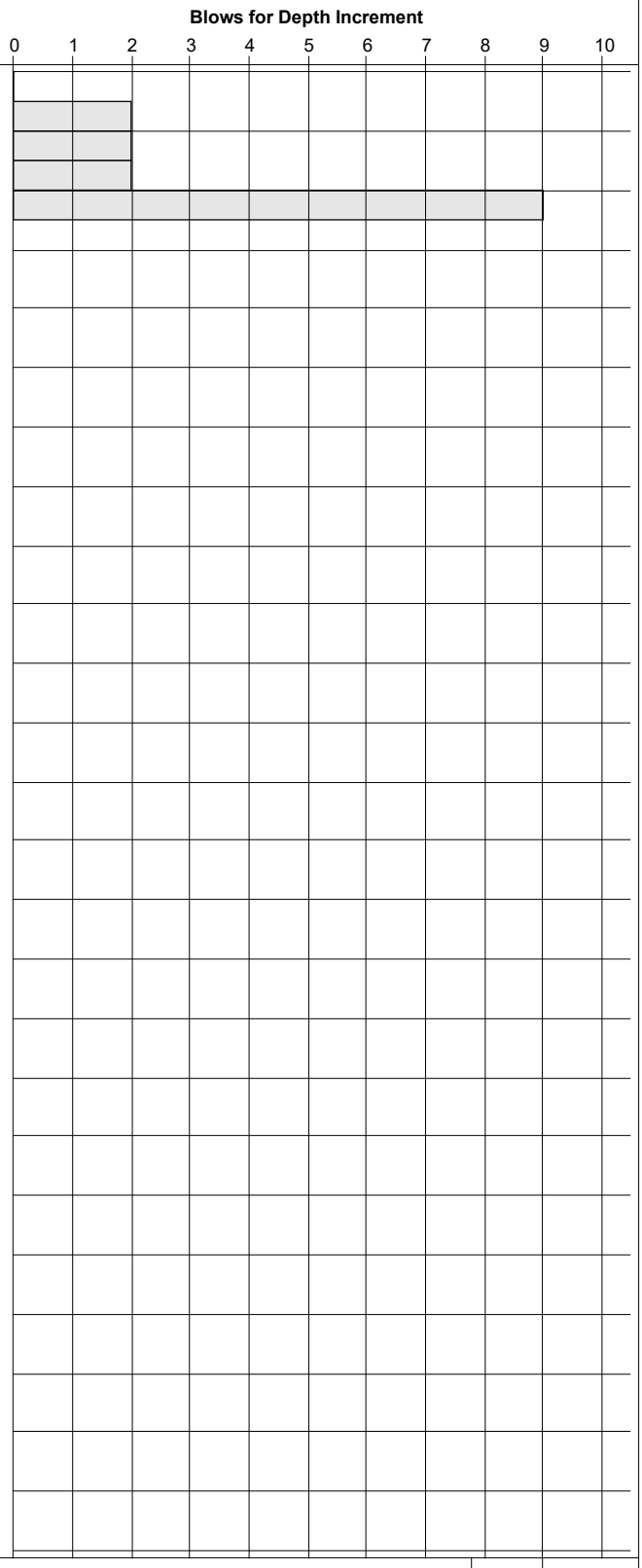
Site	Probe Number
Blackglen Road	DPH11

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	147.43	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717663.7 E 725239.3 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	2	
0.20-0.30	2	
0.30-0.40	2	
0.40-0.50	9	

Level (mOD)	Depth (m)
147.43	0.00
146.93	0.50
146.43	1.00
145.93	1.50
145.43	2.00
144.93	2.50
144.43	3.00
143.93	3.50
143.43	4.00
142.93	4.50
142.43	5.00



Remarks
Refusal at 0.50m BGL 25 blows for 10mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH11

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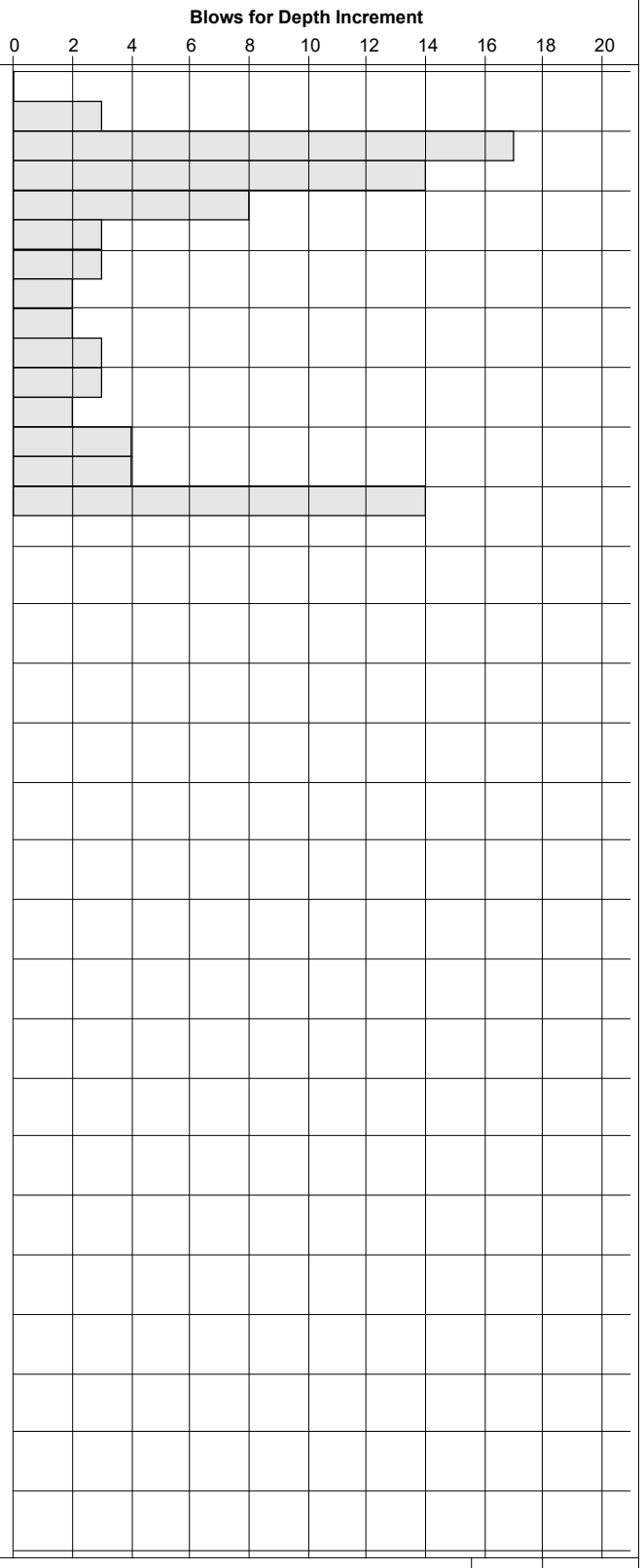
Site	Probe Number
Blackglen Road	DPH12

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	145.73	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717679.6 E 725241 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	0		145.73	0.00
0.10-0.20	3			
0.20-0.30	17			
0.30-0.40	14			
0.40-0.50	8			
0.50-0.60	3		145.23	0.50
0.60-0.70	3			
0.70-0.80	2			
0.80-0.90	2			
0.90-1.00	3			
1.00-1.10	3		144.73	1.00
1.10-1.20	2			
1.20-1.30	4			
1.30-1.40	4			
1.40-1.50	14		144.23	1.50
			143.73	2.00
			143.23	2.50
			142.73	3.00
			142.23	3.50
			141.73	4.00
			141.23	4.50
			140.73	5.00



Remarks
Refusal at 1.50m BGL 25 blows for 75mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH12

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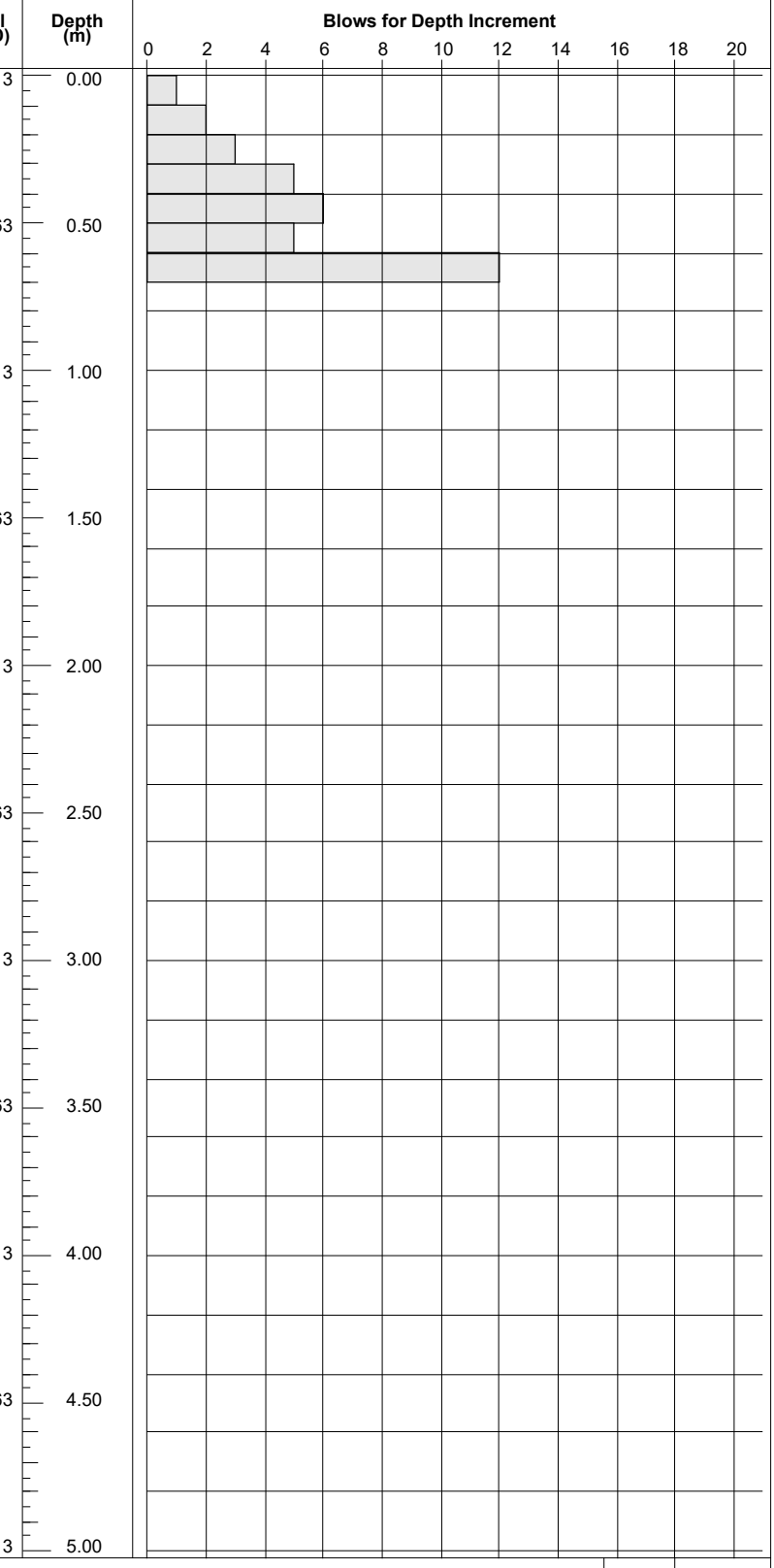
Site	Probe Number
Blackglen Road	DPH13

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	144.13	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717697.6 E 725241.6 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	1	
0.10-0.20	2	
0.20-0.30	3	
0.30-0.40	5	
0.40-0.50	6	
0.50-0.60	5	
0.60-0.70	12	



Remarks
Refusal at 0.70m BGL 25 blows for 10mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH13

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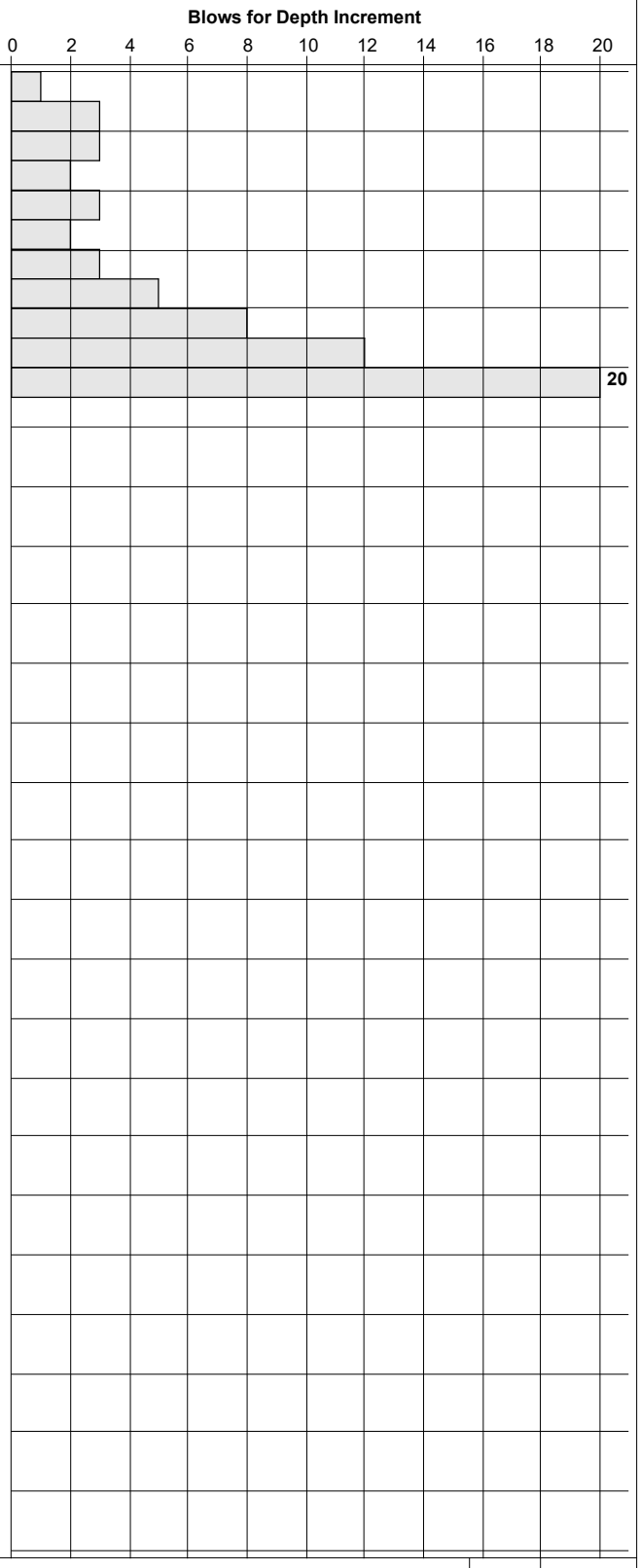
Site	Probe Number
Blackglen Road	DPH14

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	144.59	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717657.9 E 725199.7 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		144.59	0.00
0.10-0.20	3			
0.20-0.30	3			
0.30-0.40	2			
0.40-0.50	3			
0.50-0.60	2		144.09	0.50
0.60-0.70	3			
0.70-0.80	5			
0.80-0.90	8			
0.90-1.00	12			
1.00-1.10	20		143.59	1.00
			143.09	1.50
			142.59	2.00
			142.09	2.50
			141.59	3.00
			141.09	3.50
			140.59	4.00
			140.09	4.50
			139.59	5.00



Remarks
Refusal at 1.10m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH14

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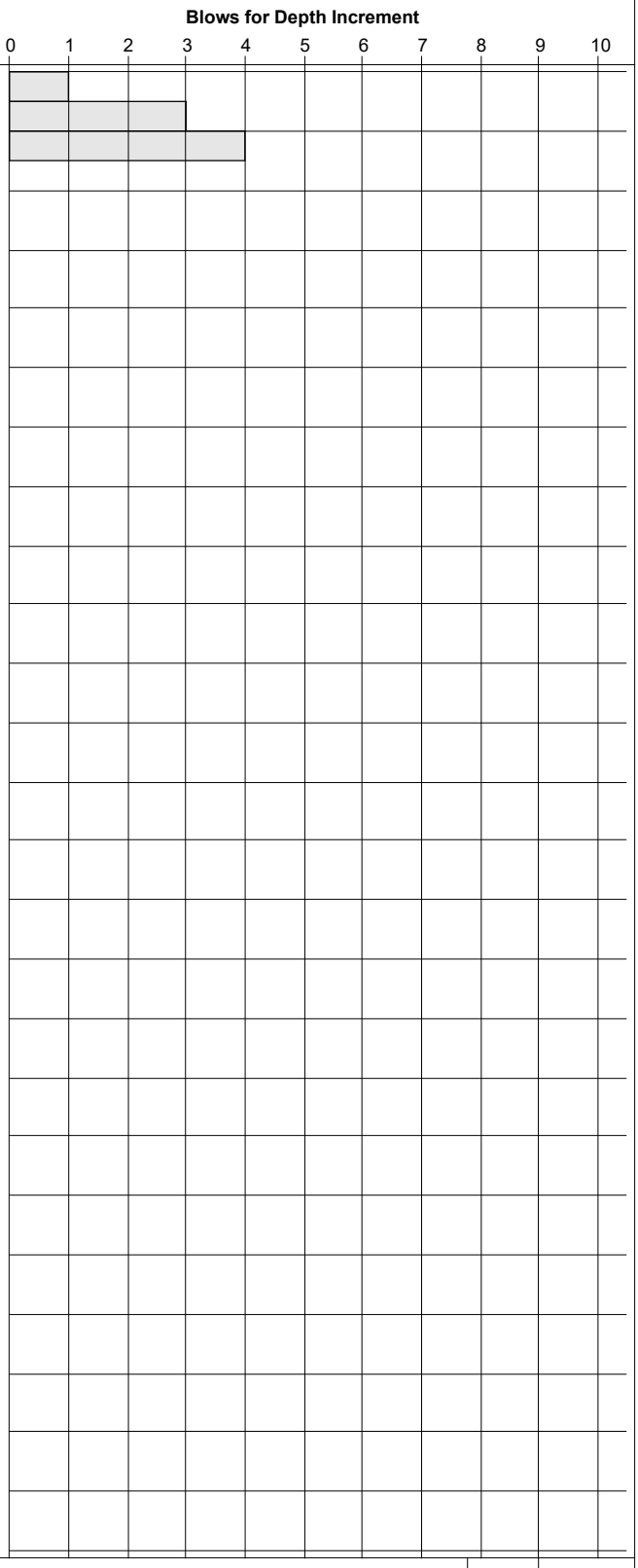
Site	Probe Number
Blackglen Road	DPH15

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	144.63	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717680.5 E 725200.7 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	1	
0.10-0.20	3	
0.20-0.30	4	

Level (mOD)	Depth (m)
144.63	0.00
144.13	0.50
143.63	1.00
143.13	1.50
142.63	2.00
142.13	2.50
141.63	3.00
141.13	3.50
140.63	4.00
140.13	4.50
139.63	5.00



Remarks
Refusal at 0.30 BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH15

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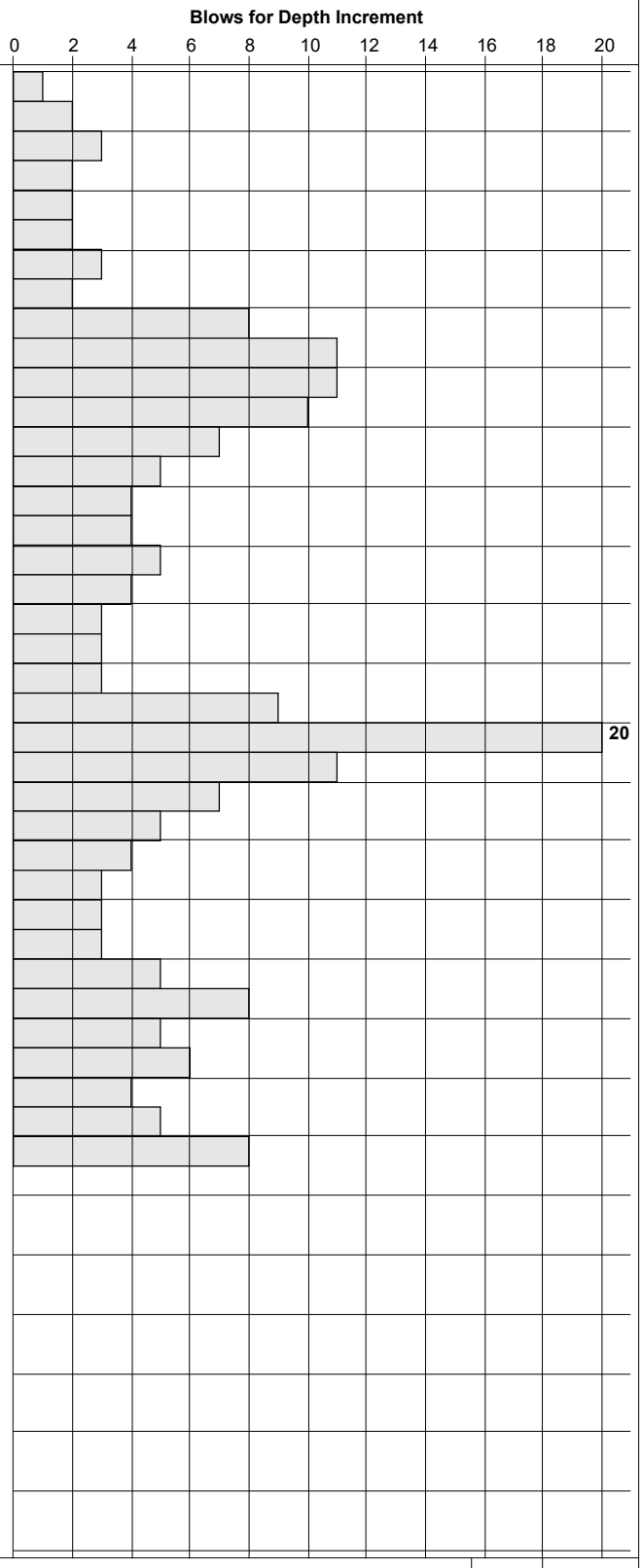
Site	Probe Number
Blackglen Road	DPH16

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	142.24	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717704.3 E 725202.5 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		142.24	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	2			
0.40-0.50	2			
0.50-0.60	2		141.74	0.50
0.60-0.70	3			
0.70-0.80	2			
0.80-0.90	8			
0.90-1.00	11			
1.00-1.10	11		141.24	1.00
1.10-1.20	10			
1.20-1.30	7			
1.30-1.40	5			
1.40-1.50	4			
1.50-1.60	4		140.74	1.50
1.60-1.70	5			
1.70-1.80	4			
1.80-1.90	3			
1.90-2.00	3			
2.00-2.10	3		140.24	2.00
2.10-2.20	9			
2.20-2.30	20			
2.30-2.40	11			
2.40-2.50	7			
2.50-2.60	5		139.74	2.50
2.60-2.70	4			
2.70-2.80	3			
2.80-2.90	3			
2.90-3.00	3			
3.00-3.10	5		139.24	3.00
3.10-3.20	8			
3.20-3.30	5			
3.30-3.40	6			
3.40-3.50	4			
3.50-3.60	5		138.74	3.50
3.60-3.70	8			
			138.24	4.00
			137.74	4.50
			137.24	5.00



Remarks
Refusal at 3.70m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH16

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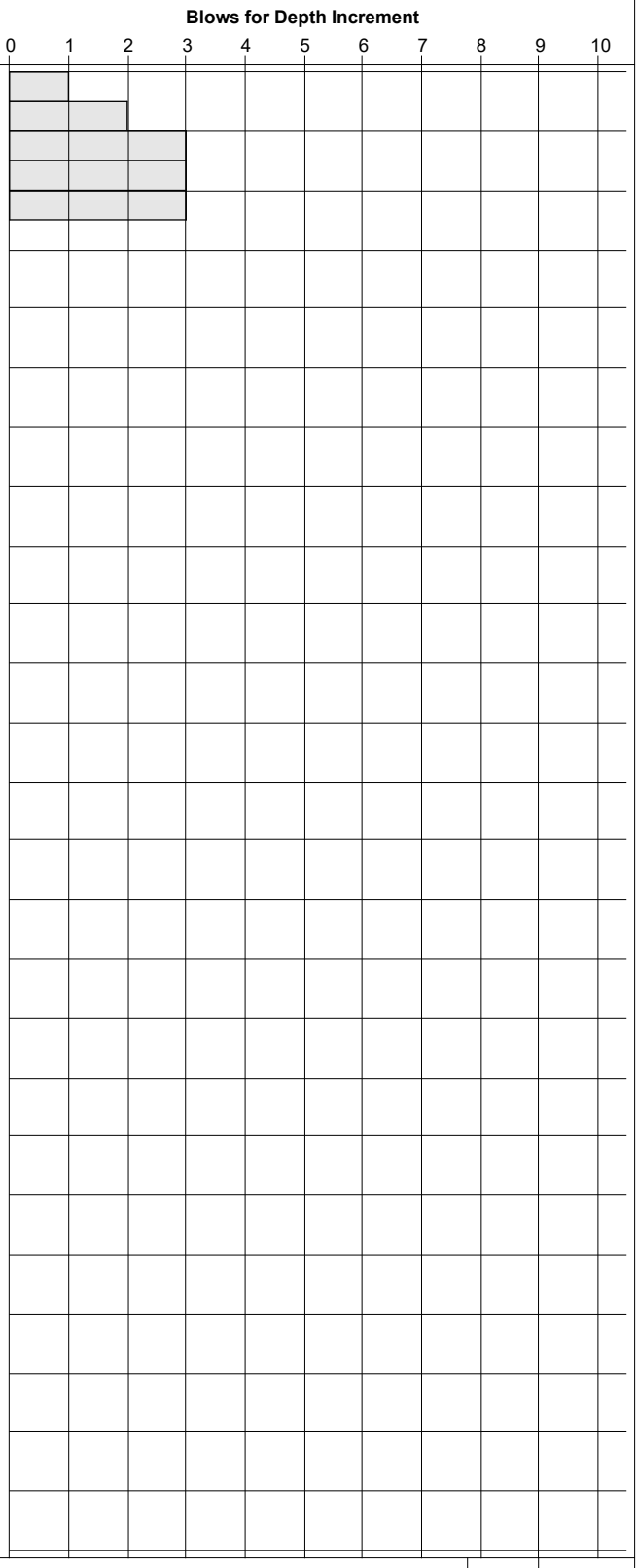
Site	Probe Number
Blackglen Road	DPH17

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	144.36	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717660.5 E 725180.5 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		144.36	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	3			
0.40-0.50	3		143.86	0.50
			143.36	1.00
			142.86	1.50
			142.36	2.00
			141.86	2.50
			141.36	3.00
			140.86	3.50
			140.36	4.00
			139.86	4.50
			139.36	5.00



Remarks
Refusal at 0.50m BGL 25 blows for 10mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH17

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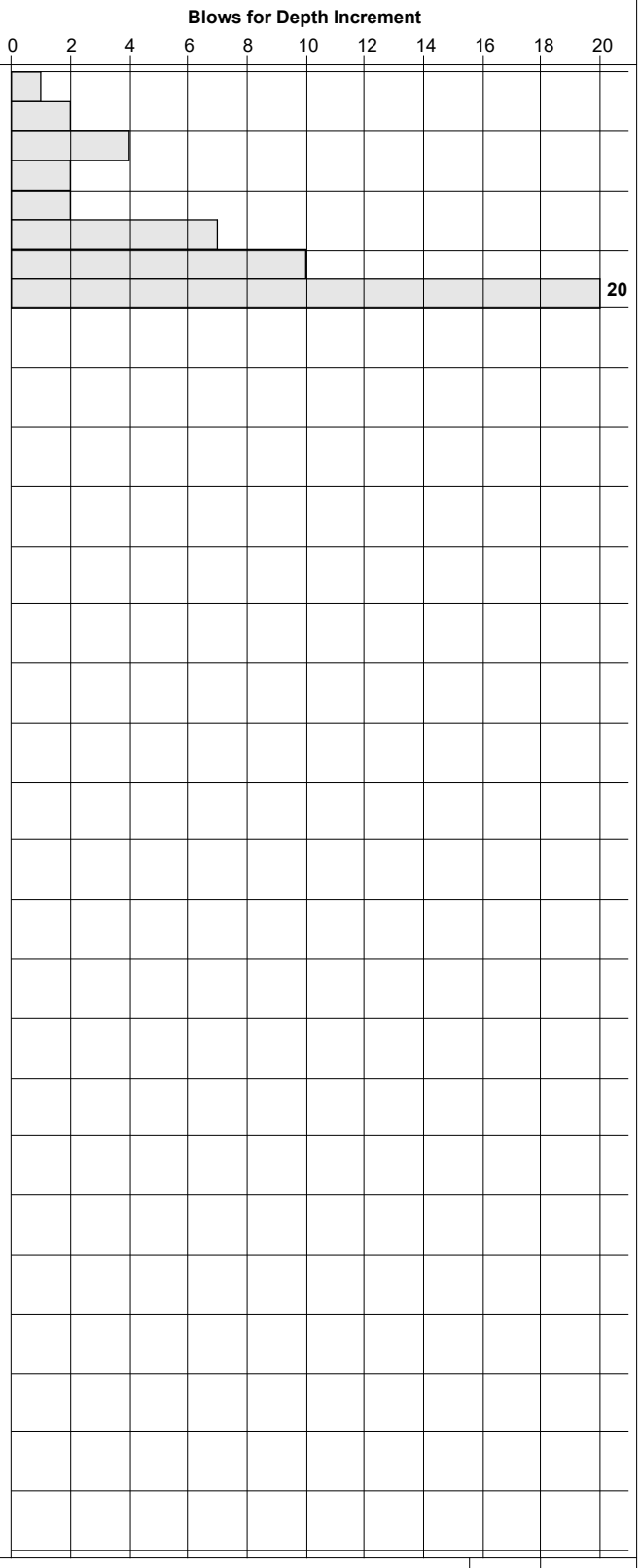
Site	Probe Number
Blackglen Road	DPH18

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	142.23	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717678 E 725179.6 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		142.23	0.00
0.10-0.20	2			
0.20-0.30	4			
0.30-0.40	2			
0.40-0.50	2			
0.50-0.60	7		141.73	0.50
0.60-0.70	10			
0.70-0.80	20			
			141.23	1.00
			140.73	1.50
			140.23	2.00
			139.73	2.50
			139.23	3.00
			138.73	3.50
			138.23	4.00
			137.73	4.50
			137.23	5.00



Remarks
Refusal at 0.80m BGL 25 blows for 50mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH18

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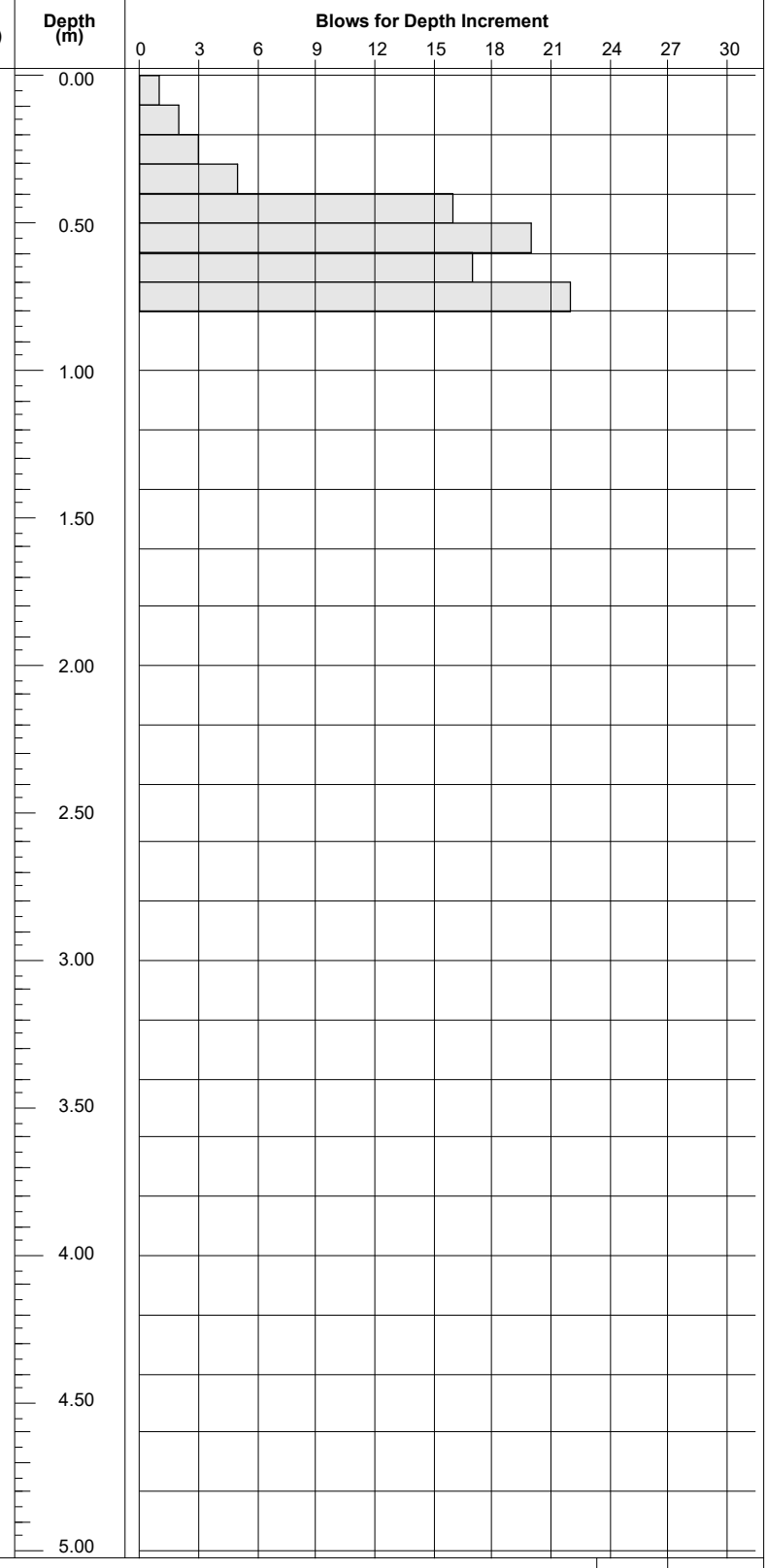
Site	Probe Number
Blackglen Road	DPH19

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm		OCSC	10477-03-21

Location	Dates	Engineer	Sheet
	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	1		
0.10-0.20	2		
0.20-0.30	3		
0.30-0.40	5		
0.40-0.50	16		
0.50-0.60	20		
0.60-0.70	17		
0.70-0.80	22		



Remarks
Refusal at 0.80m BGL 25 blows for 10mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH101

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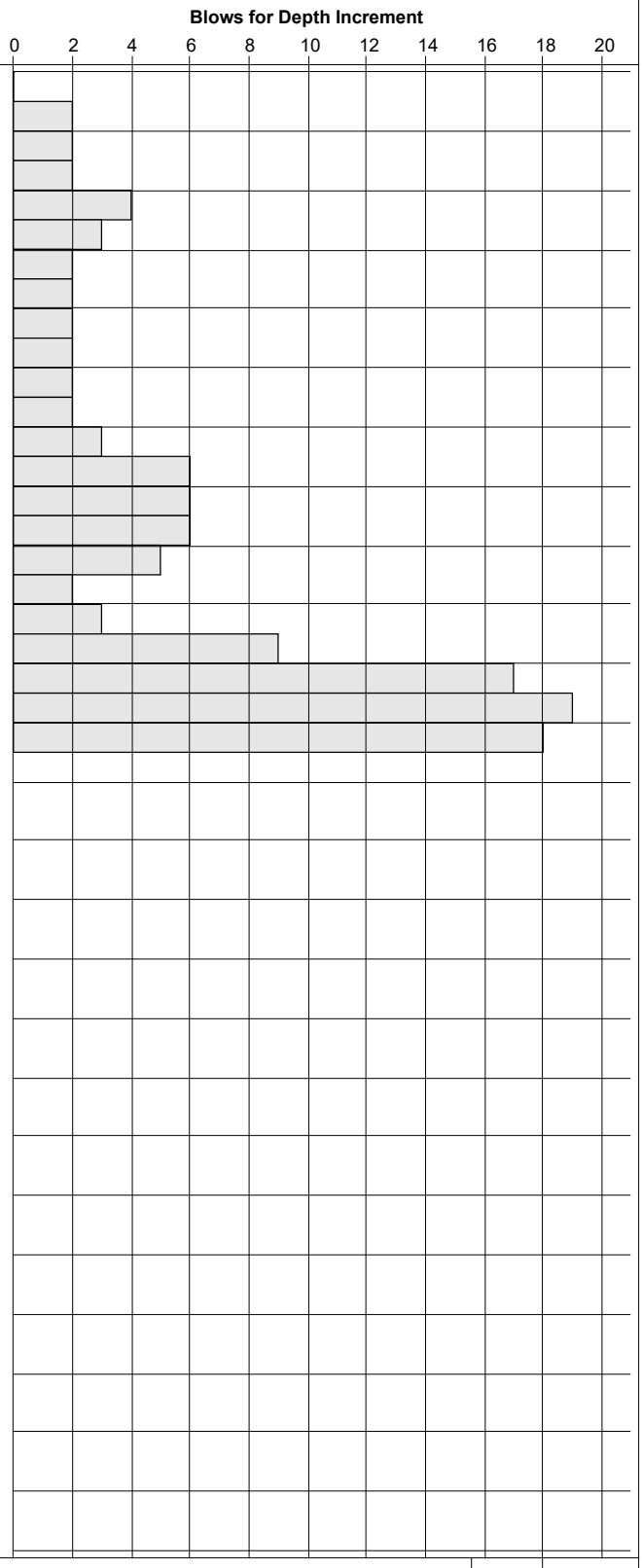
Site	Probe Number
Blackglen Road	DPH20

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	140.53	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717698.9 E 725160.3 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	0		140.53	0.00
0.10-0.20	2			
0.20-0.30	2			
0.30-0.40	2			
0.40-0.50	4			
0.50-0.60	3		140.03	0.50
0.60-0.70	2			
0.70-0.80	2			
0.80-0.90	2			
0.90-1.00	2			
1.00-1.10	2		139.53	1.00
1.10-1.20	2			
1.20-1.30	3			
1.30-1.40	6			
1.40-1.50	6			
1.50-1.60	6		139.03	1.50
1.60-1.70	5			
1.70-1.80	2			
1.80-1.90	3			
1.90-2.00	9			
2.00-2.10	17		138.53	2.00
2.10-2.20	19			
2.20-2.30	18			
			138.03	2.50
			137.53	3.00
			137.03	3.50
			136.53	4.00
			136.03	4.50
			135.53	5.00



Remarks
Refusal at 2.30m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH20

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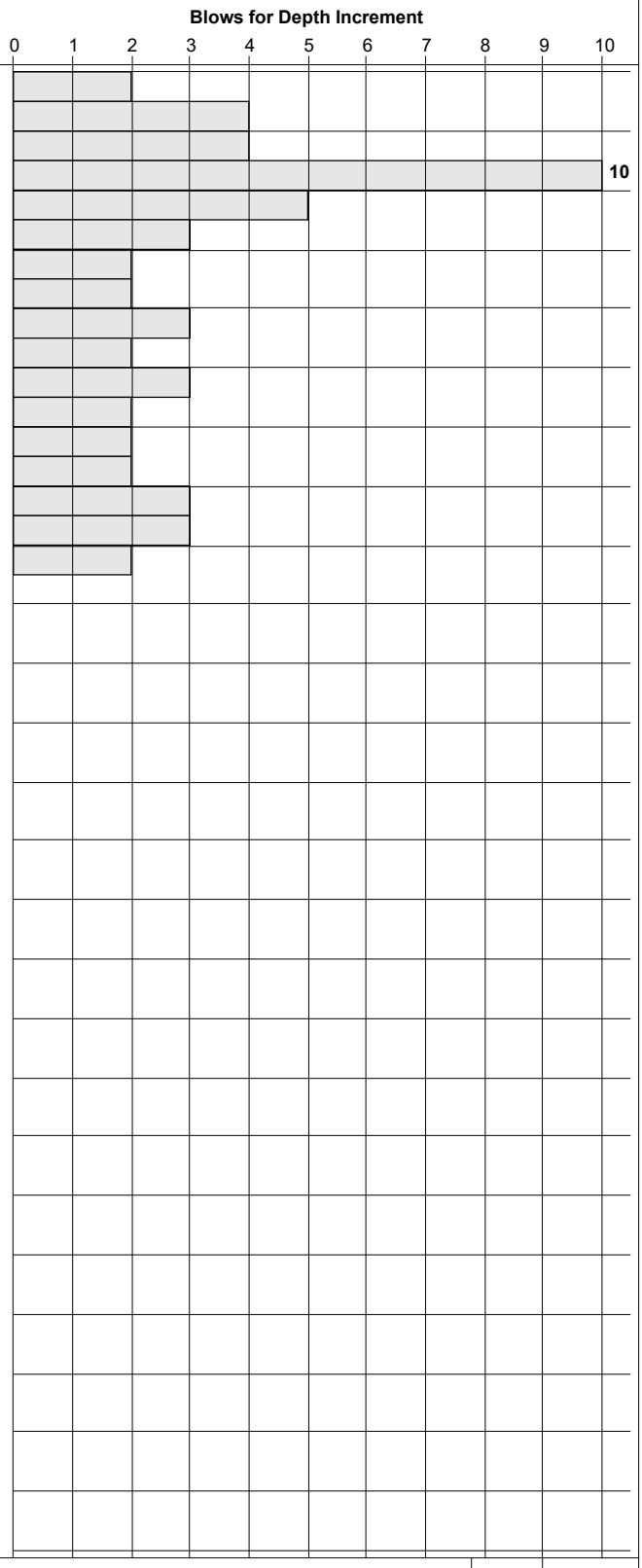
Site	Probe Number
Blackglen Road	DPH21

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	143.80	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717679.8 E 725139.9 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		143.80	0.00
0.10-0.20	4			
0.20-0.30	4			
0.30-0.40	10			
0.40-0.50	5			
0.50-0.60	3		143.30	0.50
0.60-0.70	2			
0.70-0.80	2			
0.80-0.90	3			
0.90-1.00	2			
1.00-1.10	3		142.80	1.00
1.10-1.20	2			
1.20-1.30	2			
1.30-1.40	2			
1.40-1.50	3			
1.50-1.60	3		142.30	1.50
1.60-1.70	2			
			141.80	2.00
			141.30	2.50
			140.80	3.00
			140.30	3.50
			139.80	4.00
			139.30	4.50
			138.80	5.00



Remarks
Refusal at 1.70m BGL 25 blows for 10mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH21

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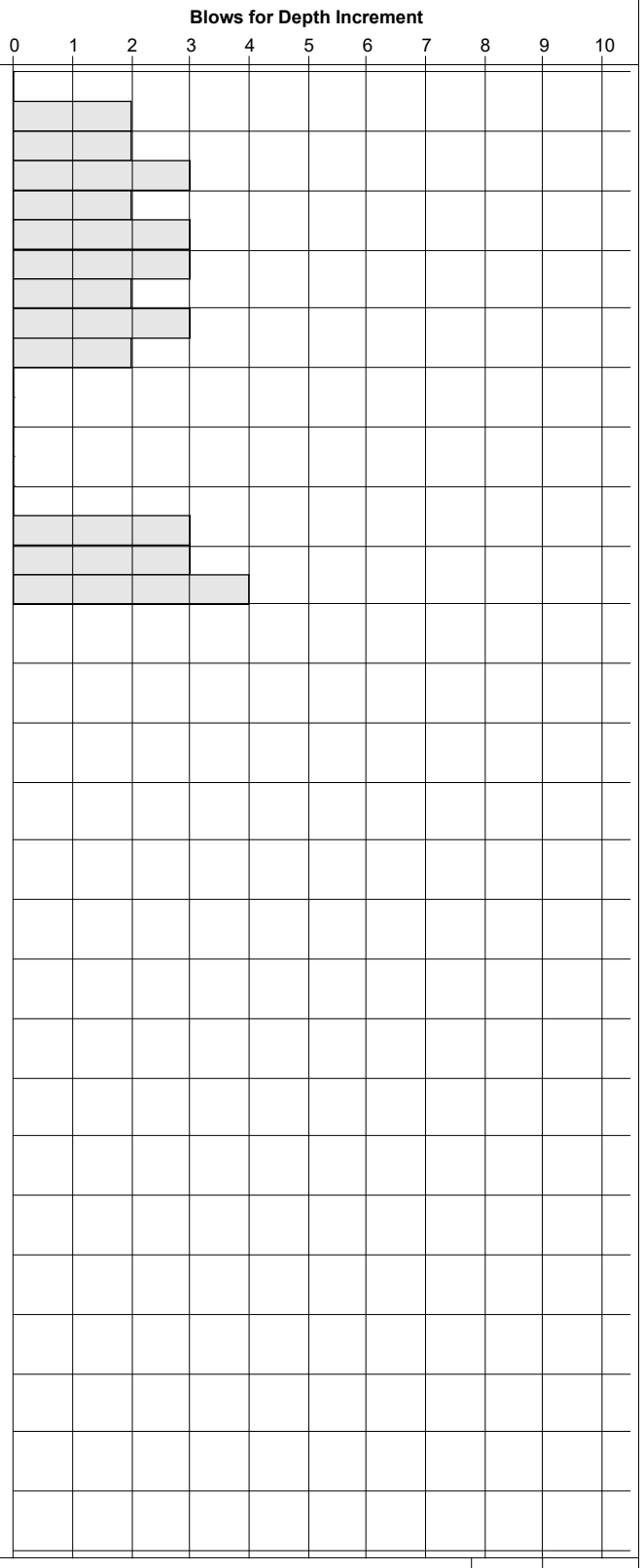
Site	Probe Number
Blackglen Road	DPH22

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	142.54	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717699.3 E 725140.1 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	0		142.54	0.00
0.10-0.20	2			
0.20-0.30	2			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	3		142.04	0.50
0.60-0.70	3			
0.70-0.80	2			
0.80-0.90	3			
0.90-1.00	2			
1.00-1.10	0		141.54	1.00
1.10-1.20	0			
1.20-1.30	0			
1.30-1.40	0			
1.40-1.50	0			
1.50-1.60	3		141.04	1.50
1.60-1.70	3			
1.70-1.80	4			
			140.54	2.00
			140.04	2.50
			139.54	3.00
			139.04	3.50
			138.54	4.00
			138.04	4.50
			137.54	5.00



Remarks
Refusal at 1.80m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH22

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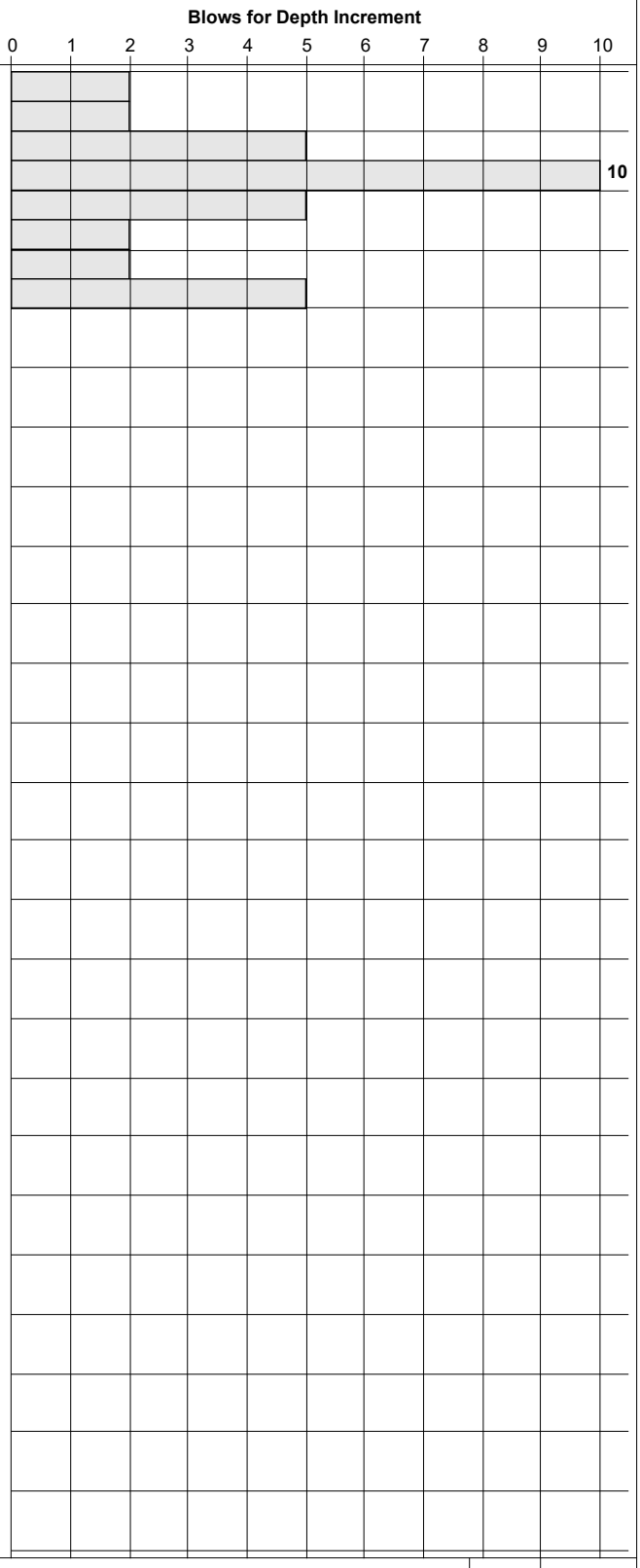
Site	Probe Number
Blackglen Road	DPH24

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	151.46	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717617.9 E 725199.1 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		151.46	0.00
0.10-0.20	2			
0.20-0.30	5			
0.30-0.40	10			
0.40-0.50	5			
0.50-0.60	2		150.96	0.50
0.60-0.70	2			
0.70-0.80	5			
			150.46	1.00
			149.96	1.50
			149.46	2.00
			148.96	2.50
			148.46	3.00
			147.96	3.50
			147.46	4.00
			146.96	4.50
			146.46	5.00



Remarks
Refusal at 0.80m BGL 25 blows for 50mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH24

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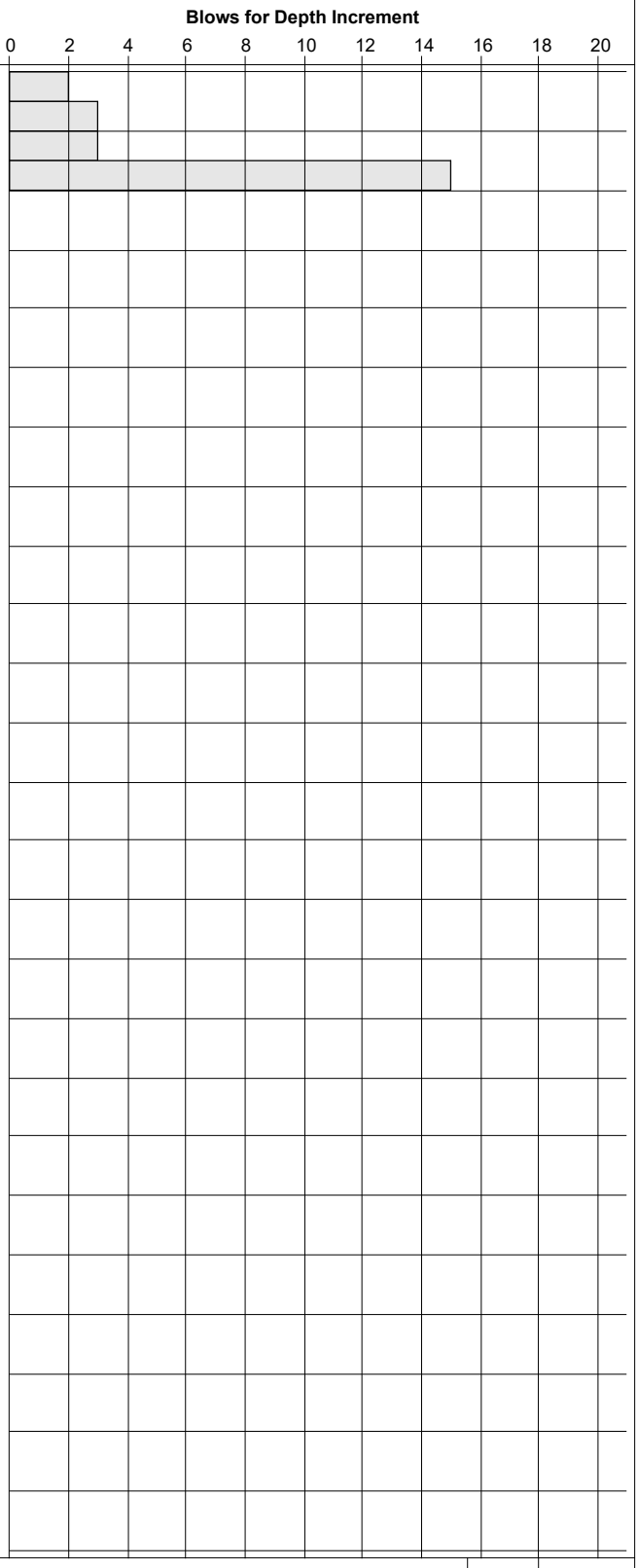
Site	Probe Number
Blackglen Road	DPH26

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	152.10	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717599.5 E 725199.9 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	3	
0.20-0.30	3	
0.30-0.40	15	

Level (mOD)	Depth (m)
152.10	0.00
151.60	0.50
151.10	1.00
150.60	1.50
150.10	2.00
149.60	2.50
149.10	3.00
148.60	3.50
148.10	4.00
147.60	4.50
147.10	5.00



Remarks
Refusal at 0.40m BGL 25 blows for 50mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH26

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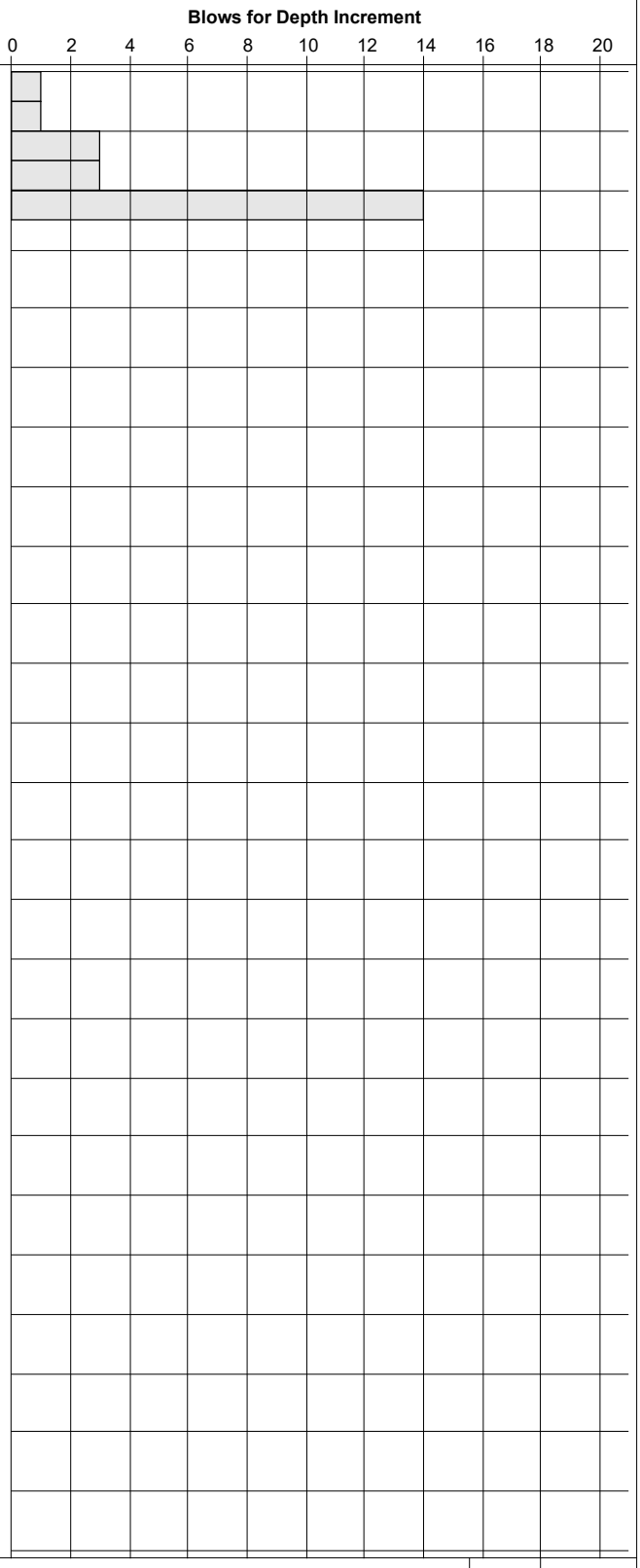
Site	Probe Number
Blackglen Road	DPH27

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	152.49	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717582.9 E 725224.2 N	12/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	1	
0.10-0.20	1	
0.20-0.30	3	
0.30-0.40	3	
0.40-0.50	14	

Level (mOD)	Depth (m)
152.49	0.00
151.99	0.50
151.49	1.00
150.99	1.50
150.49	2.00
149.99	2.50
149.49	3.00
148.99	3.50
148.49	4.00
147.99	4.50
147.49	5.00



Remarks
Refusal at 0.50m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH27

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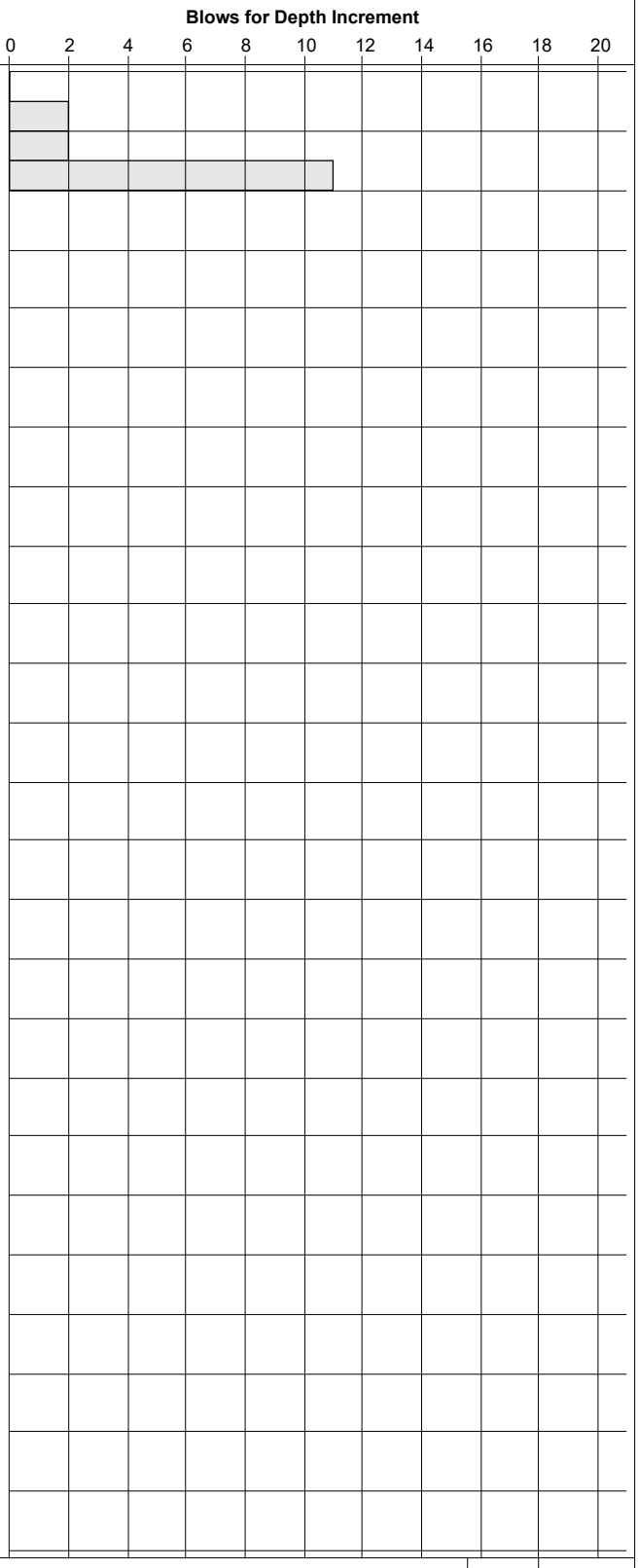
Site	Probe Number
Blackglen Road	DPH28

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	153.39	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717582.5 E 725196.3 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	2	
0.20-0.30	2	
0.30-0.40	11	

Level (mOD)	Depth (m)
153.39	0.00
152.89	0.50
152.39	1.00
151.89	1.50
151.39	2.00
150.89	2.50
150.39	3.00
149.89	3.50
149.39	4.00
148.89	4.50
148.39	5.00



Remarks
Refusal at 0.40m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH28

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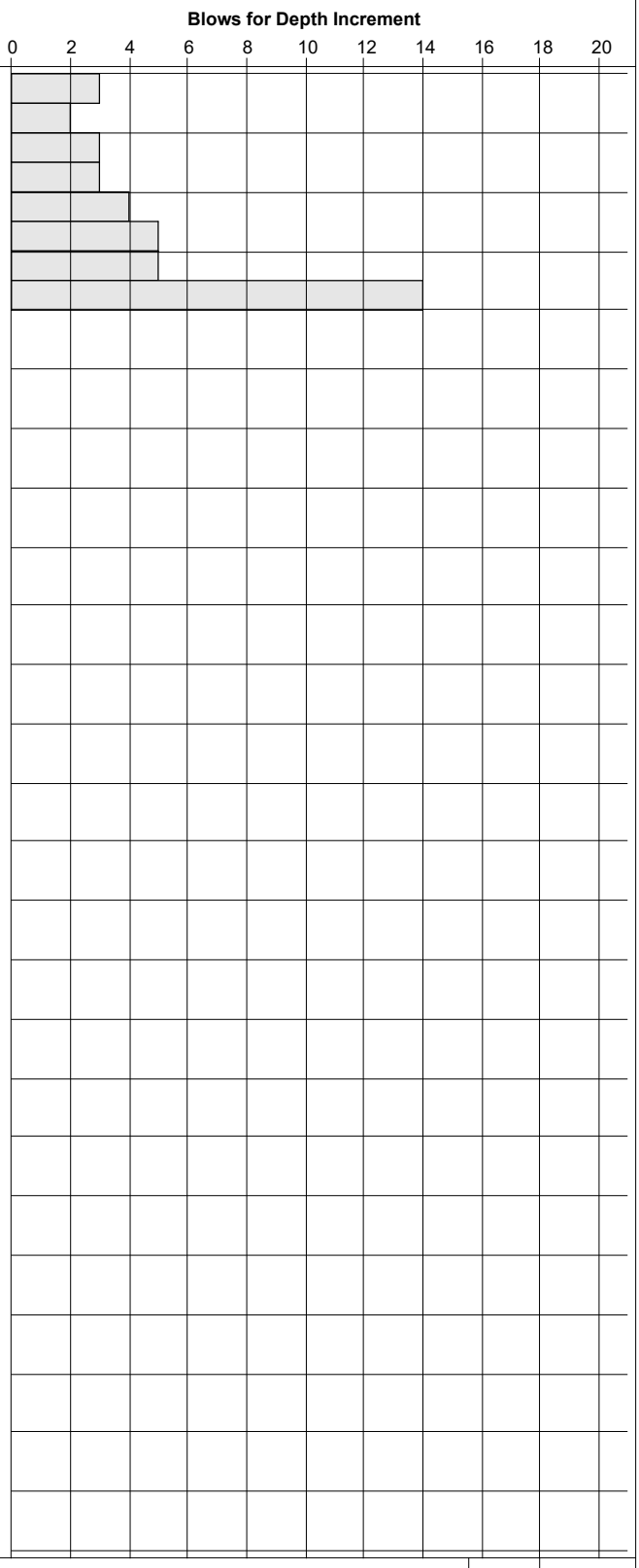
Site	Probe Number
Blackglen Road	DPH29

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	153.74	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717580.3 E 725181.3 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	3	
0.10-0.20	2	
0.20-0.30	3	
0.30-0.40	3	
0.40-0.50	4	
0.50-0.60	5	
0.60-0.70	5	
0.70-0.80	14	

Level (mOD)	Depth (m)
153.74	0.00
153.24	0.50
152.74	1.00
152.24	1.50
151.74	2.00
151.24	2.50
150.74	3.00
150.24	3.50
149.74	4.00
149.24	4.50
148.74	5.00



Remarks
Refusal at 0.80m BGL 25 blows for 50mm

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH29

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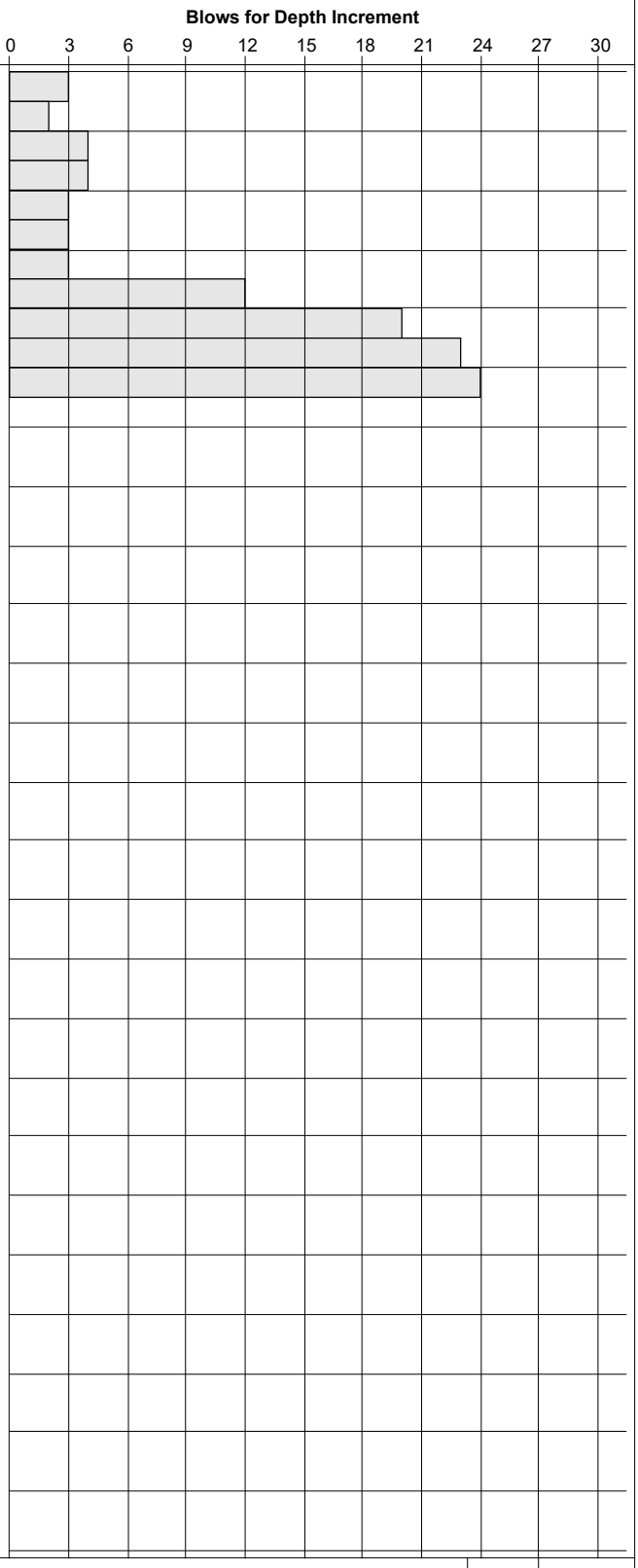
Site	Probe Number
Blackglen Road	DPH30

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	153.14	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717560 E 725198.5 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		153.14	0.00
0.10-0.20	2			
0.20-0.30	4			
0.30-0.40	4			
0.40-0.50	3			
0.50-0.60	3		152.64	0.50
0.60-0.70	3			
0.70-0.80	12			
0.80-0.90	20			
0.90-1.00	23			
1.00-1.10	24		152.14	1.00
			151.64	1.50
			151.14	2.00
			150.64	2.50
			150.14	3.00
			149.64	3.50
			149.14	4.00
			148.64	4.50
			148.14	5.00



Remarks

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH30

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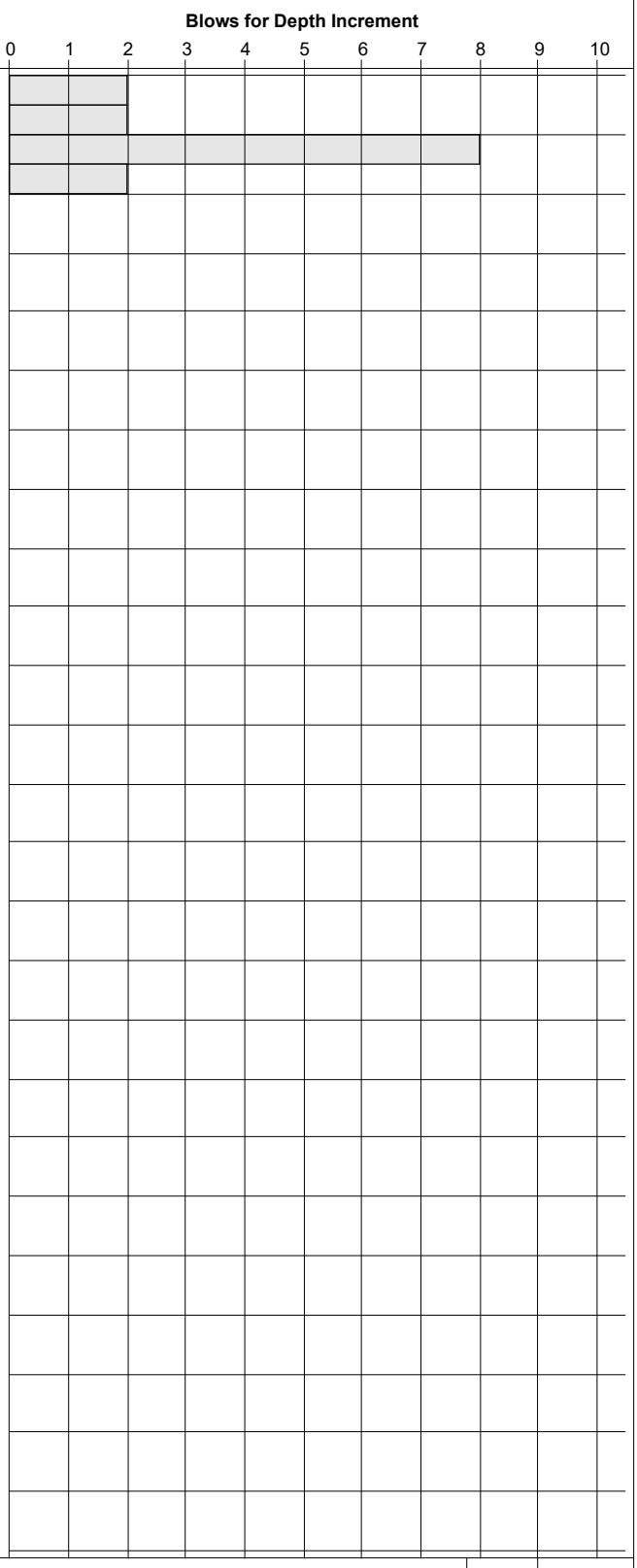
Site	Probe Number
Blackglen Road	DPH32

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	153.72	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717544.9 E 725201.2 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	2	
0.20-0.30	8	
0.30-0.40	2	

Level (mOD)	Depth (m)
153.72	0.00
153.22	0.50
152.72	1.00
152.22	1.50
151.72	2.00
151.22	2.50
150.72	3.00
150.22	3.50
149.72	4.00
149.22	4.50
148.72	5.00



Remarks
Refusal at 0.40m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH32

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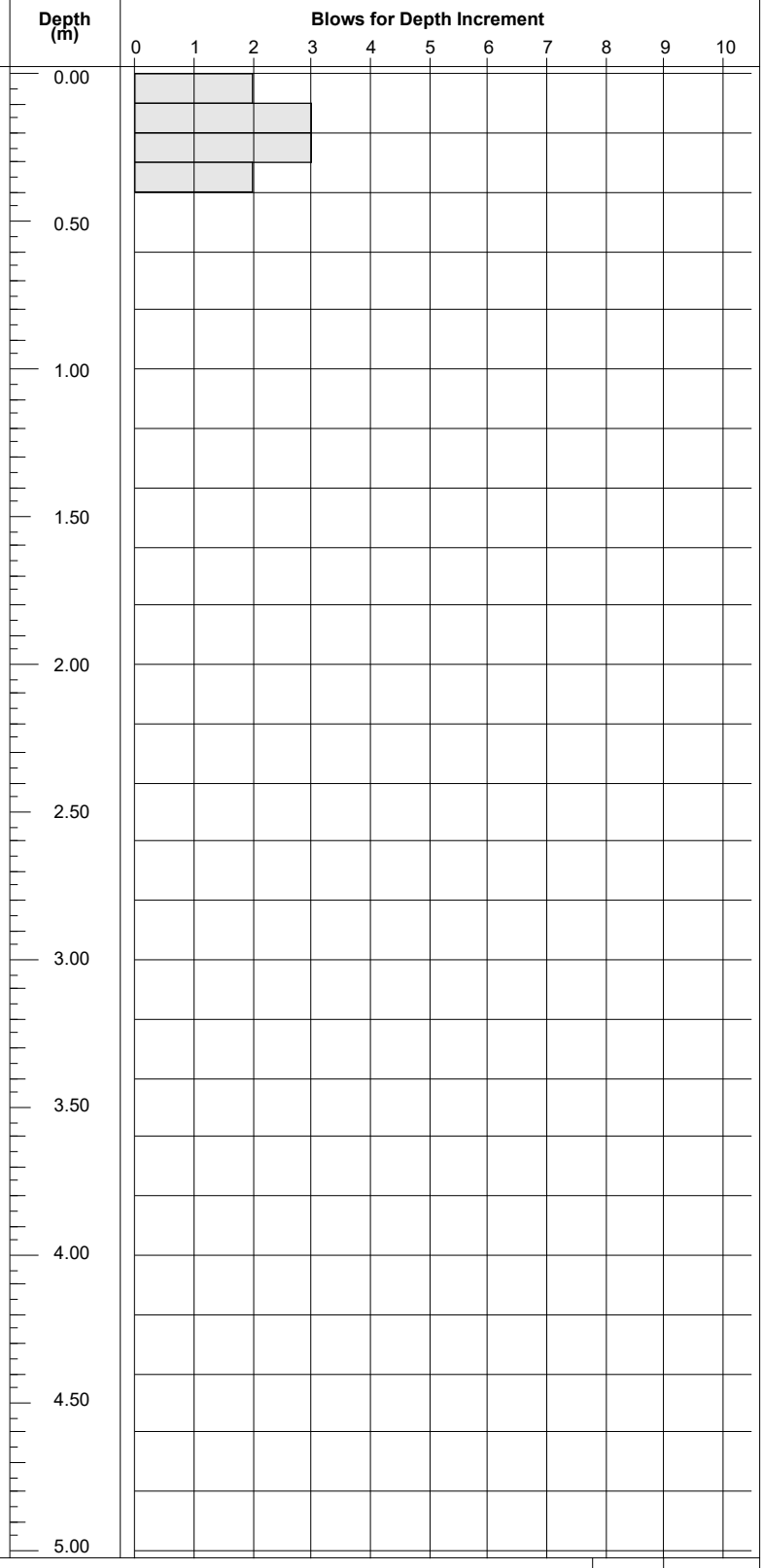
Site	Probe Number
Blackglen Road	DPH36

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm		OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717519.4 E 725140 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	2		
0.10-0.20	3		
0.20-0.30	3		
0.30-0.40	2		



Remarks
Refusal at 0.40m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH36

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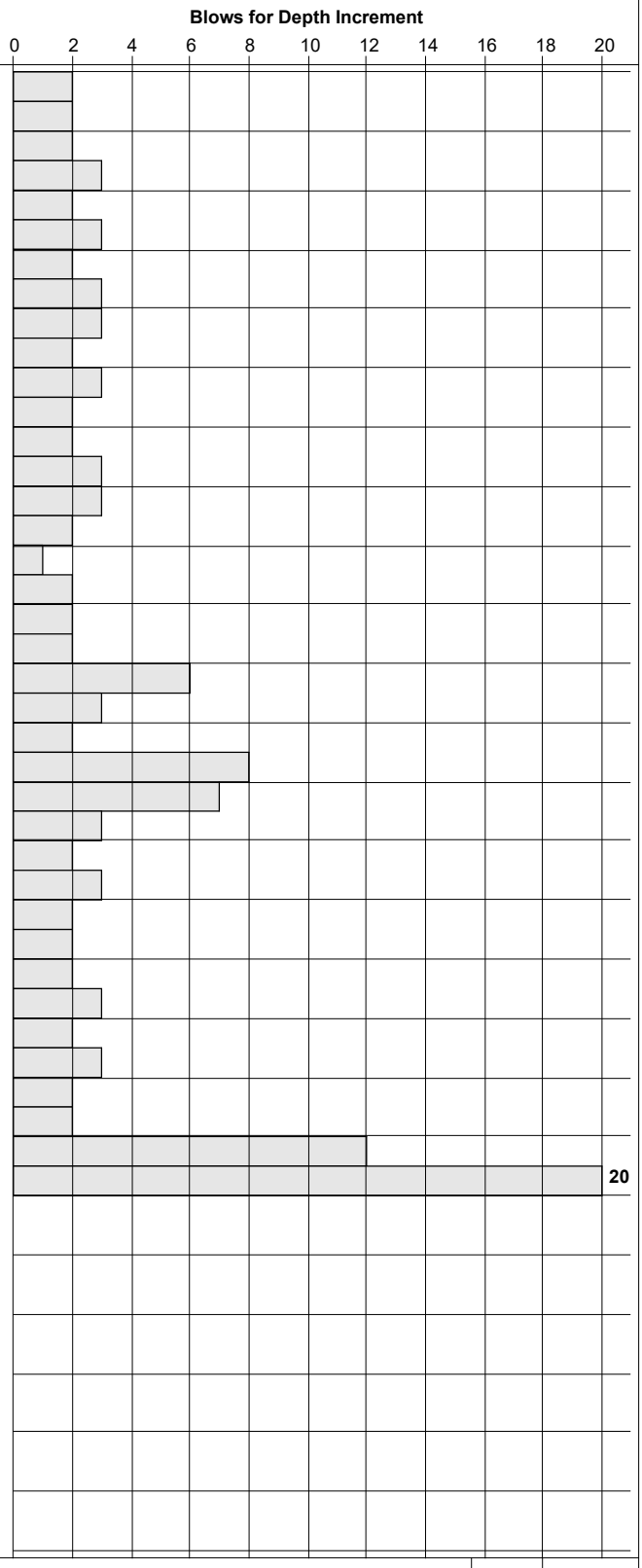
Site	Probe Number
Blackglen Road	DPH38

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	154.42	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717559.8 E 725138.7 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		154.42	0.00
0.10-0.20	2			
0.20-0.30	2			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	3		153.92	0.50
0.60-0.70	2			
0.70-0.80	3			
0.80-0.90	3			
0.90-1.00	2			
1.00-1.10	3		153.42	1.00
1.10-1.20	2			
1.20-1.30	2			
1.30-1.40	3			
1.40-1.50	3			
1.50-1.60	2		152.92	1.50
1.60-1.70	1			
1.70-1.80	2			
1.80-1.90	2			
1.90-2.00	2			
2.00-2.10	6		152.42	2.00
2.10-2.20	3			
2.20-2.30	2			
2.30-2.40	8			
2.40-2.50	7			
2.50-2.60	3		151.92	2.50
2.60-2.70	2			
2.70-2.80	3			
2.80-2.90	2			
2.90-3.00	2			
3.00-3.10	2		151.42	3.00
3.10-3.20	3			
3.20-3.30	2			
3.30-3.40	3			
3.40-3.50	2			
3.50-3.60	2		150.92	3.50
3.60-3.70	12			
3.70-3.80	20			
			150.42	4.00
			149.92	4.50
			149.42	5.00



Remarks
Refusal at 3.80m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH38

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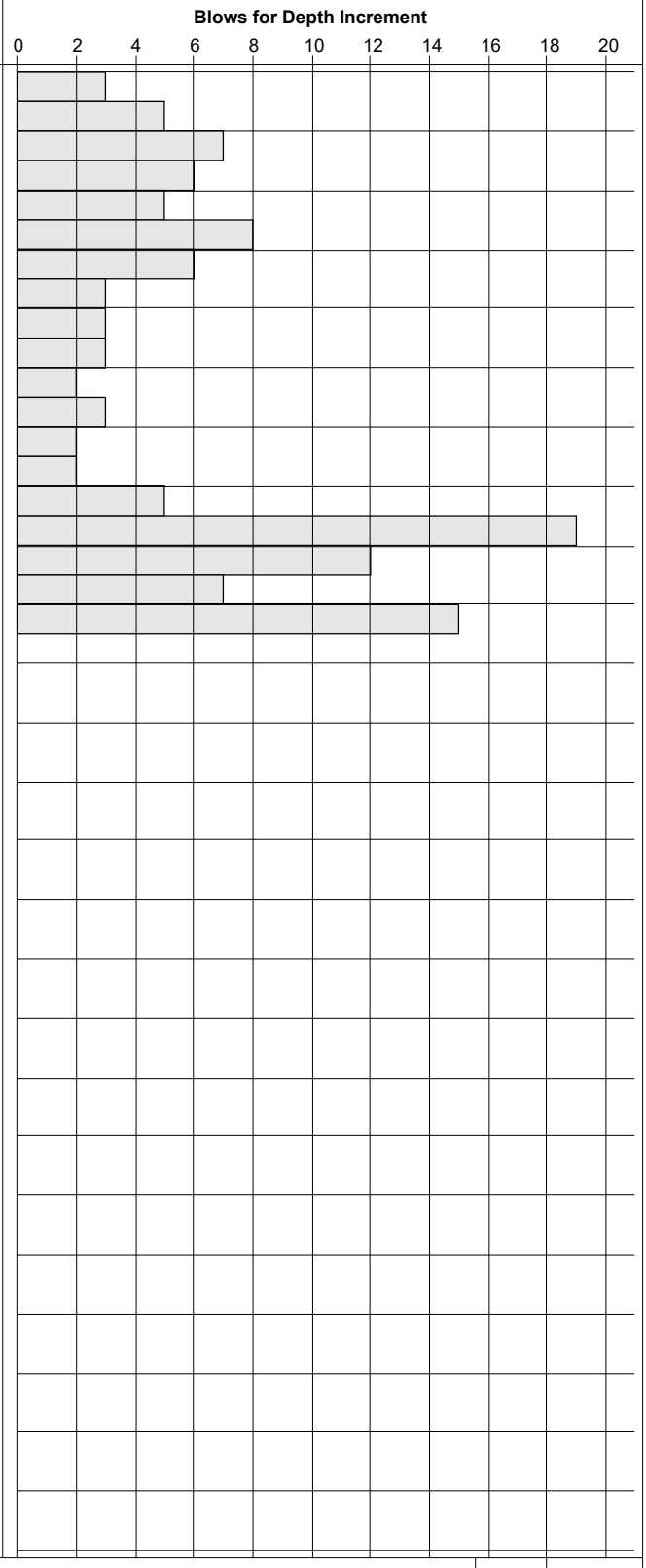
Site	Probe Number
Blackglen Road	DPH39

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	154.89	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717580.6 E 725138.9 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		154.89	0.00
0.10-0.20	5			
0.20-0.30	7			
0.30-0.40	6			
0.40-0.50	5			
0.50-0.60	8		154.39	0.50
0.60-0.70	6			
0.70-0.80	3			
0.80-0.90	3			
0.90-1.00	3			
1.00-1.10	2		153.89	1.00
1.10-1.20	3			
1.20-1.30	2			
1.30-1.40	2			
1.40-1.50	5			
1.50-1.60	19		153.39	1.50
1.60-1.70	12			
1.70-1.80	7			
1.80-1.90	15			
			152.89	2.00
			152.39	2.50
			151.89	3.00
			151.39	3.50
			150.89	4.00
			150.39	4.50
			149.89	5.00



Remarks
Refusal at 1.90m BGL for 25 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH39

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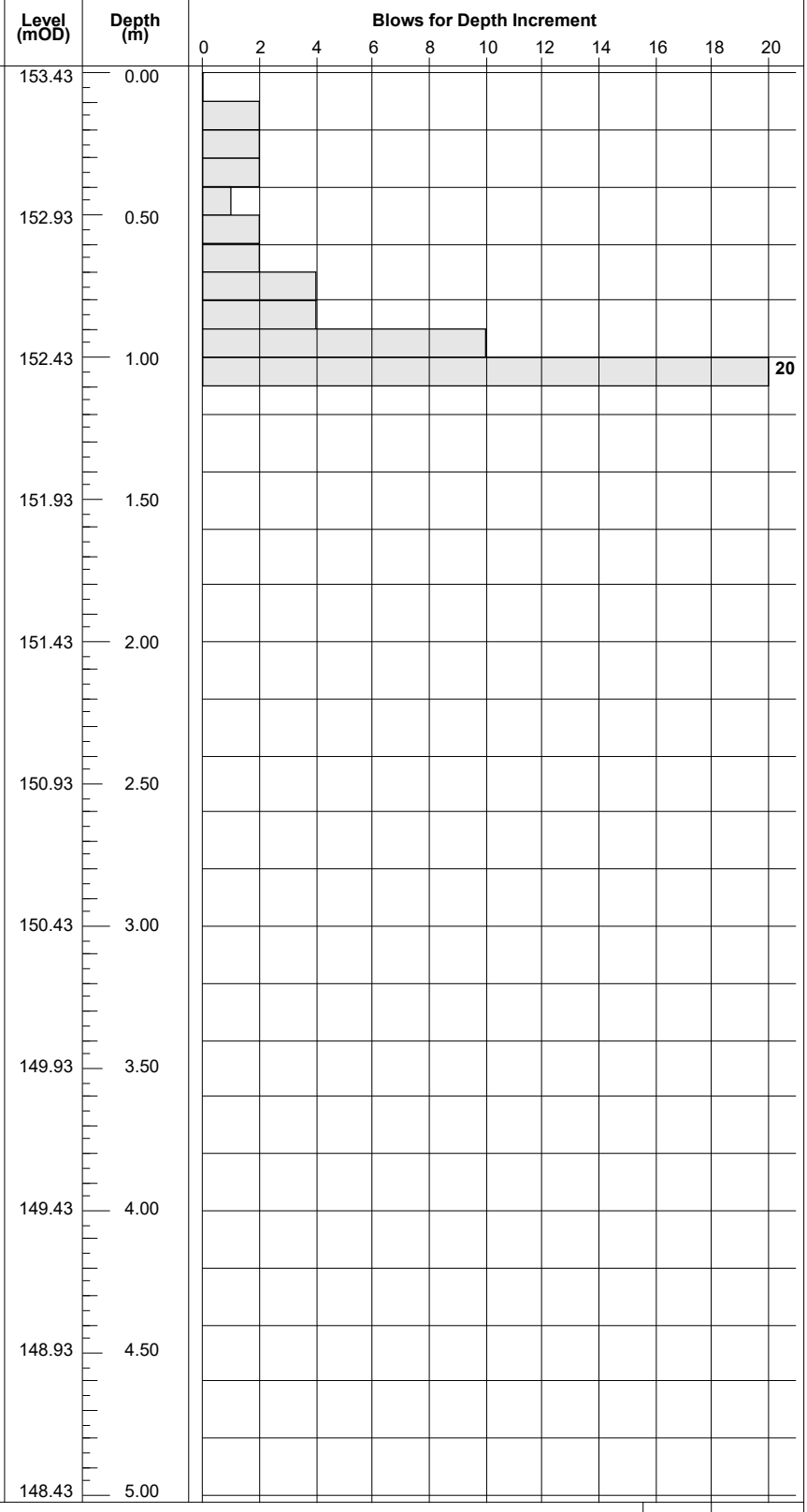
Site	Probe Number
Blackglen Road	DPH40

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe DPH, Fall Height 500mm, Hammer wt 50Kg.	43.7mm	153.43	OCSC	10477-03-21
	Location	**Dates**	**Engineer**	**Sheet**
	717546.4 E 725123.3 N	09/04/2021		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	2	
0.20-0.30	2	
0.30-0.40	2	
0.40-0.50	1	
0.50-0.60	2	
0.60-0.70	2	
0.70-0.80	4	
0.80-0.90	4	
0.90-1.00	10	
1.00-1.10	20	



Remarks
Refusal at 1.10m BGL for 28 blows

Scale (approx)	Logged By
1:25	CF

Figure No.
10477-03-21.DPH40

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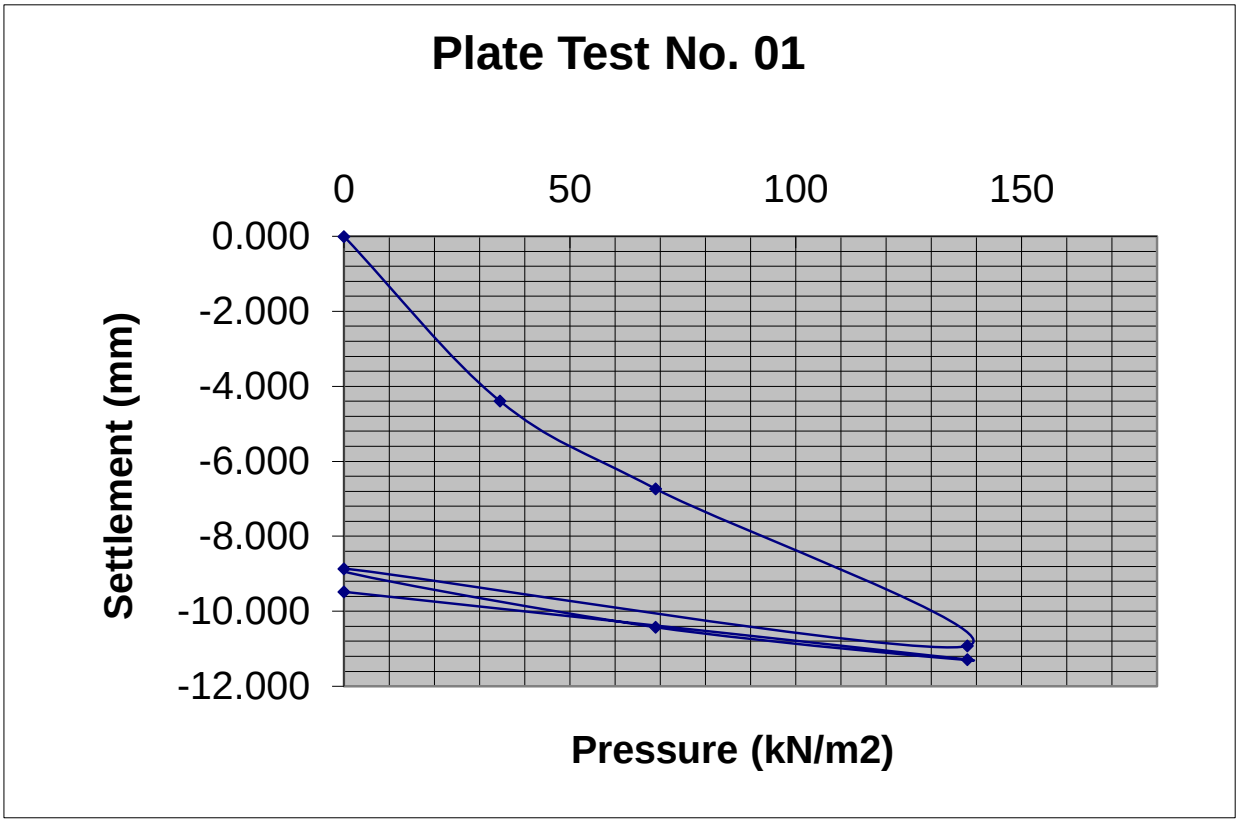
APPENDIX 5 –Plate Testing Records

Applied Load	Gauge settlement
0	**0.000**
34.5	-4.39
69	-6.735
138	-10.925
0	-8.865
69	-10.425
138	-11.285
0	-9.48

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Blackglen Road	**MATERIAL**	Brown gravelly CLAY with subanguar cobbles, plastic, red brick, tubing fragments
CONTRACT NO.	10477-03-21		
DATE	09/04/2021		
CLIENT	OCSC	**DEPTH**	0.45m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-01	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **6.92 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **29.89 MN/m2/m**

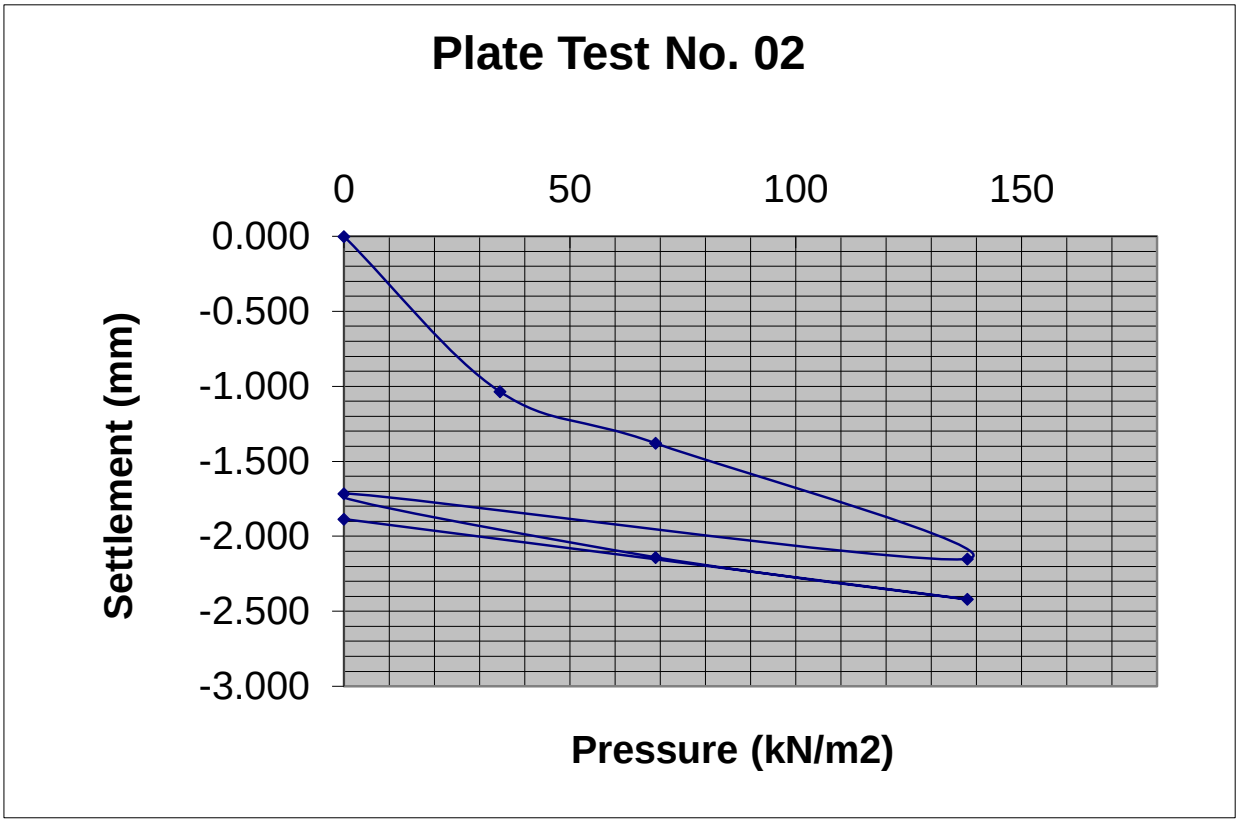
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.28 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **3.48 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-1.035
69	-1.38
138	-2.15
0	-1.715
69	-2.14
138	-2.42
0	-1.885

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Blackglen Road	**MATERIAL**	MG Light brown gravelly CLAY with plastic fragment and roots
CONTRACT NO.	10477-03-21		
DATE	09/04/2021		
CLIENT	OCSC	**DEPTH**	0.45m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-02	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **33.79 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **109.70 MN/m2/m**

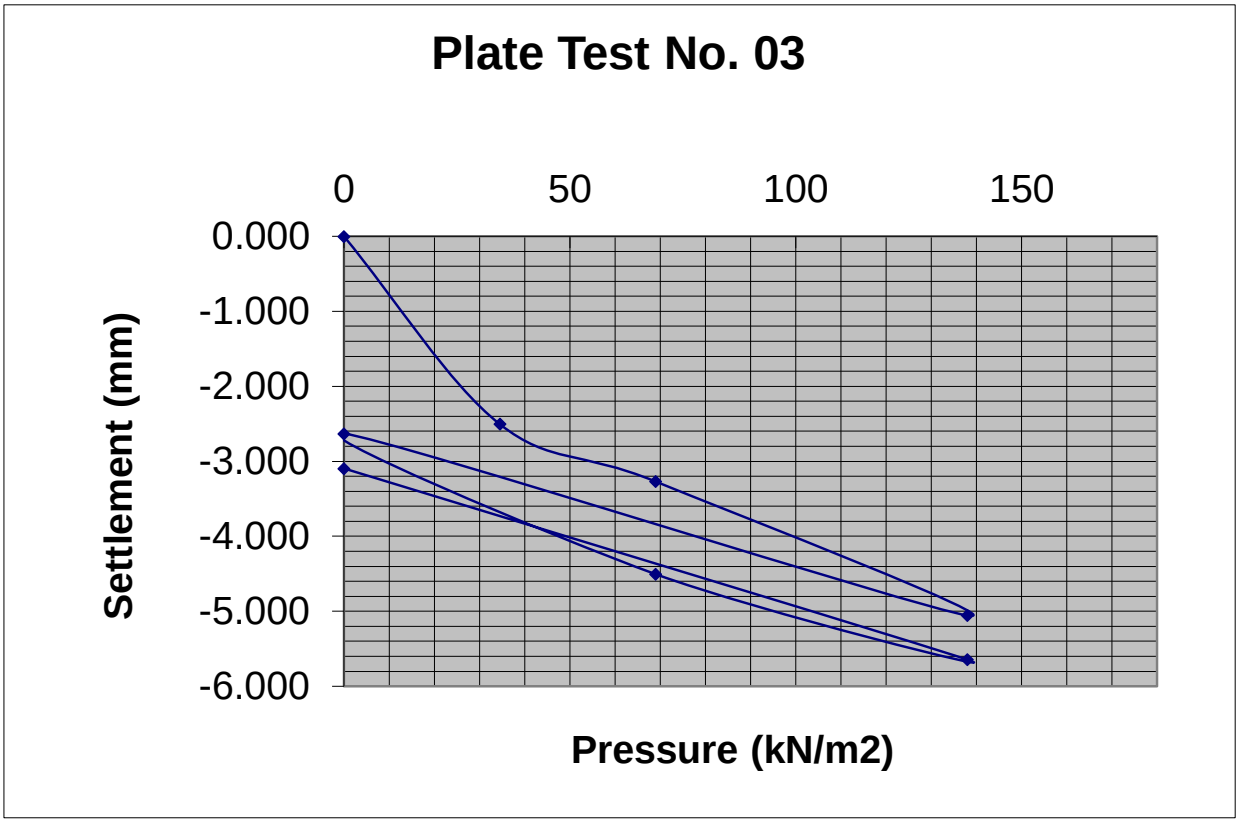
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **4.30 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **33.11 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-2.505
69	-3.27
138	-5.055
0	-2.63
69	-4.505
138	-5.645
0	-3.095

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Blackglen Road	**MATERIAL**	Brown gravelly CLAY
CONTRACT NO.	10477-03-21		
DATE	09/04/2021		
CLIENT	OCSC	**DEPTH**	0.45m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-03	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **14.26 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **24.87 MN/m2/m**

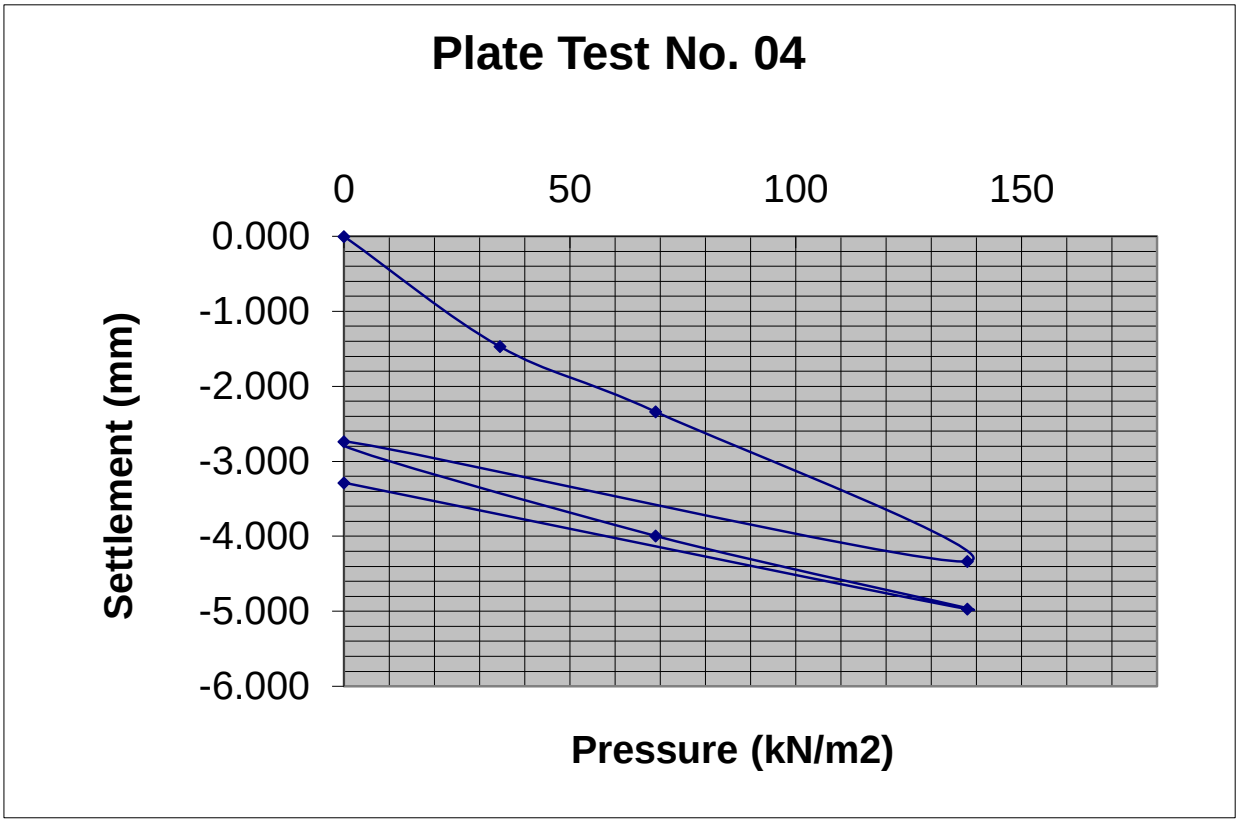
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.96 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **2.53 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-1.47
69	-2.34
138	-4.335
0	-2.735
69	-3.995
138	-4.97
0	-3.285

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Blackglen Road	**MATERIAL**	Brown gravelly CLAY
CONTRACT NO.	10477-03-21		
DATE	09/04/2021		
CLIENT	OCSC	**DEPTH**	0.45m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-04	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **19.92 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **37.00 MN/m2/m**

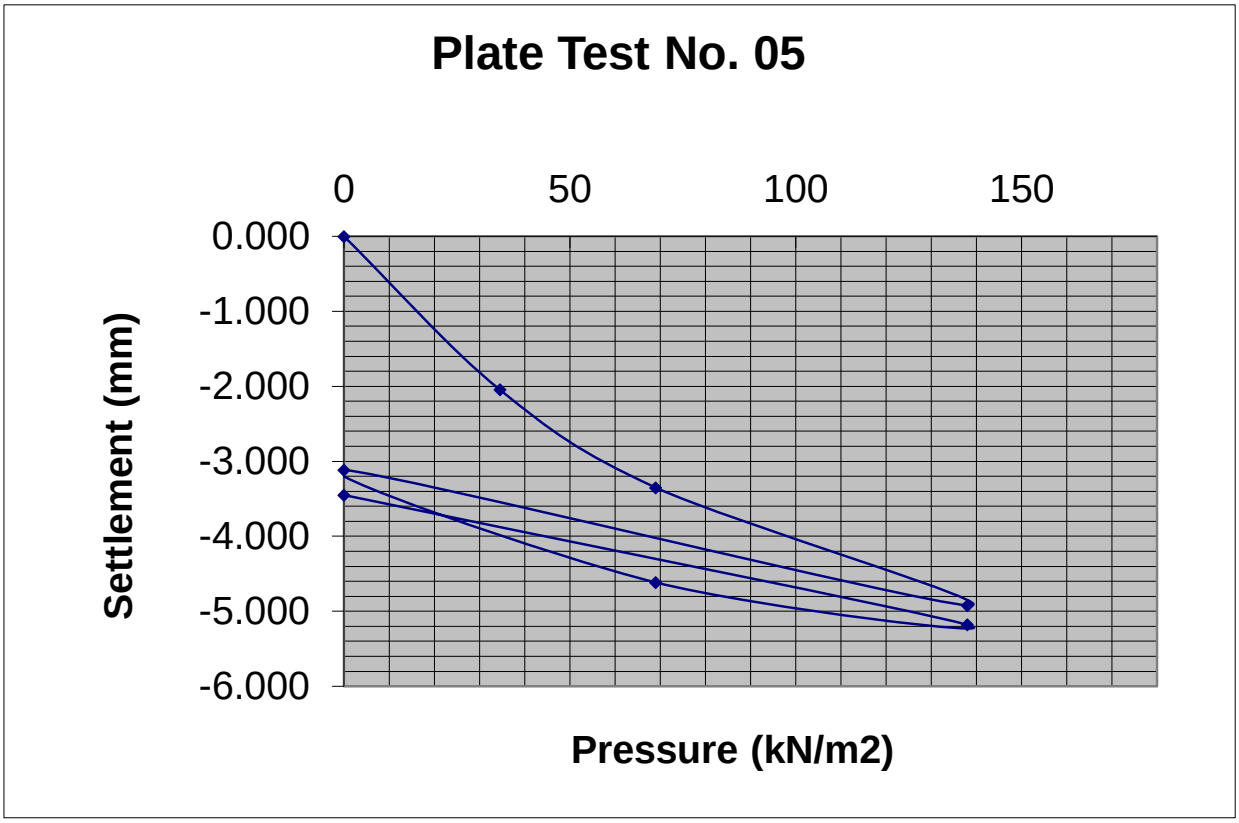
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **1.72 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **5.04 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-2.045
69	-3.35
138	-4.92
0	-3.115
69	-4.615
138	-5.18
0	-3.45

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Blackglen Road	**MATERIAL**	Soft brown gravelly CLAY with some angular to sub-angular cobbles
CONTRACT NO.	10477-03-21		
DATE	09/04/2021		
CLIENT	OCSC	**DEPTH**	0.45m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-05	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **13.92 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **31.08 MN/m2/m**

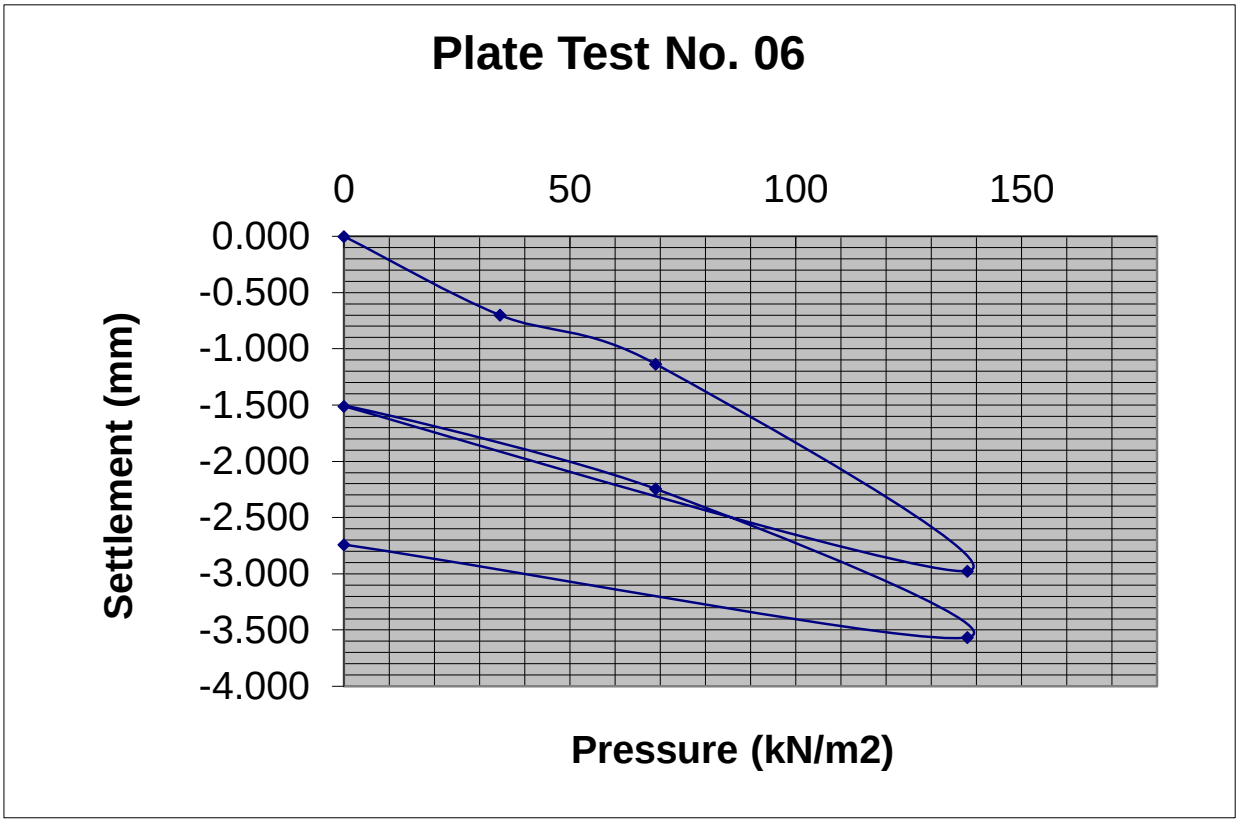
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.92 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **3.72 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.7
69	-1.135
138	-2.975
0	-1.51
69	-2.245
138	-3.565
0	-2.74

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Blackglen Road	**MATERIAL**	Brown gravelly CLAY with some angular to sub-angular cobbles
CONTRACT NO.	10477-03-21		
DATE	09/04/2021		
CLIENT	OCSC	**DEPTH**	0.45m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-06	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **41.08 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **63.43 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **6.04 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **12.82 %**

APPENDIX 6 - Rotary Borehole Records

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www.gii.ie

Site Blackglen Road			**Borehole Number** RC01
Machine : Beretta T41 **Flush :** Water **Core Dia :** 64 mm **Method :** Rotary Cored	**Casing Diameter** 98mm cased to 8.00m	**Ground Level (mOD)** 146.32	**Client** OCSC	**Job Number** 10477-03-21
	Location 717650.4 E 725282.6 N	**Dates** 18/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	19	-					(0.40)	OVERBURDEN: Brown slightly sandy gravelly CLAY. Driller notes Clay and pebbles			
						145.92	0.40	Possible Weathered Rock: Grey slightly sandy subangular to subrounded fine to coarse GRAVEL. Driller notes Clay and Gravels			
1.50 1.50-1.95	37	-			6,5/6,8,6,8 SPT(C) N=28		(2.20)				
2.50 2.60				3		143.72	2.60	Recovery consists of medium strong to strong massive grey crystalline fine to coarse grained GRANITE with distinct weathering 1 fracture set. F1: Dipping 10-30 degrees stepped rough close to medium spacing with some clay smearing			
3.00	97	97	67	7							
4.00	100	89	76	5			(4.40)	2 fracture sets. F1: Dipping 10-30 degrees stepped rough close to medium spaced with some clay smearing. F2: Dipping 65-85 degrees stepped rough medium spaced with some clay smearing			
5.00				5							
5.50	100	80	77								
6.00				5							
7.00	95	95	88	2		139.32	7.00	Recovery consists of strong massive grey crystalline fine to coarse grained GRANITE with partial weathering. Driller notes harder Bedrock 1 fracture set. F1: Dipping 10-30 degrees stepped rough			
							(1.00)				
8.00					Water strike(1) at 8.00m.	138.32	8.00	Complete at 8.00m		▽1	

Remarks
Groundwater encountered at 8.00m BGL
Borehole complete at scheduled depth
Standpipe installed in borehole upon completion. Plain pipe with bentonite seal from GL to 4.00m BGL, slotted pipe with geosock and pe-gravel surround from 4.00m to 8.00m BGL, finished with a raised cover.

Scale (approx)	Logged By
1:50	M.Sheehan

Figure No. 10477-03-21.RC01

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Ground Investigations Ireland Ltd
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Site Blackglen Road			**Borehole Number** RC02
Machine : Beretta T41 **Flush :** Water **Core Dia :** 64 mm **Method :** Rotary Cored	**Casing Diameter** 100mm cased to 8.50m	**Ground Level (mOD)** 139.88	**Client** OCSC	**Job Number** 10477-03-21
	Location 717698.9 E 725291.3 N	**Dates** 14/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	53	-					(1.50)	OVERBURDEN: Dense brown slightly clayey gravelly fine to medium SAND. Driller notes Clay into Sand and Gravels			
1.50 1.50-1.68	100	-			6,7/50 SPT(C) 50/30	138.38	1.50 (0.80)	Weathered Rock: Grey/brown slightly clayey slightly sandy subangular to rounded fine to coarse GRAVEL. Driller notes weathered Granite			
2.00 2.30 2.50	100	78	69	3 4		137.58	2.30	Recovery consists of medium strong massive grey crystalline fine to coarse GRANITE with distinct weathering 1 fracture set. F1: Dipping 10-30 degrees close to medium spaced stepped rough with clay smearing			
3.50	100	78	70	4			(2.70)	1 fracture set. F1: Dipping 20-40 degrees close to medium spacing stepped rough with clay smearing			
4.50 5.00				6		134.88	5.00	2 fracture sets. F1: Dipping 60-80 degrees medium to wide spacing stepped rough with clay smearing. F2: Dipping 10-30 degrees medium to wide spacing stepped rough with clay smearing			
5.50	100	61	61	6			(1.10)	Recovery consists of medium strong to strong massive grey crystalline fine to coarse grained GRANITE with distinct weathering			
6.10 6.35	52	27	27	NI 1		133.78 133.53	6.10 (0.25) 6.35	Recovery consists of weak to medium strong massive grey crystalline fine to coarse grained GRANITE with destructured weathering. Driller notes soft weathered Rock Non intact			
7.30	44	0	0	NI		132.58	(0.95) 7.30	Recovery consists of medium strong to strong massive grey crystalline fine to coarse grained GRANITE with distinct weathering 1 fracture set. F1: Dipping 20-40 degrees stepped rough spacing with clay smearing			
8.10	100	70	50	1		131.78	(0.80) 8.10	Poor recovery. Recovery consists of weak to medium strong massive grey crystalline fine to coarse grained GRANITE with destuctured weathering. Driller notes sand weathered Rock Non intact			
8.50						131.38	(0.40) 8.50	Recovery consists of medium strong to strong massive grey crystalline fine to coarse grained GRANITE with distinct weathering 1 fracture set. F1: Dipping 50-70 degrees stepped rough close spacing with some clay smearing			
								Complete at 8.50m			

Remarks
No groundwater encountered
Borehole complete at scheduled depth
Standpipe installed in borehole upon completion. Plain pipe with bentonite seal from GL to 3.00m BGL, slotted pipe with geosock and pe-gravel surround from 3.00m to 8.50m BGL, finished with a raised cover.

Scale (approx)	Logged By
1:50	M.Sheehan

Figure No. 10477-03-21.RC02

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Ground Investigations Ireland Ltd
www.gii.ie

Site Blackglen Road			**Borehole Number** RC03
Machine : Beretta T41 **Flush :** Water **Core Dia:** 64 mm **Method :** Rotary Cored	**Casing Diameter** 100mm cased to 7.90m	**Ground Level (mOD)** 153.86	**Client** OCSC	**Job Number** 10477-03-21
	Location 717557.5 E 725220.3 N	**Dates** 18/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	50	-					(1.10)	OVERBURDEN: Dark grey brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium. Driller notes Clay			
1.10				3		152.76	1.10				
1.40				NI				Recovery consists of strong massive grey crystalline fine to coarse grained GRANITE with partial weathering. Driller notes extremely hard Bedrock			
1.50					25,25/50			1 fracture set. F1: Dipping 10-30 degrees close spacing stepped rough with some clay smearing			
1.50-1.50					SPT(C) 50*/0			Non intact			
	100	80	73	1	50/0			2 fracture sets. F1: Dipping 10-30 degrees close to medium spaced stepped rough with clay smearing. F2: Dipping 50-70 degrees medium spaced stepped rough with clay smearing			
2.00											
				7			(2.60)				
2.50											
	100	60	47								
3.00				7							
						150.16	3.70	Recovery consists of medium strong to strong massive grey crystalline fine to coarse grained GRANITE with distinct weathering			
4.00											
	100	60	53	8			(1.90)				
5.00											
				6							
5.50						148.26	5.60	Recovery consists of strong massive grey crystalline fine to coarse grained GRANITE with partial weathering. Driller notes extremely hard Bedrock			
6.00											
	100	90	90	4			(2.30)	2 fracture sets. F1: Dipping 10-30 degrees close to medium spaced stepped rough with clay smearing. F2: Dipping 70-90 degrees medium to wide spacing stepped rough with some clay smearing			
7.00											
	100	42	33	6							
7.90						145.96	7.90	Complete at 7.90m			

Remarks
No groundwater encountered
Borehole complete at scheduled depth
Standpipe installed in borehole upon completion. Plain pipe with bentonite seal from GL to 2.00m BGL, slotted pipe with geosock and pe-gravel surround from 2.00m to 7.90m BGL, finished with a raised cover.

Scale (approx)	Logged By
1:50	M.Sheehan

Figure No. 10477-03-21.RC03

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Ground Investigations Ireland Ltd
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Site Blackglen Road			**Borehole Number** RC04
Machine : Beretta T41 **Flush :** Water **Core Dia:** 64 mm **Method :** Rotary Cored	**Casing Diameter** 100mm cased to 8.30m	**Ground Level (mOD)** 143.71	**Client** OCSC	**Job Number** 10477-03-21
	Location 717658.4 E 725158.4 N	**Dates** 18/04/2021	**Engineer**	**Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	24	-					(1.50)	Poor recovery. Driller notes Clay and Boulders			
1.50 1.50-1.95	18	-			8,6/8,10,10,12 SPT(C) N=40	142.21	1.50 (1.00)	Poor recovery: Recovery consists of brown slightly sandy gravelly CLAY. Gravel is subangular to rounded fine to coarse. Driller notes soft Clay and pebbles			
2.50	26	-				141.21	2.50 (1.70)	Poor recovery: Recovery consists of grey subangular to subrounded fine to coarse GRAVEL. Driller notes soft Clays			
4.00 4.00-4.15 4.20	67	67	67	9	25,25/50 SPT(C) 50/0	139.51	4.20 (2.15)	Recovery consisting of medium strong to strong massive grey crystalline fine to coarse grained GRANITE with distinct weathering 2 fracture sets. F1: Dipping 20-40 degrees stepped rough close spacing with some clay smearing. F2: Dipping 70-90 degrees stepped rough medium spacing with some clay smearing			
5.50 5.65	90	42	42	NI 5		137.36	6.35	Non intact Recovery consists of strong massive grey crystalline fine to coarse grained GRANITE with partial weathering			
6.50 7.00				1			(1.95)	1 fracture set. F1: Dipping 30-50 degrees stepped rough medium to wide spacing with some clay smearing			
7.50	100	92	92	1							
8.30						135.41	8.30	Complete at 8.30m			

Remarks
No groundwater encountered
Borehole complete at scheduled depth
Standpipe installed in borehole upon completion. Plain pipe with bentonite seal from GL to 4.30m BGL, slotted pipe with geosock and pe-gravel surround from 4.30m to 8.30m BGL, finished with a raised cover.

Scale (approx)	Logged By
1:50	M.Sheehan

Figure No. 10477-03-21.RC04

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Blackglen Road Rotary Core Photographs



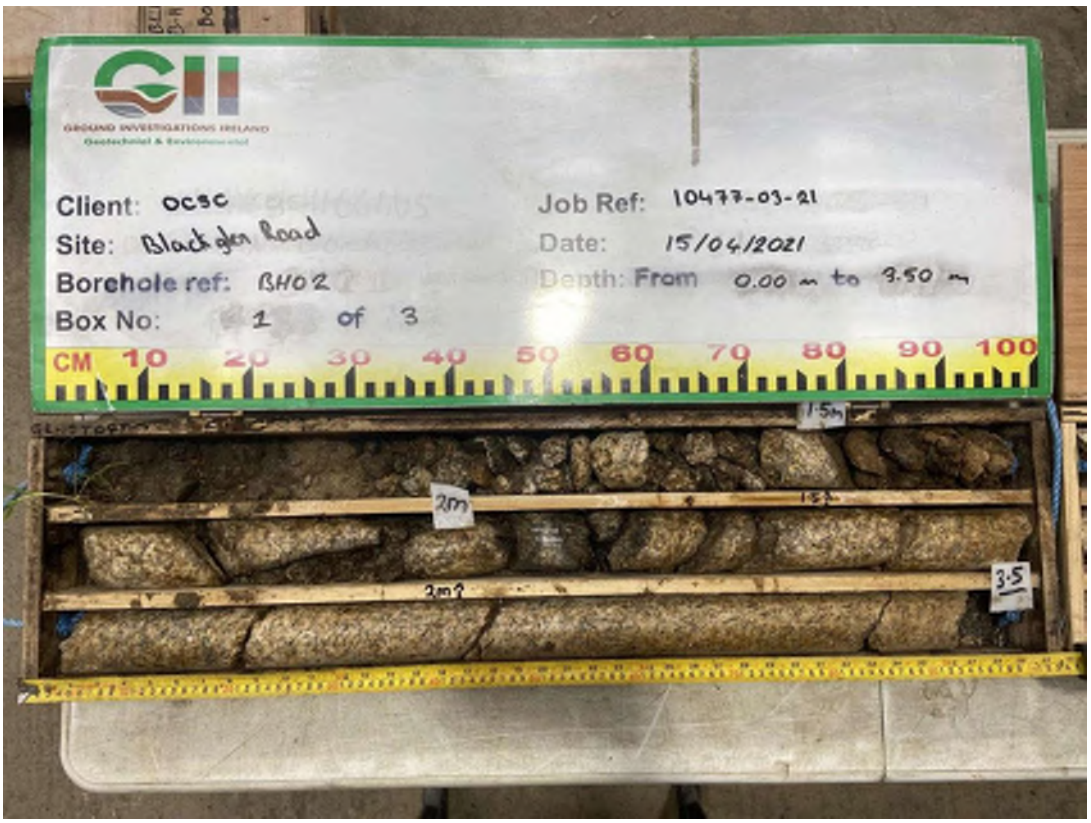
BH01



BH01


GII
GROUND INVESTIGATIONS IRELAND
Client:
Site: Blackjer Road
Borehole ref: BH01
Box No: 3 of 3
Job Ref: 10477-03-21
Date: 18/04/2021
Depth: From 7.50m to 8.00m
CM 10 20 30 40 50 60 70 80 90 100
8m

BH01


Client: OCSC
Site: Blackglen Road
Borehole ref: BH02
Box No: 1 of 3
Job Ref: 10477-03-21
Date: 15/04/2021
Depth: From 0.00 m to 3.50 m
CM 10 20 30 40 50 60 70 80 90 100
1.5m
2m
2m?
3.5

BH02


Client: OCSC
Site: Blackglen Road
Borehole ref: BH02
Box No: 2 of 2
Job Ref: 10477-03-21
Date: 15/04/2021
Depth: From 3.50 m to 6.55 m
CM 10 20 30 40 50 60 70 80 90 100
5m
6.1m

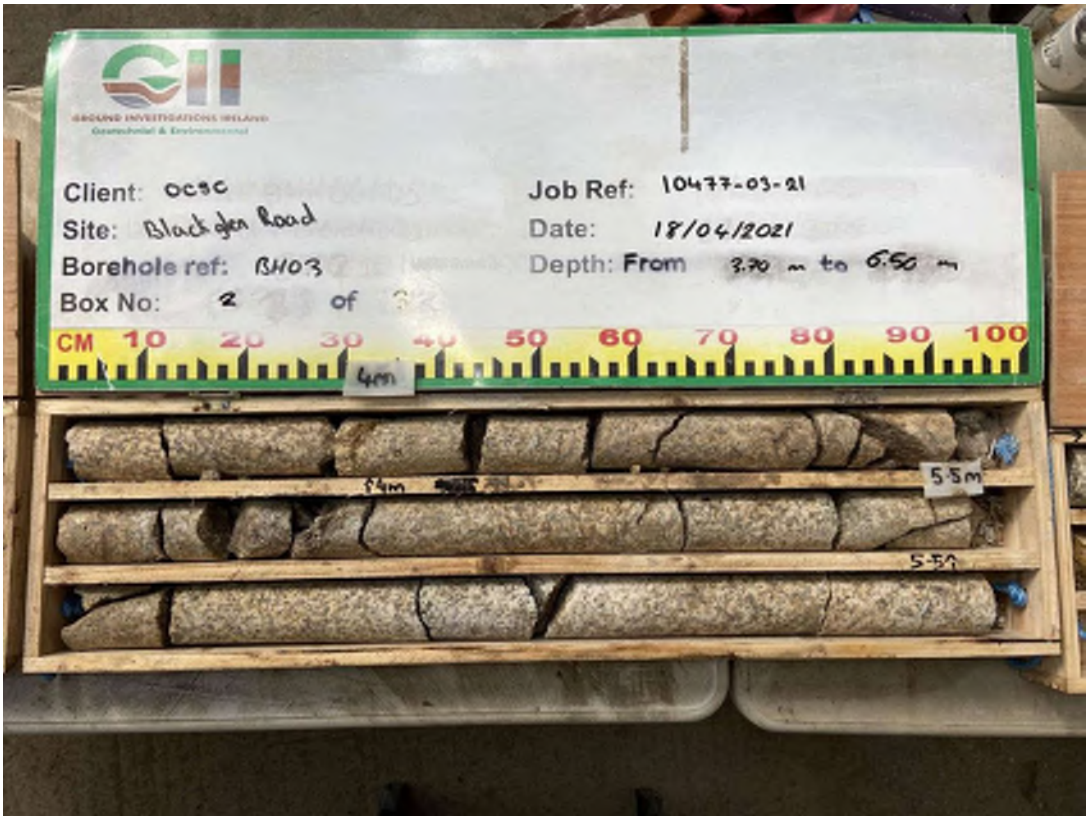
BH02


GROUND INVESTIGATIONS IRELAND
Client:
Site:
Borehole ref: BH02
Box No: 3 of 3
Job Ref: 10477-03-21
Date: 15/04/2021
Depth: From 6.35 m to 8.50 m
CM 10 20 30 40 50 60 70 80 90 100

BH02


Client: OCSC
Site: Blackglen Road
Borehole ref: BH03
Box No: 1 of 3
Job Ref: 10477-03-21
Date: 18/04/2021
Depth: From 0.00 m to 3.70 m
CM 10 20 30 40 50 60 70 80 90 100
1.5m
1.5m
2.5m

BH03


Client: OCSC
Site: Blackglen Road
Borehole ref: BH03
Box No: 2 of
Job Ref: 10477-03-21
Date: 18/04/2021
Depth: From 3.70 m to 6.50 m
CM 10 20 30 40 50 60 70 80 90 100
4m
4m
5.5m

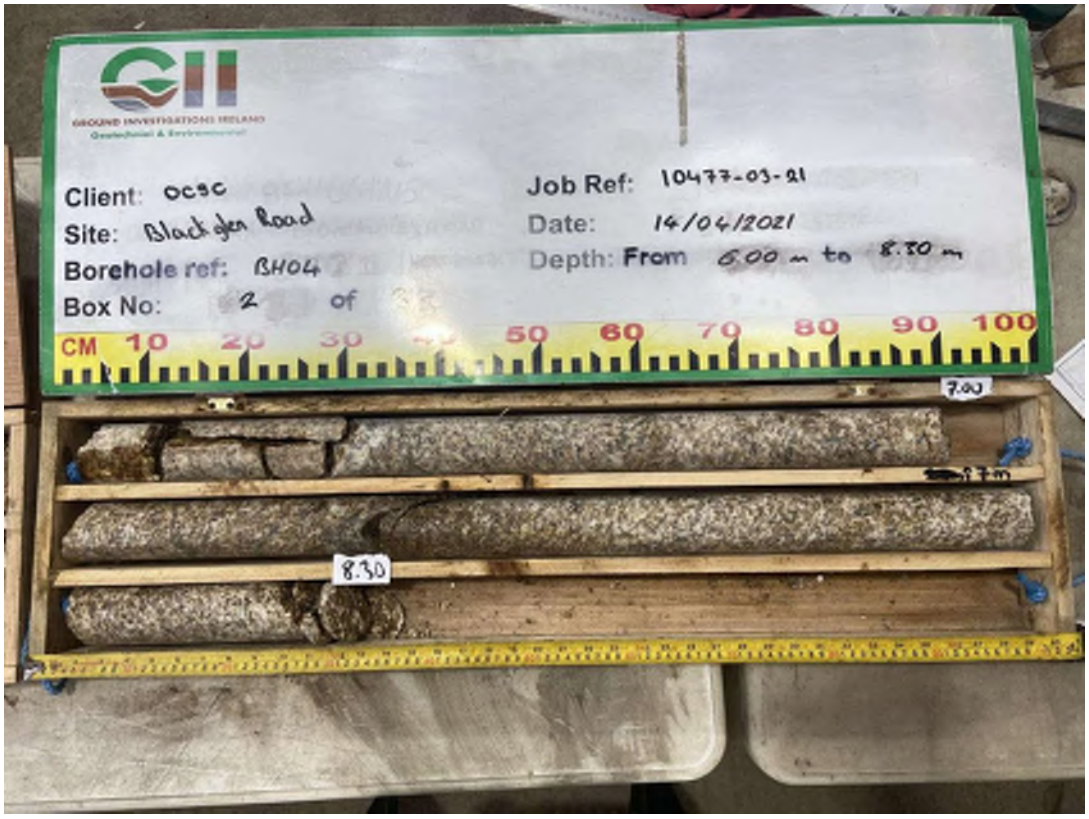
BH03


GROUND INVESTIGATIONS IRELAND
Client: OCSC
Site: Blackglen Road
Borehole ref: BH03
Box No: 3 of 3
Job Ref: 10477-03-21
Date: 18/04/2021
Depth: From 6.50 m to 7.90 m
CM 10 20 30 40 50 60 70 80 90 100
7m

BH03


Client: ocsc
Site: Blackglen Road
Borehole ref: BH04
Box No: 1 of 2
Job Ref: 10477-03-21
Date: 14/04/2021
Depth: From 0.00 m to 6.00 m
CM 10 20 30 40 50 60 70 80 90 100

BH04


Client: ocsc
Site: Blackglen Road
Borehole ref: BH04
Box No: 2 of
Job Ref: 10477-03-21
Date: 14/04/2021
Depth: From 6.00 m to 8.30 m
CM 10 20 30 50 60 70 80 90 100
8.30

BH04

APPENDIX 7 – Laboratory Testing

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

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F: +44 (0) 1244 833781
W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Conor Finnerty
Date :	30th April, 2021
Your reference :	10477-03-21
Our reference :	Test Report 21/5988 Batch 1
Location :	Blackglen Road
Date samples received :	22nd April, 2021
Status :	Final report
Issue :	1

Two samples were received for analysis on 22nd April, 2021 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Bruce Leslie
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/5988

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4									LOD/LOR	Units	Method No.
Sample ID	TP01	TP06											
Depth	1.00	0.50											
COC No / misc													
Containers	V J T	T											
Sample Date	01/04/2021	01/04/2021											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	22/04/2021	22/04/2021											
Antimony	2	-									<1	mg/kg	TM30/PM15
Arsenic #	19.7	-									<0.5	mg/kg	TM30/PM15
Barium #	97	-									<1	mg/kg	TM30/PM15
Cadmium #	2.5	-									<0.1	mg/kg	TM30/PM15
Chromium #	73.9	-									<0.5	mg/kg	TM30/PM15
Copper #	37	-									<1	mg/kg	TM30/PM15
Lead #	71	-									<5	mg/kg	TM30/PM15
Mercury #	0.3	-									<0.1	mg/kg	TM30/PM15
Molybdenum #	5.5	-									<0.1	mg/kg	TM30/PM15
Nickel #	28.6	-									<0.7	mg/kg	TM30/PM15
Selenium #	2	-									<1	mg/kg	TM30/PM15
Zinc #	134	-									<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	-									<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	-									<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	-									<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	-									<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.17	-									<0.03	mg/kg	TM4/PM8
Anthracene #	0.07	-									<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.44	-									<0.03	mg/kg	TM4/PM8
Pyrene #	0.39	-									<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.37	-									<0.06	mg/kg	TM4/PM8
Chrysene #	0.28	-									<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.73	-									<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.42	-									<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.35	-									<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.07	-									<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.30	-									<0.04	mg/kg	TM4/PM8
Coronene	0.08	-									<0.04	mg/kg	TM4/PM8
PAH 6 Total #	2.24	-									<0.22	mg/kg	TM4/PM8
PAH 17 Total	3.67	-									<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.53	-									<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.20	-									<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	-									<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	86	-									<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	-									<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/5988

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4									LOD/LOR	Units	Method No.
Sample ID	TP01	TP06											
Depth	1.00	0.50											
COC No / misc													
Containers	V J T	T											
Sample Date	01/04/2021	01/04/2021											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	22/04/2021	22/04/2021											
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	-									<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	-									<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	-									<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	-									<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	<4	-									<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	<7	-									<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	19	-									<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	-									<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	-									<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	-									<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	-									<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	16	-									<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	-									<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	-									<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	-									<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	-									<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	<4	-									<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	13	-									<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	100	-									<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	60	-									<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	173	-									<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	173	-									<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR) #	<0.1	-									<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	20	-									<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	88	-									<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	-									<5	ug/kg	TM36/PM12
Benzene #	<5	-									<5	ug/kg	TM36/PM12
Toluene #	<5	-									<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	-									<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	-									<5	ug/kg	TM36/PM12
o-Xylene #	<5	-									<5	ug/kg	TM36/PM12
PCB 28 #	<5	-									<5	ug/kg	TM17/PM8
PCB 52 #	<5	-									<5	ug/kg	TM17/PM8
PCB 101 #	<5	-									<5	ug/kg	TM17/PM8
PCB 118 #	<5	-									<5	ug/kg	TM17/PM8
PCB 138 #	<5	-									<5	ug/kg	TM17/PM8
PCB 153 #	<5	-									<5	ug/kg	TM17/PM8
PCB 180 #	<5	-									<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	-									<35	ug/kg	TM17/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/5988

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4									LOD/LOR	Units	Method No.
Sample ID	TP01	TP06											
Depth	1.00	0.50											
COC No / misc													
Containers	V J T	T											
Sample Date	01/04/2021	01/04/2021											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	22/04/2021	22/04/2021											
Natural Moisture Content	15.9	-									<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	13.7	-									<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	-									<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0158	0.0102									<0.0015	g/l	TM38/PM20
Chromium III	73.9	-									<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	1.19	-									<0.02	%	TM21/PM24
pH #	8.24	6.75									<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1096	-										kg	NONE/PM17
Mass of dried test portion	0.09	-										kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/5988

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3										LOD/LOR	Units	Method No.
Sample ID	TP01												
Depth	1.00												
COC No / misc													
Containers	V J T												
Sample Date	01/04/2021												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	22/04/2021												
Dissolved Antimony #	<0.002										<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02										<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	0.0043										<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	0.043										<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.005										<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.05										<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005										<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005										<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015										<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015										<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007										<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07										<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005										<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05										<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.007										<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.07										<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002										<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02										<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003										<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03										<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003										<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03										<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001										<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001										<0.0001	mg/kg	TM61/PM0
Phenol	<0.01										<0.01	mg/l	TM26/PM0
Phenol	<0.1										<0.1	mg/kg	TM26/PM0
Fluoride	0.4										<0.3	mg/l	TM173/PM0
Fluoride	4										<3	mg/kg	TM173/PM0
Sulphate as SO4 #	0.7										<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	7										<5	mg/kg	TM38/PM0
Chloride #	0.3										<0.3	mg/l	TM38/PM0
Chloride #	<3										<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	5										<2	mg/l	TM60/PM0
Dissolved Organic Carbon	50										<20	mg/kg	TM60/PM0
pH	8.05										<0.01	pH units	TM73/PM0
Total Dissolved Solids #	69										<35	mg/l	TM20/PM0
Total Dissolved Solids #	690										<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/5988

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3																
Sample ID	TP01																
Depth	1.00																
COC No / misc																	
Containers	V J T																
Sample Date	01/04/2021																
Sample Type	Soil																
Batch Number	1																
Date of Receipt	22/04/2021																
												Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Solid Waste Analysis																	
Total Organic Carbon #	1.19											3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025											6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035											1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30											500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	2.24											-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	3.67											100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																	
Arsenic #	0.043											0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.05											20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005											0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015											0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07											2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001											0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	0.07											0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02											0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05											0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02											0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03											0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03											4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	690											4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	50											500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	82.1											-	-	-	<0.1	%	NONE/PM4
pH #	8.24											-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1											1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	4											-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	7											1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3											800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland

Reference: 10477-03-21

Location: Blackglen Road

Contact: Conor Finnerty

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
21/5988	1	TP01	1.00	1-3	PAH's, Possible tarmac/bitumen & Possible lubricaitng oil

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/5988	1	TP01	1.00	2	23/04/2021	**General Description (Bulk Analysis)**	soil.stones
					23/04/2021	**Asbestos Fibres**	NAD
					23/04/2021	**Asbestos ACM**	NAD
					23/04/2021	**Asbestos Type**	NAD
					23/04/2021	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland

Reference: 10477-03-21

Location: Blackglen Road

Contact: Conor Finnerty

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
21/5988	1	TP01	1.00	1-3	EPH, GRO, PAH, PCB	Sample holding time exceeded prior to receipt

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/5988

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/5988

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

EMT Job No: 21/5988

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes

EMT Job No: 21/5988

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

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Ground Investigations Ireland
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Ireland

Attention :	Conor Finnerty
Date :	30th June, 2021
Your reference :	10477-03-21
Our reference :	Test Report 21/9397 Batch 1
Location :	Blackglen Road
Date samples received :	21st June, 2021
Status :	Final report
Issue :	1

Fifteen samples were received for analysis on 21st June, 2021 of which fifteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	LOD/LOR	Units	Method No.
Sample ID	ENV TP07	ENV TP08	ENV TP05	ENV TP05	ENV TP04	ENV TP01	ENV TP01	ENV TP02	ENV TP02	ENV TP02			
Depth	0.00-1.00	0.00-1.00	0.00-1.00	1.00-2.00	0.00-1.00	0.00-1.00	1.00-7.00	0.00-1.00	1.00-2.00	2.00-3.00			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021			
Antimony	<1	<1	<1	2	<1	1	1	2	2	1	<1	mg/kg	TM30/PM15
Arsenic #	25.7	14.5	76.9	22.9	21.5	176.4	418.8 AA	24.2	47.0	22.9	<0.5	mg/kg	TM30/PM15
Barium #	22	13	27	57	15	205	72	74	80	58	<1	mg/kg	TM30/PM15
Cadmium #	<0.1	<0.1	<0.1	1.2	<0.1	2.1	<0.1	0.9	1.5	1.1	<0.1	mg/kg	TM30/PM15
Chromium #	49.5	45.9	65.2	63.6	58.7	61.3	56.8	59.5	61.0	57.2	<0.5	mg/kg	TM30/PM15
Copper #	10	6	6	28	6	25	16	26	29	22	<1	mg/kg	TM30/PM15
Lead #	22	9	14	22	10	21	19	23	21	17	<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum #	4.0	3.7	5.1	4.5	4.4	6.3	4.9	3.2	3.6	4.0	<0.1	mg/kg	TM30/PM15
Nickel #	7.2	7.0	9.5	42.3	9.1	56.4	32.6	48.3	49.2	34.5	<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	3	<1	3	1	<1	<1	<1	<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	388	227	227	340	101	184	91	128	115	136	<50	mg/kg	TM50/PM29
Water Soluble Boron #	0.5	0.2	0.4	0.5	0.1	0.3	0.2	0.4	0.3	0.3	<0.1	mg/kg	TM74/PM32
Zinc #	39	36	59	81	40	82	67	87	91	74	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	92	103	106	101	91	104	94	98	87	90	<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	LOD/LOR	Units	Method No.
Sample ID	ENV TP07	ENV TP08	ENV TP05	ENV TP05	ENV TP04	ENV TP01	ENV TP01	ENV TP02	ENV TP02	ENV TP02			
Depth	0.00-1.00	0.00-1.00	0.00-1.00	1.00-2.00	0.00-1.00	0.00-1.00	1.00-7.00	0.00-1.00	1.00-2.00	2.00-3.00			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021			
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<26	<26	<26	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	<7	11	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26	<26	<26	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<52	<52	<52	<52	<52	<52	<52	<52	<52	<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR) #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5 SV	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
Benzene #	<5	<5 SV	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
Toluene #	<5	<5 SV	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5 SV	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5 SV	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5 SV	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	LOD/LOR	Units	Method No.
Sample ID	ENV TP07	ENV TP08	ENV TP05	ENV TP05	ENV TP04	ENV TP01	ENV TP01	ENV TP02	ENV TP02	ENV TP02			
Depth	0.00-1.00	0.00-1.00	0.00-1.00	1.00-2.00	0.00-1.00	0.00-1.00	1.00-7.00	0.00-1.00	1.00-2.00	2.00-3.00			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021			
Phenol #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM26/PM21B
Natural Moisture Content	29.6	25.3	19.6	26.8	16.5	17.7	20.8	21.8	20.4	16.3	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	22.9	20.2	16.4	21.1	14.1	15.0	17.2	17.9	16.9	14.0	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	49.5	45.9	65.2	63.6	58.7	61.3	56.8	59.5	61.0	57.2	<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	1.45	0.79	0.37	0.18	0.12	0.17	0.14	0.49	0.23	0.21	<0.02	%	TM21/PM24
Sulphide	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM107/PM45
Elemental Sulphur	<1	2	<1	<1	<1	2	<1	9	1	<1	<1	mg/kg	TM108/PM114
pH #	4.34	6.02	5.88	5.78	5.43	8.10	7.85	7.90	8.56	8.57	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1156	0.1193	0.1033	0.106	0.1072	0.1185	0.1075	0.1107	0.107	0.1045		kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	31-33	34-36	37-39	40-42	43-45						LOD/LOR	Units	Method No.
Sample ID	ENV TP02	ENV TP03	ENV TP03	ENV ST01	ENV ST01								
Depth	3.00-3.60	0.00-1.00	1.00-2.00	0.00-1.00	1.00-2.00								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1								
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021								
Antimony	<1	1	<1	1	1						<1	mg/kg	TM30/PM15
Arsenic #	20.6	27.3	25.1	25.1	25.1						<0.5	mg/kg	TM30/PM15
Barium #	28	74	61	56	52						<1	mg/kg	TM30/PM15
Cadmium #	1.0	0.5	1.2	0.8	0.7						<0.1	mg/kg	TM30/PM15
Chromium #	49.2	64.7	77.8	53.3	65.9						<0.5	mg/kg	TM30/PM15
Copper #	17	20	22	20	19						<1	mg/kg	TM30/PM15
Lead #	11	27	19	56	33						<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM30/PM15
Molybdenum #	3.5	4.0	4.7	4.3	5.1						<0.1	mg/kg	TM30/PM15
Nickel #	22.9	31.9	41.9	22.2	20.7						<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1						<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	165	306	113	279	428						<50	mg/kg	TM50/PM29
Water Soluble Boron #	0.3	1.1	0.4	0.6	0.5						<0.1	mg/kg	TM74/PM32
Zinc #	47	82	83	92	81						<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03						<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05						<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	0.21	0.04						<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	0.36	0.08						<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	0.32	0.08						<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	0.21	0.09						<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	0.25	0.06						<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	0.40	0.12						<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	0.21	0.07						<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	0.17	0.05						<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	0.05	<0.04						<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	0.20	0.05						<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	<0.22	<0.22	1.34	0.37						<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	2.38	0.64						<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	0.29	0.09						<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	0.11	0.03						<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1	<1	<1						<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	93	90	87	102	93						<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	<30	<30						<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	31-33	34-36	37-39	40-42	43-45							
Sample ID	ENV TP02	ENV TP03	ENV TP03	ENV ST01	ENV ST01							
Depth	3.00-3.60	0.00-1.00	1.00-2.00	0.00-1.00	1.00-2.00							
COC No / misc												
Containers	V J T	V J T	V J T	V J T	V J T							
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021							
Sample Type	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1							
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021							

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	<0.2	<0.2	<0.2	<0.2						<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	<4	<4	<4	<4	<4						<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	<7	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	<7	<7	<7	21	15						<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<26	<26	<26	<26						<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10	<10	<10	<10						<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	<10	<10	23	16						<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<0.2	<0.2	<0.2						<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	<4	<4	<4	<4	<4						<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	<7	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	<7	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	<7	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26	<26	<26	<26						<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<52	<52	<52	<52						<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	<10	<10	<10	<10						<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	<10	<10	<10	<10	<10						<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5	<5						<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5	<5	<5						<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5	<5	<5						<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5						<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5						<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5						<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5	<5	<5						<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5						<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5						<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5						<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5						<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5						<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5						<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35						<35	ug/kg	TM17/PM8

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	31-33	34-36	37-39	40-42	43-45						LOD/LOR	Units	Method No.
Sample ID	ENV TP02	ENV TP03	ENV TP03	ENV ST01	ENV ST01								
Depth	3.00-3.60	0.00-1.00	1.00-2.00	0.00-1.00	1.00-2.00								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1								
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021								
Phenol #	<0.01	<0.01	<0.01	<0.01	<0.01						<0.01	mg/kg	TM26/PM21B
Natural Moisture Content	14.7	28.2	22.0	15.6	16.7						<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	12.8	22.0	18.1	13.5	14.3						<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3						<0.3	mg/kg	TM38/PM20
Chromium III	49.2	64.7	77.8	53.3	65.9						<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	0.22	1.57	0.22	0.86	0.75						<0.02	%	TM21/PM24
Sulphide	<10	<10	<10	<10	<10						<10	mg/kg	TM107/PM45
Elemental Sulphur	7	11	4	2	2						<1	mg/kg	TM108/PM114
pH #	8.60	7.94	8.32	8.36	8.40						<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1014	0.1255	0.114	0.1036	0.1055							kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09							kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	LOD/LOR	Units	Method No.
Sample ID	ENV TP07	ENV TP08	ENV TP05	ENV TP05	ENV TP04	ENV TP01	ENV TP01	ENV TP02	ENV TP02	ENV TP02			
Depth	0.00-1.00	0.00-1.00	0.00-1.00	1.00-2.00	0.00-1.00	0.00-1.00	1.00-7.00	0.00-1.00	1.00-2.00	2.00-3.00			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021			
Dissolved Antimony #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	0.0401	<0.0025	<0.0025	<0.0025	<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.401	<0.025	<0.025	<0.025	<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.005	<0.003	<0.003	<0.003	0.004	<0.003	0.056	<0.003	<0.003	0.004	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.05	<0.03	<0.03	<0.03	0.04	<0.03	0.56	<0.03	<0.03	0.04	<0.03	mg/kg	TM30/PM17
Dissolved Boron #	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	mg/l	TM30/PM17
Dissolved Boron (A10) #	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.005	<0.002	0.003	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	0.03	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	0.004	<0.002	<0.002	0.006	0.004	<0.002	<0.002	<0.002	0.003	0.003	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	0.04	<0.02	<0.02	0.06	0.04	<0.02	<0.02	<0.02	0.03	0.03	<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	0.013	<0.003	<0.003	0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	0.13	<0.03	<0.03	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	0.00002	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	<0.3	<0.3	0.3	<0.3	<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3	<3	<3	<3	<3	<3	3	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	1.7	5.7	3.7	2.6	3.9	7.0	1.8	5.9	1.2	0.8	<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	17	57	37	26	39	70	18	59	12	8	<5	mg/kg	TM38/PM0
Chloride #	1.1	2.3	1.4	<0.3	<0.3	2.3	1.1	1.2	1.1	1.9	<0.3	mg/l	TM38/PM0
Chloride #	11	23	14	<3	<3	23	11	12	11	19	<3	mg/kg	TM38/PM0
Ammoniacal Nitrogen as N #	0.04	0.03	0.04	<0.03	0.03	<0.03	0.05	<0.03	<0.03	0.03	<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	0.4	<0.3	0.4	<0.3	0.3	<0.3	0.5	<0.3	<0.3	0.3	<0.3	mg/kg	TM38/PM0
Dissolved Organic Carbon	26	29	10	5	<2	10	9	8	4	4	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	260	290	100	50	<20	100	90	80	40	40	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	48	41	<35	<35	<35	<35	55	<35	50	45	<35	mg/l	TM20/PM0
Total Dissolved Solids #	480	410	<350	<350	<350	<350	550	<350	500	450	<350	mg/kg	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	31-33	34-36	37-39	40-42	43-45						LOD/LOR	Units	Method No.
Sample ID	ENV TP02	ENV TP03	ENV TP03	ENV ST01	ENV ST01								
Depth	3.00-3.60	0.00-1.00	1.00-2.00	0.00-1.00	1.00-2.00								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1								
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021								
Dissolved Antimony #	0.003	<0.002	0.002	<0.002	<0.002						<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	0.03	<0.02	<0.02	<0.02	<0.02						<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	0.0029	0.0047	0.0043	0.0035	0.0031						<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	0.029	0.047	0.043	0.035	0.031						<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	0.008	0.005	0.006	0.006						<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	0.08	0.05	0.06	0.06						<0.03	mg/kg	TM30/PM17
Dissolved Boron #	<0.012	<0.012	<0.012	<0.012	0.013						<0.012	mg/l	TM30/PM17
Dissolved Boron (A10) #	<0.12	<0.12	<0.12	<0.12	0.13						<0.12	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005						<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005						<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	0.0017	0.0038	<0.0015	<0.0015	0.0018						<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	0.017	0.038	<0.015	<0.015	0.018						<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007	<0.007						<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07						<0.07	mg/kg	TM30/PM17
Dissolved Lead #	0.021	<0.005	<0.005	<0.005	<0.005						<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	0.21	<0.05	<0.05	<0.05	<0.05						<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.002	<0.002	0.005	0.004	0.004						<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	<0.02	0.05	0.04	0.04						<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	0.006	<0.002	<0.002	0.003						<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	0.06	<0.02	<0.02	0.03						<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003						<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03						<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	0.008	0.016	<0.003	<0.003	0.007						<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	0.08	0.16	<0.03	<0.03	0.07						<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001						<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001						<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01						<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	0.6	0.7	0.4	0.4						<0.3	mg/l	TM173/PM0
Fluoride	<3	6	7	4	4						<3	mg/kg	TM173/PM0
Sulphate as SO4 #	1.5	3.1	1.6	<0.5	0.9						<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	15	31	16	<5	9						<5	mg/kg	TM38/PM0
Chloride #	1.3	2.9	2.4	0.6	0.3						<0.3	mg/l	TM38/PM0
Chloride #	13	29	24	6	<3						<3	mg/kg	TM38/PM0
Ammoniacal Nitrogen as N #	<0.03	<0.03	0.03	0.03	0.03						<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	<0.3	<0.3	<0.3	0.3	<0.3						<0.3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	3	3	3	4						<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	30	30	30	40						<20	mg/kg	TM60/PM0
Total Dissolved Solids #	43	53	68	85	93						<35	mg/l	TM20/PM0
Total Dissolved Solids #	430	530	680	850	930						<350	mg/kg	TM20/PM0

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30						
Sample ID	ENV TP07	ENV TP08	ENV TP05	ENV TP05	ENV TP04	ENV TP01	ENV TP01	ENV TP02	ENV TP02	ENV TP02						
Depth	0.00-1.00	0.00-1.00	0.00-1.00	1.00-2.00	0.00-1.00	0.00-1.00	1.00-7.00	0.00-1.00	1.00-2.00	2.00-3.00						
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1	1	1	1						
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Solid Waste Analysis																
Total Organic Carbon #	1.45	0.79	0.37	0.18	0.12	0.17	0.14	0.49	0.23	0.21	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025 [SV]	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.401	<0.025	<0.025	<0.025	0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.05	<0.03	<0.03	<0.03	0.04	<0.03	0.56	<0.03	<0.03	0.04	20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	0.03	<0.02	0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	0.04	<0.02	<0.02	0.06	0.04	<0.02	<0.02	<0.02	0.03	0.03	0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	0.13	<0.03	<0.03	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	480	410	<350	<350	<350	<350	550	<350	500	450	4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	260	290	100	50	<20	100	90	80	40	40	500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	78.2	75.3	86.9	85.1	83.8	75.9	83.5	81.5	83.8	86.5	-	-	-	<0.1	%	NONE/PM4
pH #	4.34	6.02	5.88	5.78	5.43	8.10	7.85	7.90	8.56	8.57	-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3	<3	<3	<3	<3	<3	3	<3	-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	17	57	37	26	39	70	18	59	12	8	1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	11	23	14	<3	<3	23	11	12	11	19	800	15000	25000	<3	mg/kg	TM38/PM0

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All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty
EMT Job No: 21/9397

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	31-33	34-36	37-39	40-42	43-45											
Sample ID	ENV TP02	ENV TP03	ENV TP03	ENV ST01	ENV ST01											
Depth	3.00-3.60	0.00-1.00	1.00-2.00	0.00-1.00	1.00-2.00											
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T											
Sample Date	17/06/2021	17/06/2021	17/06/2021	17/06/2021	17/06/2021											
Sample Type	Soil	Soil	Soil	Soil	Soil											
Batch Number	1	1	1	1	1											
Date of Receipt	21/06/2021	21/06/2021	21/06/2021	21/06/2021	21/06/2021											
											Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Solid Waste Analysis																
Total Organic Carbon #	0.22	1.57	0.22	0.86	0.75						3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025						6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035						1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30						500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22	<0.22	1.34	0.37						-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	<0.64	2.38	0.64						100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	0.029	0.047	0.043	0.035	0.031						0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	0.08	0.05	0.06	0.06						20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005						0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	0.017	0.038	<0.015	<0.015	0.018						0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07						2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001						0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	<0.02	0.05	0.04	0.04						0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	0.06	<0.02	<0.02	0.03						0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	0.21	<0.05	<0.05	<0.05	<0.05						0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	0.03	<0.02	<0.02	<0.02	<0.02						0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	<0.03						0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	0.08	0.16	<0.03	<0.03	0.07						4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	430	530	680	850	930						4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	30	30	30	40						500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	89.2	71.7	79.1	86.5	85.2						-	-	-	<0.1	%	NONE/PM4
pH #	8.60	7.94	8.32	8.36	8.40						-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1						1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	6	7	4	4						-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	15	31	16	<5	9						1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	13	29	24	6	<3						800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland

Reference: 10477-03-21

Location: Blackglen Road

Contact: Conor Finnerty

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
21/9397	1	ENV TP07	0.00-1.00	1-3	No interpretation possible
21/9397	1	ENV TP08	0.00-1.00	4-6	No interpretation possible
21/9397	1	ENV TP05	0.00-1.00	7-9	No interpretation possible
21/9397	1	ENV TP05	1.00-2.00	10-12	No interpretation possible
21/9397	1	ENV TP04	0.00-1.00	13-15	No interpretation possible
21/9397	1	ENV TP01	0.00-1.00	16-18	No interpretation possible
21/9397	1	ENV TP01	1.00-7.00	19-21	No interpretation possible
21/9397	1	ENV TP02	0.00-1.00	22-24	No interpretation possible
21/9397	1	ENV TP02	1.00-2.00	25-27	No interpretation possible
21/9397	1	ENV TP02	2.00-3.00	28-30	No interpretation possible
21/9397	1	ENV TP02	3.00-3.60	31-33	No interpretation possible
21/9397	1	ENV TP03	0.00-1.00	34-36	No interpretation possible
21/9397	1	ENV TP03	1.00-2.00	37-39	No interpretation possible
21/9397	1	ENV ST01	0.00-1.00	40-42	No interpretation possible
21/9397	1	ENV ST01	1.00-2.00	43-45	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/9397	1	ENV TP07	0.00-1.00	2	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP08	0.00-1.00	5	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP05	0.00-1.00	8	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP05	1.00-2.00	11	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP04	0.00-1.00	14	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP01	0.00-1.00	17	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP01	1.00-7.00	20	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/9397	1	ENV TP01	1.00-7.00	20	23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP02	0.00-1.00	23	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP02	1.00-2.00	26	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP02	2.00-3.00	29	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stone
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP02	3.00-3.60	32	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stones
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP03	0.00-1.00	35	23/06/2021	**General Description (Bulk Analysis)**	Soil/Stones
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV TP03	1.00-2.00	38	23/06/2021	**General Description (Bulk Analysis)**	soil
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV ST01	0.00-1.00	41	23/06/2021	**General Description (Bulk Analysis)**	soil
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD
21/9397	1	ENV ST01	1.00-2.00	44	23/06/2021	**General Description (Bulk Analysis)**	soil
					23/06/2021	**Asbestos Fibres**	NAD
					23/06/2021	**Asbestos ACM**	NAD
					23/06/2021	**Asbestos Type**	NAD
					23/06/2021	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 10477-03-21
Location: Blackglen Road
Contact: Conor Finnerty

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/9397						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/9397

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/9397

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

EMT Job No: 21/9397

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.	Yes		AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes		AD	Yes

EMT Job No: 21/9397

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM108	Determination of Elemental Sulphur by Reversed Phase High Performance Liquid Chromatography with Ultra Violet spectroscopy.	PM114	End over end extraction of dried and crushed soil samples for organic analysis. The solvent mix varies depending on analysis required			AD	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

EMT Job No: 21/9397

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

APPENDIX 8 – Groundwater Monitoring

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
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D22 YD52

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Web: www.gii.ie

GROUNDWATER MONITORING

Blackglen Road

BOREHOLE	DATE	TIME	GROUNDWATER (m BGL)	Comments
RC01	10/05/2021	9.30	1.97m BGL	Level logger installed
RC02	10/05/2021	9.39	1.54m BGL	Level logger installed
RC03	10/05/2021	9.13	2.43m BGL	Level logger & Baro logger installed
RC04	10/05/2021	9.51	2.96m BGL	Level logger installed


Water Level RC01
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Water Level (mOD)
Temperature (Degrees C)
Date
Water Level
Temperature
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
10.2
10.1
10
9.9
9.8
9.7
9.6
9.5
04/05/2021
09/05/2021
14/05/2021
19/05/2021
24/05/2021
03/06/2021
08/06/2021
13/06/2021
18/06/2021
23/06/2021


Water Level RC02
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Water Level (mOD)
Temperature (Degrees C)
Date
Water Level
Temperature
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
9.4
9.2
9
8.8
8.6
8.4
8.2
8
04/05/2021
09/05/2021
14/05/2021
19/05/2021
24/05/2021
03/06/2021
08/06/2021
13/06/2021
18/06/2021
23/06/2021


Water Level RC03
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Water Level (mOD)
Temperature (Degrees C)
Date
Water Level
Temperature
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
9.2
9.1
9
8.9
8.8
8.7
8.6
8.5
8.4
04/05/2021
09/05/2021
14/05/2021
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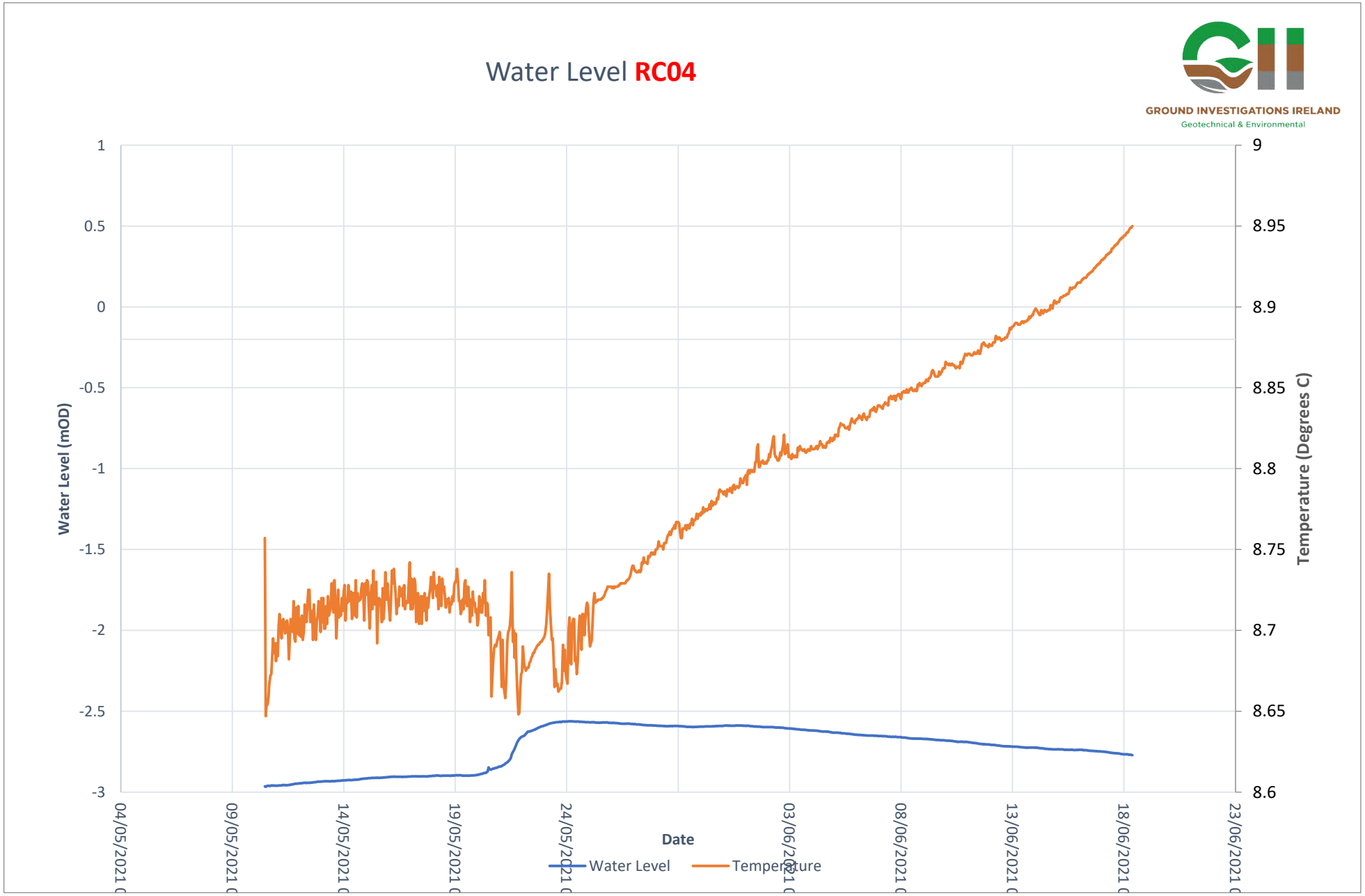
18/06/2021
23/06/2021


Water Level RC04
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Water Level (mOD)
Temperature (Degrees C)
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
9
8.95
8.9
8.85
8.8
8.75
8.7
8.65
8.6
04/05/2021 0
09/05/2021 0
14/05/2021 0
19/05/2021 0
24/05/2021 0
03/06/2021 0
08/06/2021 0
13/06/2021 0
18/06/2021 0
23/06/2021 0
Date
Water Level
Temperature

Appendix B INVASIVE ALIEN SPECIES SURVEY

Invasive Alien Species Survey at Blackglen



October 2024

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Rev	Date	Details	Prepared by	Checked by	Approved by
0	October 2024	IAS Survey	Dr. William Earle (Invasive species specialist)	Mr Tom Donovan (Director)	Dr. William Earle (Invasive species specialist)

Cover photo: A Sika stag beside Buddleja on the Blackglen site in September 2024.

Rear photo: Buddleja and Old man's beard on the Blackglen site in September 2024.

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1. INTRODUCTION

At the request of Enviroguide Consulting (Enviroguide), INVAS Biosecurity Ltd. (INVAS) was commissioned to carry out a survey for Invasive Alien Plant Species (IAPS) and preparation of associated reports and a Management Plan For the site at Blackglen, Dublin (Figure 1.1).



Plate 1.1: *A Sika stag at the northern site boundary in October 2024.*

1.1. Project Background

The information provided by this survey will aid in the development of a Management Plan for the IAPS detected. The site will be used for residential development and to date, localised general maintenance around the boundaries and some construction works along the Blackglen Road have taken place in the area. Otherwise, the site is heavily overgrown throughout with dense Bracken and Gorse dominating the site. The survey area is located *circa*. 5km from the Wicklow Mountains SAC (IE002122) and SPA (IE004040) and *circa*. 100m from Fitzsimons Wood pNHA (001753).

1.2. Objectives

The aim of the survey was to identify all IAPS within the footprint of the proposed development site (Figure 1.1), in particular invasive species that are restricted under Irish legislation (S.I. 347/2024) and those listed as being of Union concern in the EU invasive alien species (IAS) Regulations (1143/2014). The survey will generate distribution maps for each IAPS identified within the survey area.



Figure 1.1: *The map provided to INVAS Biosecurity by Enviroguide outlining the survey area for the IAPS survey in September 2024.*

2. SURVEY

2.1. Survey Details

The field survey was conducted on the 27th of September 2024 by Dr William Earle (INVAS). Survey points for all listed species were recorded using a Garmin® GPSmap78 at a height of one metre. Points were recorded at 0.5-metre intervals around the perimeter of IAPS infestations. In some cases, survey points were taken along the extremities of certain infestations due to dangerous terrain, inaccessibility of sites or overgrowth with vegetation. In the case of some difficult sites, Google Maps was used in the field to record additional information regarding the extent of an infestation, using local landmarks as reference points. Records were maintained on printed satellite imagery maps. No Small Unmanned Aerial Vehicle (SUAV) survey was carried out. Microsoft® Bing™ Maps were used to provide an overview of the distribution for each species within the survey area and for the development of visual aids to assist with future works. Digital photographs were taken of each species to show the full extent of IAPS infestations.

2.2. Survey limitations

The above ground vegetation of Three-cornered leek and Spanish bluebell (both regulated under S.I. 374/2024) is most regularly encountered between December and late April depending on weather conditions each year. As the survey took place in September it is possible that infestations of both of these species may be present in the survey area but were not recorded due to the absence of above ground vegetation.

2.3. General IAPS distribution

Nine IAPS, one that is listed in the First Schedule (Part 1) of SI 374/2024 (highlighted in bold) and eight that are known to be invasive in Irish riparian and terrestrial habitats, were recorded throughout the survey area (Figure 2.2, Table 2.1). These included **Rhododendron (*Rhododendron ponticum*)**, Buddleja (*Buddleja davidii*), Cherry laurel (*Prunus laurocerasus*), Cotoneaster (*Cotoneaster horizontalis*), Himalayan honeysuckle (*Lycesteria formosa*), Lesser knotweed (*Persicaria campanulata*), Old man's beard (*Clematis vitalba*), Sycamore (*Acer pseudoplantanus*) and Winter heliotrope (*Petasites pyrenaicus*). Of this list, Rhododendron is contained in Irish Legislation (S.I 374/2024), with no species from the EU Regulation (EU 1143/2014) detected at this site. Detailed distribution maps for all species are provided for the survey area (Figure 2.1 – 2.9). Plates 2.1 to 2.9 provides images relating to the general

distribution of the IAPS on the ground. **Sika deer (*Cervus nippon*)** were also recorded throughout the site and are listed in the First Schedule (Part 2) of SI 374/2024.

Table 2.1: The IAPS recorded and a description of their general location on the Blackglen Road site in September 2024. The colours refer to the polygons represented by each species on the following maps: Figure 2.1-2.9.

Common name	**Scientific name**	**Location**	**Map Colour**
Species included in S.I. 274/2024 or EU 1143/2014			
Rhododendron	*Rhododendron ponticum*	Two small infestations in close proximity to the south site boundary	Pink
Species not yet included in any regulations or legislation			
Buddleja	*Buddleja davidii*	Widespread throughout the survey area with dense infestations primarily in the north of the site	Purple
Cherry laurel	*Prunus laurocerasus*	Two infestations in the south of the site along the site boundary	Green
Cotoneaster	*Cotoneaster horizontalis*	Two infestations in the south of the site along the site boundary and one in the northwest of the site	Light green
Himalayan honeysuckle	*Lycesteria formosa*	One infestation in the northeast of the site near the site boundary	Yellow
Lesser knotweed	*Persicaria campanulata*	One infestation off site across the stream on the southeastern site boundary	Red
Old man's beard	*Clematis vitalba*	One large infestation in the north of the site, primarily growing on top of Buddleja	Orange
Sycamore	*Acer pseudoplantanus*	Primarily mature trees along the site boundaries in the south and east of the site	Light blue
Winter heliotrope	*Petasites pyrenaicus*	One infestation in the north of the site and one adjacent to the road on the south site boundary	Blue



Figure 2.1: The Blackglen Road site with Rhododendron (m²) recorded in September 2024.



Plate 2.1: *Photographs showing Rhododendron growing on the Blackglen Road site (a & b).*

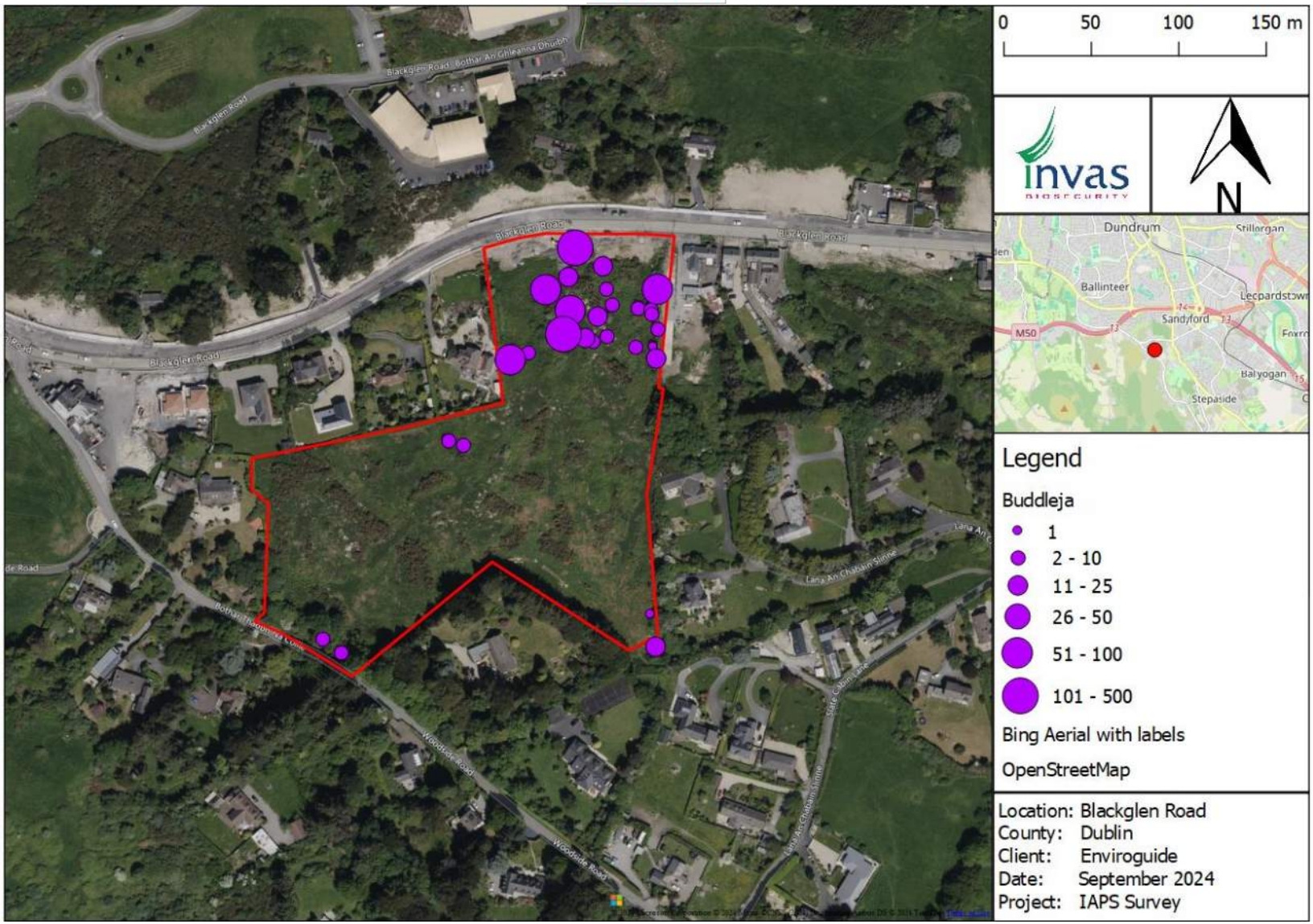

Figure 2.2: The Blackglen Road site with Buddleja (m²) recorded in September 2024.



Plate 2.2: *Photographs showing Buddleja growing on the Blackglen Road site (a, b, c & d).*



Figure 2.3: The Blackglen Road site with Cherry laurel (m²) recorded in September 2024.



Plate 2.3: *Photographs showing Cherry laurel growing on the Blackglen Road site (a & b).*



Figure 2.4: The Blackglen Road site with Cotoneaster (m²) recorded in September 2024.



Plate 2.4: *Photographs showing Cotoneaster growing on the Blackglen Road site (a & b).*

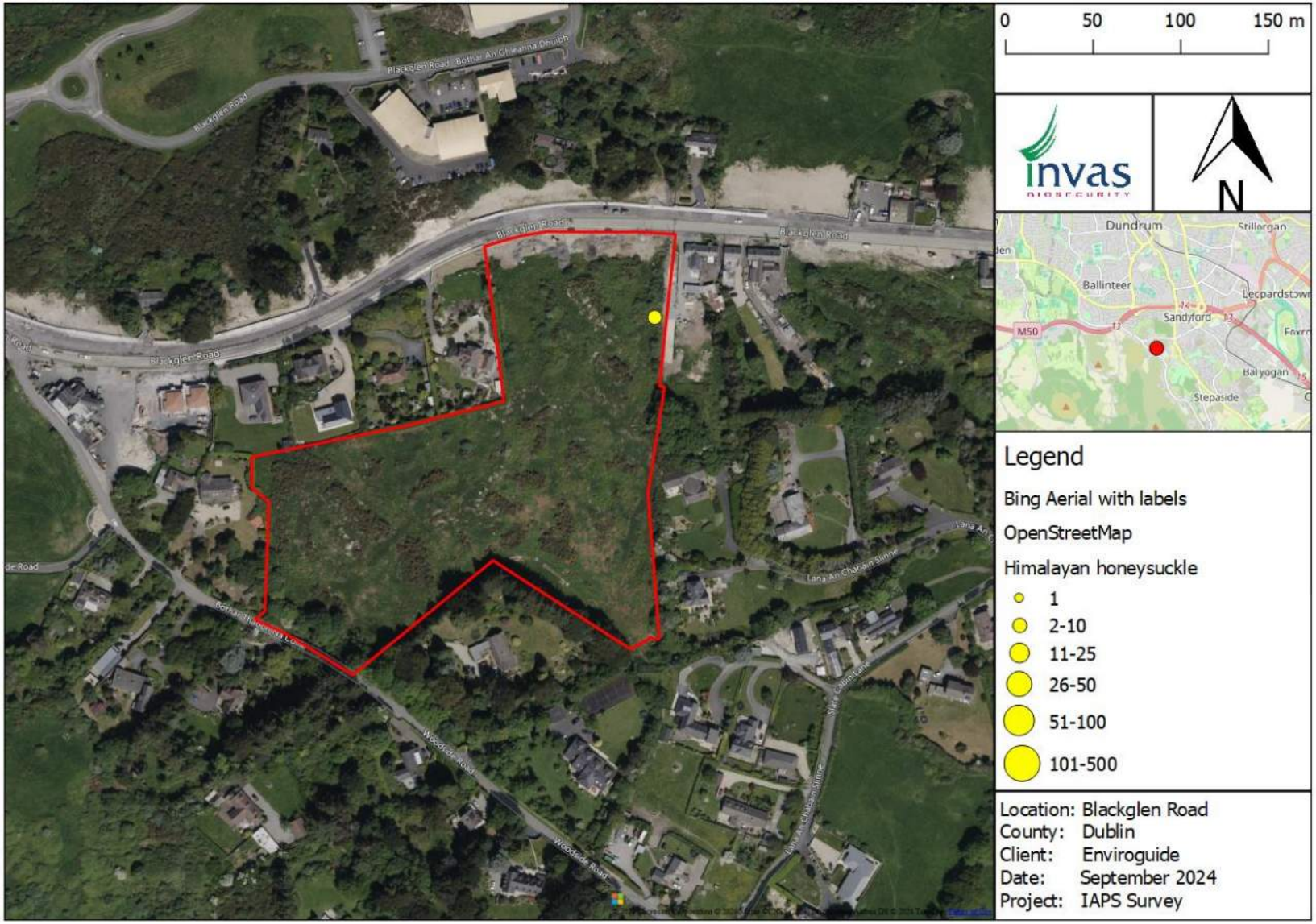

Figure 2.5: The Blackglen Road site with Himalayan honeysuckle (m²) recorded in September 2024.



Plate 2.5: *A photograph showing Himalayan honeysuckle growing among dense Buddleja on the Blackglen Road site (a).*

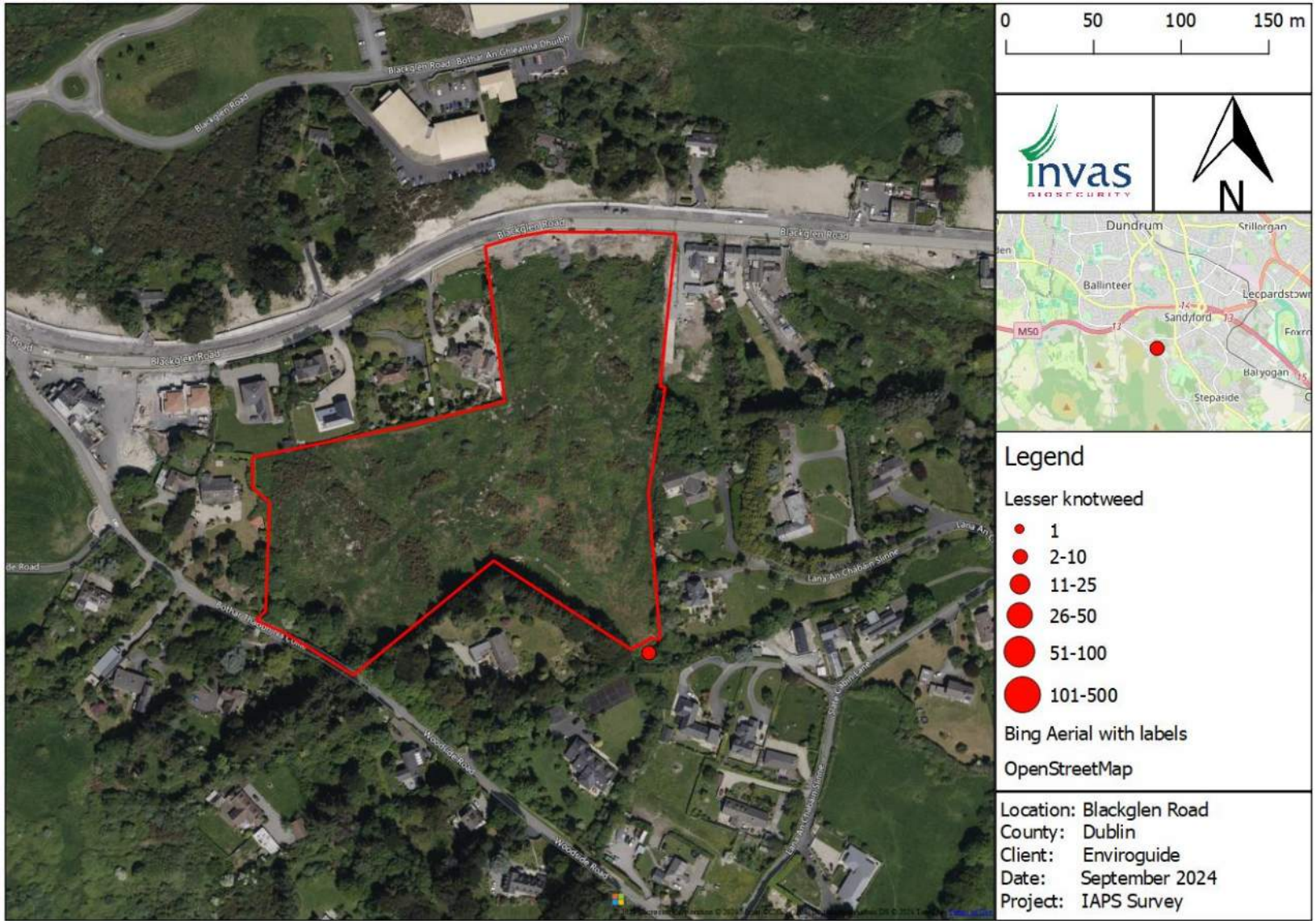

Figure 2.6: The Blackglen Road site with Lesser knotweed (m²) recorded off site in September 2024.

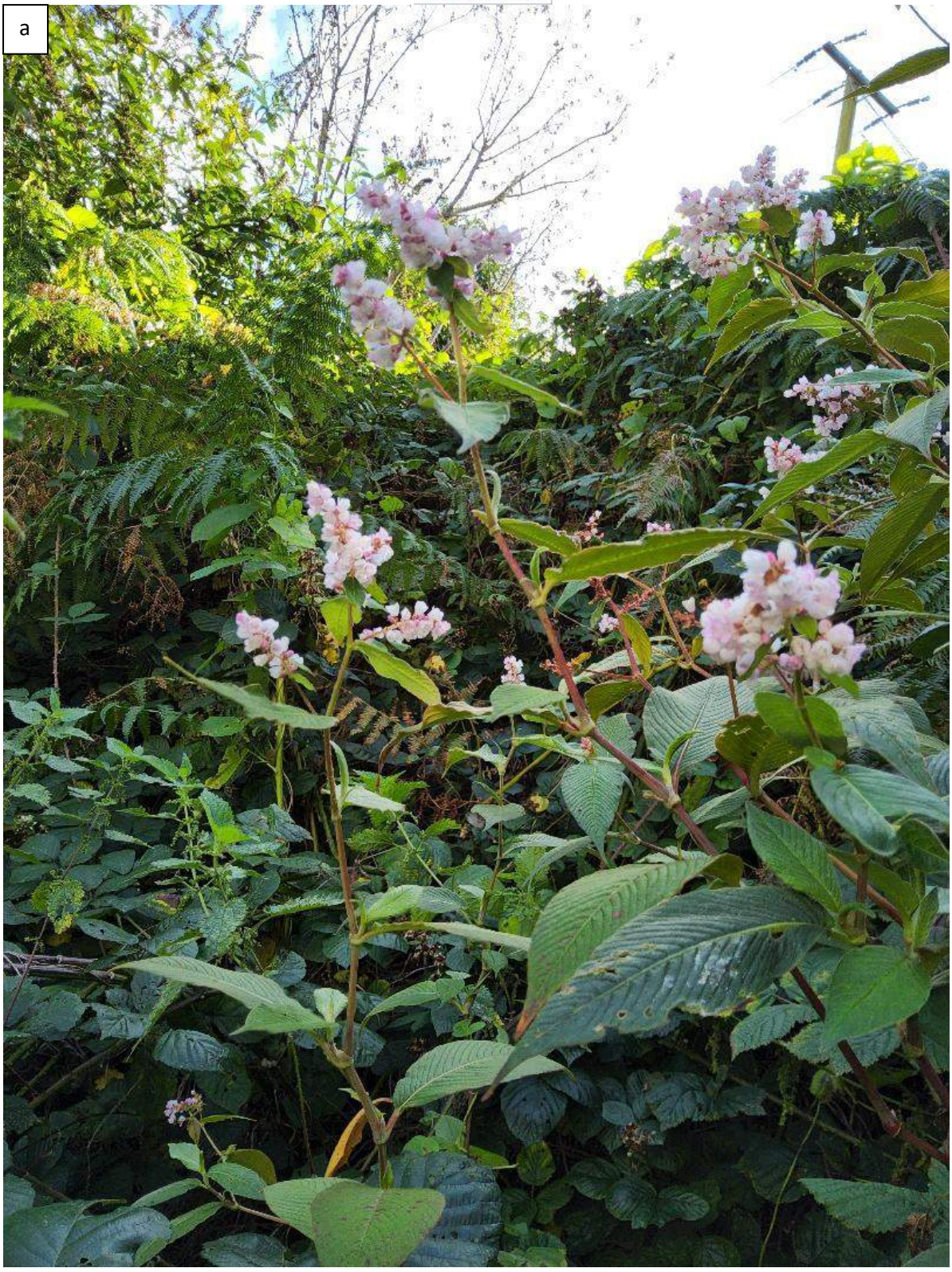

Plate 2.6: *A photograph showing Lesser knotweed growing off site near the stream at the southeast boundary of the Blackglen Road site (a).*

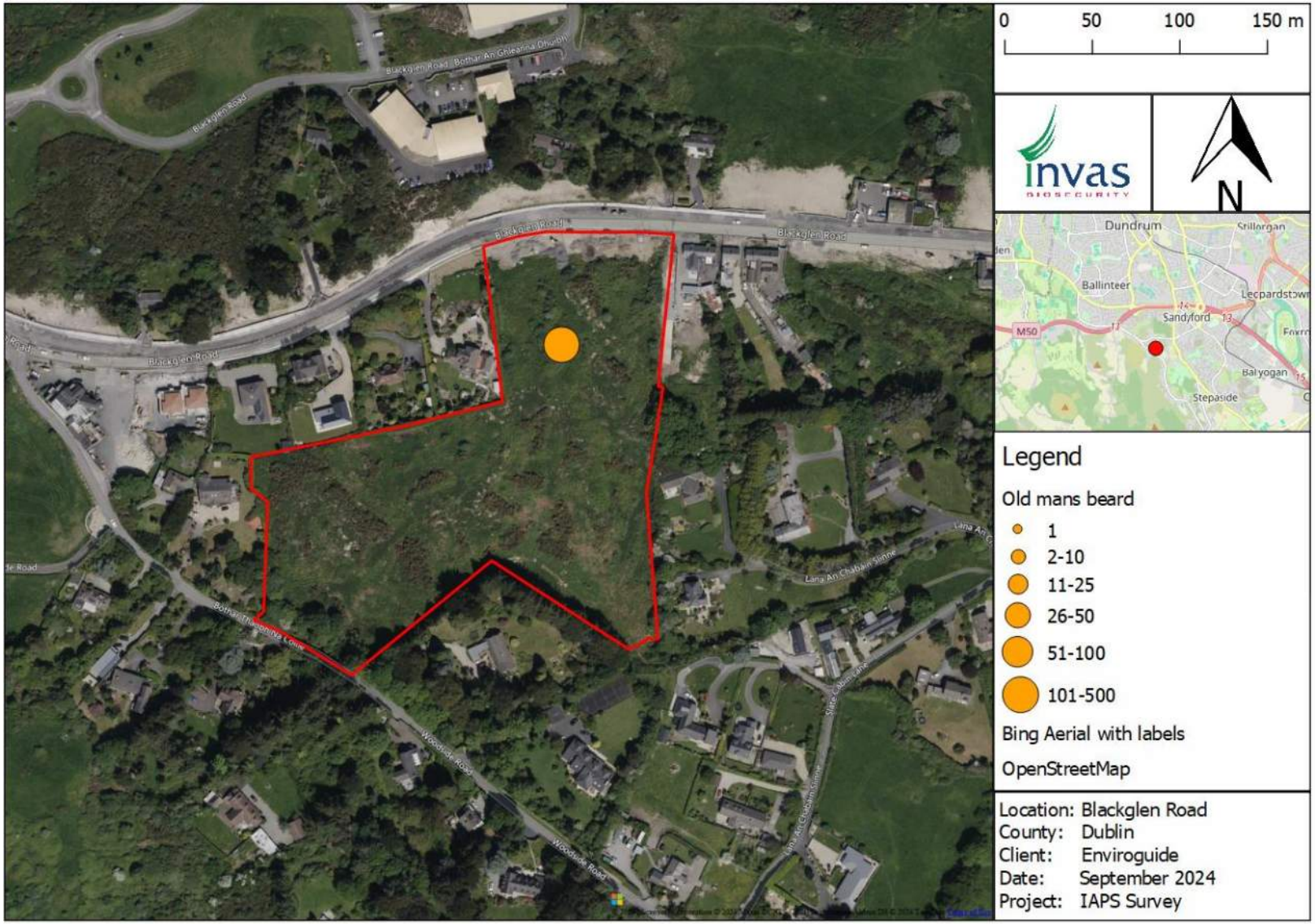

Figure 2.7: The Blackglen Road site with Old man's beard (m²) recorded in September 2024.



Plate 2.7: *Photographs showing Old man's beard growing on the Blackglen Road site (a & b).*

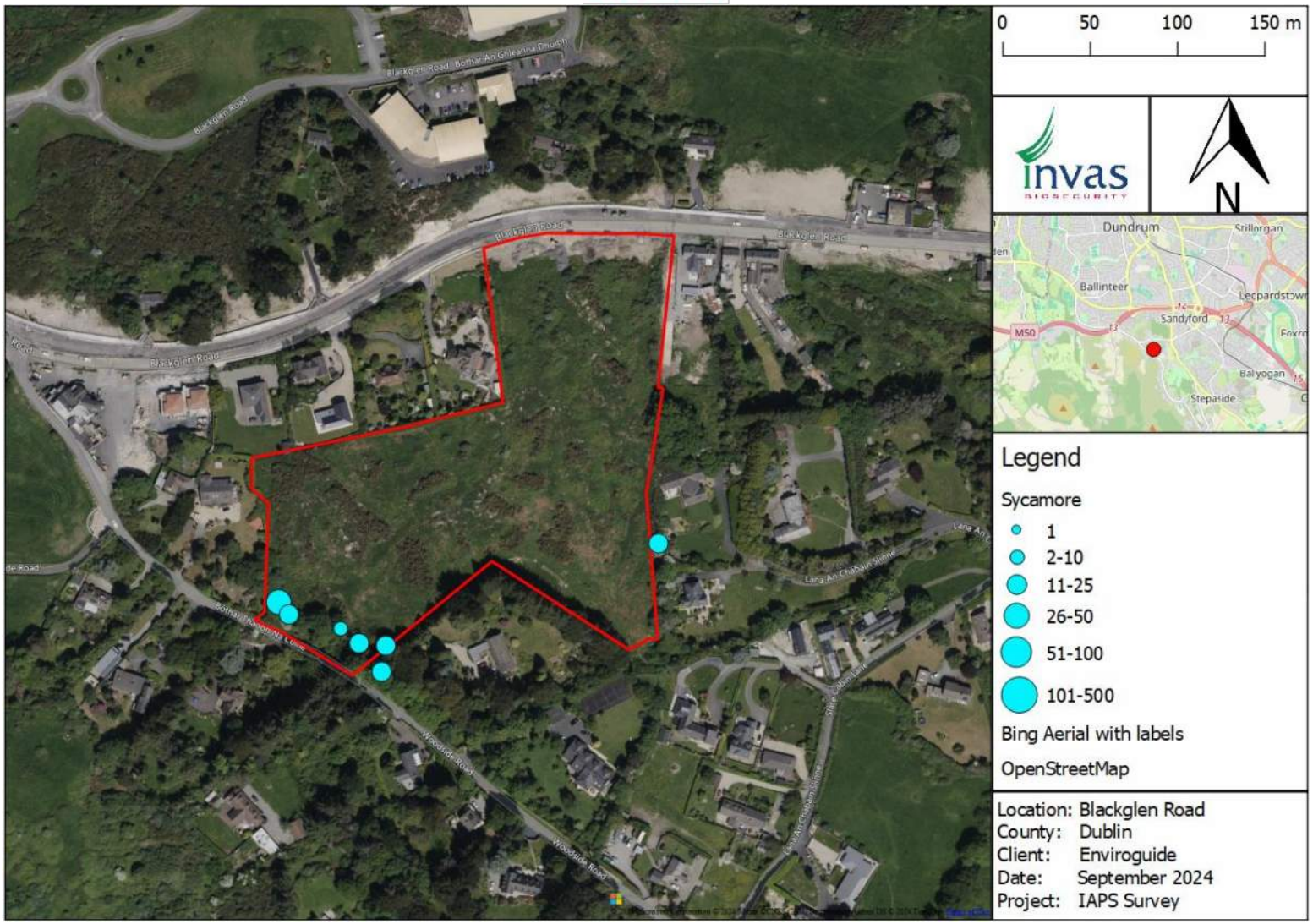

Figure 2.8: The Blackglen Road site with Sycamore (m²) recorded in September 2024.



Plate 2.8: *A photograph showing Sycamore growing on the Blackglen Road site (a).*

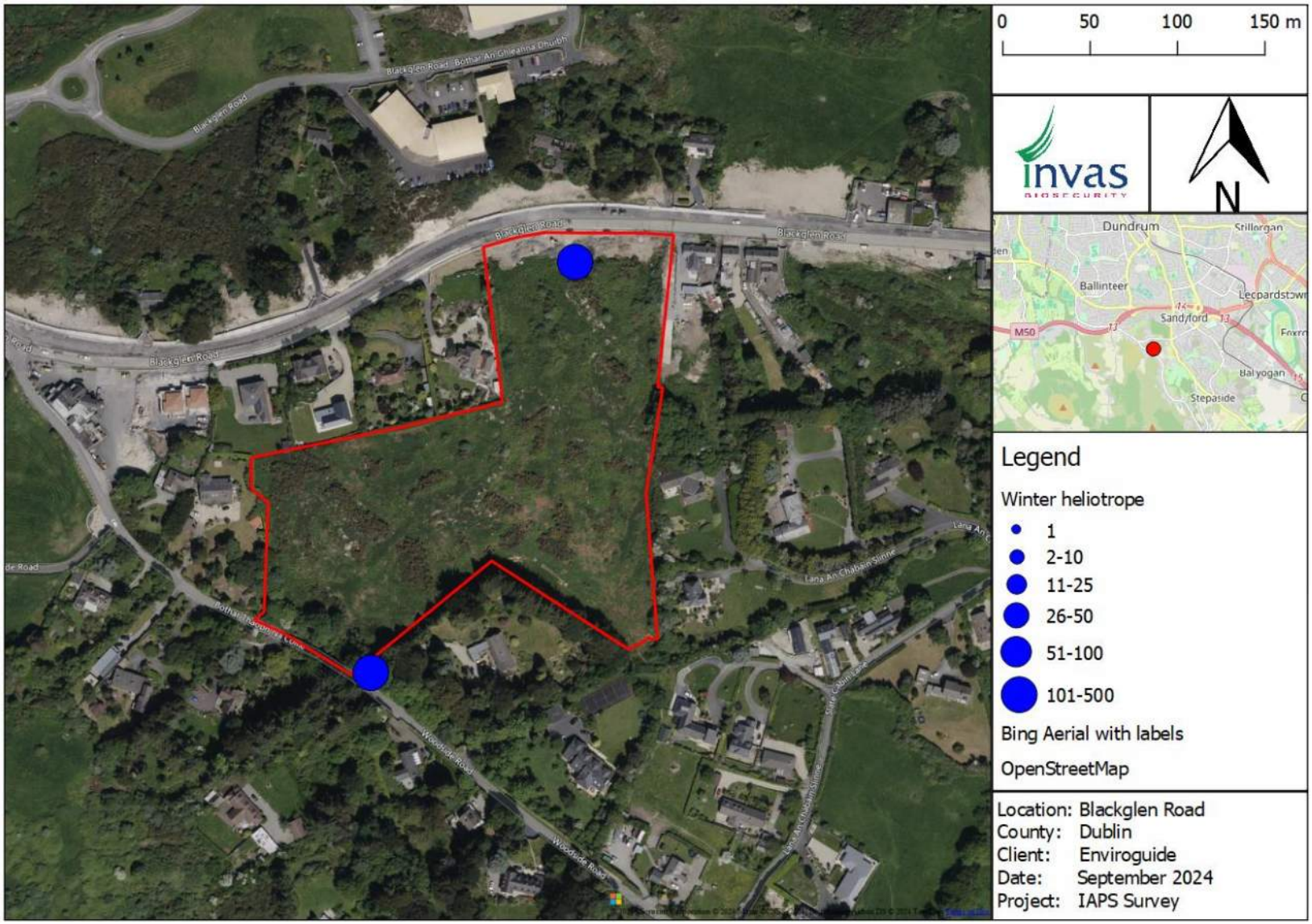

Figure 2.9: The Blackglen Road site with Winter heliotrope (m²) recorded in September 2024.



Plate 2.9: *Photographs showing Winter heliotrope growing on the Blackglen Road site (a & b).*

3. GENERAL LOCATIONS, DESCRIPTIONS, LEGISLATION AND MANAGEMENT OPTIONS FOR IAPS RECORDED ON THE BLACKGLEN ROAD SITE

The following sections contain information relating to each of the IAPS recorded on the Blackglen Road Site in June 2024. For each species maps are provided that detail the specific distribution of that species within the survey area (see Section 2). These maps are supported by photographic images of the infestations. There follows a Table that provides a description of the individual invasive species, to include their general ecology, impacts and dispersal mechanisms. This Table also identifies any national or European legislation relating to the keeping, propagation and dispersal of each species.

3.1. Rhododendron

Rhododendron was recorded as two small infestations in close proximity to the south site boundary (Figure 2.1, Plate 2.1).

Table 3.1: Species description and legislation relating to Rhododendron.

Distinguishing features	Rhododendron (*Rhododendron ponticum*) is a fast-growing evergreen shrub that can grow to 8m tall and is tolerant of a wide range of conditions and soil types. It is capable of producing dense thickets. Its leaves are hairless, dark green and glossy above, with a paler underside. Leaves are borne in a spiral at the end of each stem. Flowering normally occurs from late April to June, with plants capable of producing large quantities of seed. Each flower is violet to purple and borne in groups of 10 to 15.
Habitat	Rhododendron favours acid soils, in areas of wetland, rocky banks and hillsides, gardens and riparian zones. It is also well adapted to the understory of forestry and woodlands.
Ecology	It is a non-native species (originally from the Iberian Peninsula and wider Mediterranean) that has become widespread in mountainous areas of Ireland, especially in the west. It was introduced into Great Britain in 1763 for ornamental purposes. Rhododendron thrives on peaty, sandy and acidic soils and is extremely hardy. This invasive plant is highly prolific in terms of seed production. These are normally spread up to 100m from the parent plant by wind action or along watercourses. It has become highly invasive in Ireland with a wide distribution along the west coast due to its prolific seeding, rapid growth rate and its toxicity, which gives it a competitive advantage over native species. This aids in the creation of dense impenetrable thickets that can cover large areas, such as the infestations in Killarney National Park. These mature thickets reduce access and make it difficult to implement control measures.

Impact	Because of the dense vegetation that the species produces, it can easily outcompete native species and become dominant. Rhododendron has a significant adverse impact on native floral (and associated faunal) biodiversity. Leaves contain toxins (free phenols) that result in herbivore avoidance and suppresses regeneration of native understorey species. It is host to *Phytophthora ramorum*, which causes Sudden oak death.
Dispersal	*Via* rhizome fragments, suckers and seeds. Each flower produces between 3,000 to 7,000 fine powder-like seeds that can persist for up to three years.
Legislation	Subject to restrictions under EU (Birds and Natural Habitats) Regulations, 2011(SI 374/2024).

3.1.1. Management of Rhododendron

The preferred management option for mature Rhododendron at the Blackglen site is a combination of targeted mechanical cutting and chemical treatment with an approved herbicide. This follows the methodology screened for the Department of Housing, Local Government and Heritage for the 'Adoption of Rhododendron clearance within Connemara National Park in accordance with Regulation 42A EC (Birds and Natural) Habitats Regulations 2011-2021'. In summary, the base of each Rhododendron tree will be cut as close to the ground as possible using a chainsaw. The chainsaw will be used to create notches and wells in the trunk of the tree) and a concentrated 5:1 solution of a glyphosate-based herbicide is immediately applied. The use of an inert dye mixed with the herbicide will ensure that no stumps are missed during treatment programmes. This type of treatment is effective all year-round but may be best carried out outside of the bird nesting season which runs from the 1st of March to the 31st of August.

Manual pulling of plants that are less than 20cm high is successful, once all of the roots are removed. It is important to knock the soil from the roots to minimise the possibility of re-rooting. Exposure of the root system to air and sunlight will result in dehydration and death of the plant.

Following the treatment of Rhododendron large plants can be cut or pulled down, if access to machinery is available. It is possible to mechanically uproot mature Rhododendron plants due to the relatively shallow nature of the root system. However, this is generally only appropriate for sites where access to machinery is possible and at sites of low ecological interest, where damage to existing native vegetation is not a concern. Where chemical control of cut stumps and rootstocks is not an option, stump extraction will be necessary. This will normally involve using machinery, where access is possible. Any cut material that has not been treated should

be removed from the site and disposed of in a licenced landfill to avoid resprouting or suckering, which will produce new plants and potential infestations. Mulching is a good option for disposal and the mulch may be left on site, if no seeds are present.

Table 3.2: Proposed management schedule for Rhododendron recorded on the Blackglen site in September 2024.

Year	Timing	Description of works	Treatment
Year 1	October/November	Mechanical and herbicide management	Cut-stump treatment and seedling removal
Year 2	February	Assessment of regrowth and retreatment as required	Cut-stump treatment and seedling removal
Year 2	October/November	Assessment of regrowth and retreatment as required	Cut-stump treatment and seedling removal
Year 3	February	Assessment of regrowth and retreatment as required	Cut-stump treatment and seedling removal
Year 3	TBC	Removal of Rhododendron trees	Mechanical removal of vegetation prior to construction works
Year 4	January/March	Survey and retreatment as necessary	Seedling removal Cut-stump treatment

3.2. Buddleja

Buddleja was widespread throughout the survey area with dense infestations primarily in the north of the site (Figures 2.2, Plate 2.2). Dense seedling growth was recorded along the north boundary in the open gravel area of the site (Plate 3.1).



Plate 3.1: *A photograph showing Buddleja seedlings growing adjacent to Blackglen Road.*

Table 3.3: Species description and legislation for Buddleja.

Distinguishing features	Buddleia (*Buddleja davidii*) is a perennial shrub that can grow to up 4 metres tall. Leaves are grey-green, lanceolate and oppositely arranged. Stems are light brown, with a cracked appearance. This species has an extensive network of large and fine roots. Scented lilac flowers are borne on a long conical spike. Each plant produces large numbers of small seeds that can persist for up to four years in the soil.
Habitat	In waste ground, roadsides, rail corridors and along lakes, rivers, canals, ponds and ditches in rich to poor soil types.
Ecology	Introduced from China as an ornamental and butterfly attractant, Buddleja has now become widespread in urban environments throughout Ireland. This species is highly adaptable and tolerant of disturbed conditions.
Impact	The penetrating roots can cause damage to buildings and hard structures, while the profusion of above-ground growth produced each growing season can have a very adverse impact on native biodiversity.
Dispersal	Buddleja reproduces by seeds that are spread primarily by wind. It can also reproduce asexually *via* stem and root cuttings.
Legislation	Not yet contained in any legislative lists.

3.2.1. Management of Buddleja

The preferred management option for mature Buddleja at the Blackglen site is a combination of targeted mechanical cutting and chemical treatment with an approved herbicide. This follows the methodology screened for the Department of Housing, Local Government and Heritage for the 'Adoption of Rhododendron clearance within Connemara National Park in accordance with Regulation 42A EC (Birds and Natural) Habitats Regulations 2011-2021'. The treatment has proven to be highly effective against Buddleja following management by INVAS on experimental sites. In summary, the base of each Buddleja tree will be cut as close to the ground as possible using a chainsaw. The chainsaw will be used to create notches and wells in the trunk of the tree) and a concentrated 5:1 solution of a glyphosate-based herbicide is immediately applied. The use of an inert dye mixed with the herbicide will ensure that no stumps are missed during treatment programmes. This type of treatment is effective all year-round but may be best carried out outside of the bird nesting season which runs from the 1st of March to the 31st of August.

Manual pulling of plants that are less than 20cm high is successful, once all of the roots are removed. It is important to knock the soil from the roots to minimise the possibility of re-rooting. Exposure of the root system to air and sunlight will result in dehydration and death of the plant.

Following the treatment of Buddleja large plants can be cut or pulled down, if access to machinery is available. It is possible to mechanically uproot mature Buddleja plants due to the relatively shallow nature of the root system. However, this is generally only appropriate for sites where access to machinery is possible and at sites of low ecological interest, where damage to existing native vegetation is not a concern. Where chemical control of cut stumps and rootstocks is not an option, stump extraction will be necessary. This will normally involve using machinery, where access is possible. Any cut material that has not been treated should be removed from the site and disposed of in a licenced landfill to avoid resprouting or suckering, which will produce new plants and potential infestations. Mulching is a good option for disposal and the mulch may be left on site, if no seeds are present.

Table 3.4: Proposed management schedule for Buddleja recorded on the Blackglen site in September 2024.

Year	Timing	Description of works	Treatment
Year 1	October/November	Mechanical and herbicide management	Cut-stump treatment and seedling removal
Year 2	February	Assessment of regrowth and retreatment as required	Cut-stump treatment and seedling removal
Year 2	October/November	Assessment of regrowth and retreatment as required	Cut-stump treatment and seedling removal
Year 3	February	Assessment of regrowth and retreatment as required	Cut-stump treatment and seedling removal
Year 3	TBC	Removal of Rhododendron trees	Mechanical removal of vegetation prior to construction works
Year 4	January/March	Survey and retreatment as necessary	Seedling removal Cut-stump treatment

3.3. Cherry laurel

Two infestations of Cherry laurel were recorded in the south of the site along the site boundary (Figures 2.3, Plate 2.3).

Table 3.5: Species description and legislation for Cherry laurel.

Distinguishing features	Cherry laurel (*Prunus laurocerasus*) is a fast-growing evergreen shrub that can grow to 15m tall and is tolerant of a wide range of habitat conditions and soil types. Its leaves are hairless, dark green and glossy above, with a paler underside. Leaves are arranged alternately on stems, ending with a single leaf. Flowering occurs in spring/summer with white flowers being produced on racemes (upright spikes). Seeds are produced in black berries.
Habitat	Cherry laurel is well adapted to the understory of forestry and woodlands. It thrives in areas of rocky banks and hillsides, gardens and riparian zones.
Ecology	It is a non-native species (originally South-West Asia) that has become widespread in forestry and estates throughout Ireland. Cherry laurel is hardy and is tolerant of drought and shade. It has become highly invasive in Ireland. It's rapid growth rate and the toxicity of its leaves give it a competitive advantage over native species. This aids in the creation of dense thickets that can cover large areas. These thickets can reduce access and make it difficult to implement control measures.
Impact	Because of the dense vegetation that the weed produces it can easily outcompete native species and becomes abundant. Cherry laurel has a significant adverse impact on native floral (and associated faunal) biodiversity. The leaves contain toxins (cyanide) that result in herbivore avoidance and suppresses regeneration of native understorey species
Dispersal	Spreads by suckers and seeds.
Legislation	Not yet contained in any legislative lists.

3.3.1. Management of Cherry laurel

The preferred management option for mature Cherry laurel at the Blackglen site is a combination of targeted mechanical cutting and chemical treatment with an approved herbicide. This follows the methodology screened for the Department of Housing, Local Government and Heritage for the 'Adoption of Rhododendron clearance within Connemara National Park in accordance with Regulation 42A EC (Birds and Natural) Habitats Regulations 2011-2021'. The treatment has proven to be highly effective against Cherry laurel following management by INVAS on experimental sites and a large scale project conducted by Coillte in the Devils Glen, Co. Wicklow. In summary, the base of each Cherry laurel tree will be cut as close to the ground as possible using a chainsaw. The chainsaw will be used to create notches and wells in the trunk of the tree) and a concentrated 5:1 solution of a glyphosate-based herbicide is immediately applied. The use of an inert dye mixed with the herbicide will ensure

that no stumps are missed during treatment programmes. This type of treatment is effective all year-round but may be best carried out outside of the bird nesting season which runs from the 1st of March to the 31st of August.

Manual pulling of plants that are less than 20cm high is successful, once all of the roots are removed. It is important to knock the soil from the roots to minimise the possibility of re-rooting. Exposure of the root system to air and sunlight will result in dehydration and death of the plant.

Following the treatment of Cherry laurel large plants can be cut or pulled down, if access to machinery is available. It is possible to mechanically uproot mature Cherry laurel plants due to the relatively shallow nature of the root system. However, this is generally only appropriate for sites where access to machinery is possible and at sites of low ecological interest, where damage to existing native vegetation is not a concern. Where chemical control of cut stumps and rootstocks is not an option, stump extraction will be necessary. This will normally involve using machinery, where access is possible. Any cut material that has not been treated should be removed from the site and disposed of in a licenced landfill to avoid resprouting or suckering, which will produce new plants and potential infestations. Mulching is a good option for disposal and the mulch may be left on site, if no seeds are present.

Table 3.6: Proposed management schedule for Cherry laurel recorded on the Blackglen site in September 2024.

Year	Timing	Description of works	Treatment
Year 1	October/November	Mechanical and herbicide management	Cut-stump treatment and seedling removal
Year 2	February	Assessment of regrowth and retreatment as required	Cut-stump treatment and seedling removal
Year 2	October/November	Assessment of regrowth and retreatment as required	Cut-stump treatment and seedling removal
Year 3	February	Assessment of regrowth and retreatment as required	Cut-stump treatment and seedling removal
Year 3	TBC	Removal of Rhododendron trees	Mechanical removal of vegetation prior to construction works
Year 4	January/March	Survey and retreatment as necessary	Seedling removal Cut-stump treatment

3.4. Old man's beard

Old man's beard was recorded as one large infestation in the north of the site, primarily growing on top of Buddleja (Figure 2.7, Plate 2.7).

Table 3.7: Species description and legislation for Old man's beard.

Distinguishing features	Old man's beard/Traveller's joy (*Clematis vitalba*) is a fast-growing vine with climbing woody stems that can extend its vertical or horizontal range by up to 10m in one season. The plant can live for up to 40 years and has woody stems that can grow to 20m long. This species is a deciduous, perennial plant and the leaves are pinnately compound (leaflets in opposite pairs with one terminal leaflet), consisting of usually 5 leaflets. Flowers are white and about 2cm in diameter. Seeds are produced in autumn and often remain on the vines late into winter. Individual plants can produce up to 100,000 seeds per season. Where the plant produces dense canopy vegetation, it can produce up to 17,000 viable seeds per $0.5m^2$. It rapidly forms dense vegetative canopies over host plants or structures, often totally obscuring them from view.
Habitat	Grows in hedgerows, roadsides, rail corridors, riverbanks and forest edges. Seedling growth is restricted in closed canopy woodlands.
Ecology	The growth form of the species is such that it uses its vines to climb over trees, shrubs, along fence lines and any other support structure that it can avail of. Old man's beard can self-pollinate or be pollinated by wind or insects. Plants in their third year of growth can produce viable seeds. Seeds can remain viable in the soil for up to 5 years and soil disturbance creates opportunities for germination from the soil seed reserve.
Impact	The blanketing growth of this species can smother and even collapse large trees, while the dense canopy it produces restricts light to plants beneath, thus effectively suppressing them. Old man's beard can impede wind passage through this dense blanketing vegetation and cause the collapse of manmade structures or already weakened trees. Old man's beard has a significant adverse impact on native floral (and associated faunal) biodiversity. Because of the large biomass of vegetation that the weed produces, it can readily impede access in infested locations to humans and animals. This reduced access can also make it difficult to implement control measures. Reputedly, sap from Old man's beard plants can cause blistering to human skin.
Dispersal	This species is primarily dispersed by seed through the action of wind (roads/rail corridors), water (rivers), human and animal interaction. Hanging vines will set root at any node that touches the ground and produce new plants. Old man's beard can spread by fragmentation, where cut or detached stems (with nodes) come into contact with the ground.
Legislation	Not yet contained in any legislative lists.

3.4.1. Management of Old man's beard

A combination of chemical and manual control methods can be highly successful in the management of Old man's beard. Seedlings should be manually removed once visible in May/June and disposed of by composting in a managed bunded area. Old man's beard that has been identified should be treated by the foliar application of a glyphosate-based herbicide. Spraying will be carried out at a rate of 5L/Ha using knapsacks fitted with low pressure drift beta nozzles. An inert dye (super signal blue) should be mixed with the spray solution to ensure all plants at the site are treated. Herbicide treatment should be carried out in June when foliage is present during the growth season and before flowering has begun, thus avoiding risk to local pollinators. Chemical application will be focused on the upper and lower foliage of Old man's beard to minimise the risk of drift to neighbouring plants. Extra care should be taken where infestations are located among or in close proximity to nontarget plant species. For mature plants that have engulfed native or sensitive vegetation, the vines should be cut back to ground level or waist height in winter or spring and the subsequent re-growth can be treated with foliar herbicide application as outlined above. This method will avoid impacting on the host plant the vine may be covering.

Following herbicide treatment, plant material should be manually removed in late July or when systemic herbicide application has effectively killed all foliage and stems have dried out. Plant material should be removed along with any further seedlings that have emerged and disposed of as outlined above. All Old man's beard stumps should be drilled and treated with a 5:1 dilution of a glyphosate-based herbicide. Stump treatment should only be required in year one but should be considered as a precautionary measure in year two.

Herbicide application should always follow the manufacturers guidelines and only be carried out by staff wearing suitable PPE and in possession of the relevant qualifications. Records of herbicide use must be kept in accordance with all relevant legislation and must be retained after each treatment. Suitable PPE including boots, durable gloves and full-length overalls should be worn by all staff involved in manual control works due to the potential toxicity of Old man's beard.

Table 3.8: Proposed management schedule for Old man's beard at the Blackglen site.

Year	Timing	Description of works	Treatment
Year 1	May/June	Seedling removal and foliar herbicide application	Manual removal and foliar herbicide application
Year 1	July	Manual removal of foliage and seedlings with stump treatment	Manual removal and cut-stump treatment
Year 2	May/June	Assessment of regrowth, seedling removal and foliar herbicide application	Manual removal and foliar herbicide application
Year 2	July	Manual removal of foliage and seedlings with stump treatment	Manual removal and cut-stump treatment
Year 3	May/June	Assessment of regrowth, seedling removal and foliar herbicide application	Manual removal and foliar herbicide application
Year 3	July	Manual removal of foliage and seedlings with stump treatment	Manual removal and cut-stump treatment
Year 4	January/March	Assessment of regrowth and retreatment as necessary	Seedling removal, foliar herbicide application and cut-stump treatment

3.5. Winter Heliotrope

Two infestations of Winter heliotrope were recorded on the Blackglen Road site. One infestation in the north of the site adjacent to the cleared site near Blackglen Road and one adjacent to the road on the south site boundary (Figure 2.9, Plate 2.9).

Table 3.9: Species description and legislation for Winter heliotrope.

Distinguishing features	Winter heliotrope (*Petasites pyrenaicus*) is a perennial, rhizomatous species that can form very dense and continuous stands. The rounded-kidney shaped leaves of this species can be present throughout the year and grow to 25cm in diameter, with large lobes where the leaf stalks attach. They have a conspicuous, regular toothed margin with dull downy hair beneath that rubs off easily. The rhizome network is extensive, but it is usually quite shallow (to 30cm deep). Winter heliotrope flowers produce an inflorescence up to 15mm across in short, loose, cone-like racemes. Individual florets are pink/lilac and tubular with sweet vanilla-scented flowers. Flowering stems are erect, D-shaped (don't roll freely between fingers), pinkish and covered with scale-like bracts.
Habitat	Riparian species on fertile soil adjacent to rivers and canals, but also in disturbed terrestrial habitats such as ditches, roadsides, railway embankments and waste places.
Ecology	Non-native species (native to Mediterranean region) and widespread in Ireland. It is one of few plants that actively grow throughout winter,

	flowering from November to February. This species readily forms monocultures in suitable habitats. Winter heliotrope may be confused with native Butterbur (*Petasites hybridus*) and Coltsfoot (*Tussilago farfara*). To date, only male plants have been recorded in Ireland. This plant is favoured by beekeepers as it provides a rare source of nectar during the winter months. Is becoming particularly prevalent along river and canal banks in Ireland.
Impact	Because of the dense vegetation that the species produces it can easily outcompete native species and become locally dominant.
Dispersal	It is dispersed by rhizome expansion and fragments. Rhizomes are often transported accidentally during ground works *via* machinery, equipment and soil movement.
Legislation	Not yet contained in any legislative lists.

3.5.1. Management of Winter heliotrope

A combination of chemical and manual control methods can be highly successful in the management of Winter heliotrope. The foliar application of a Glyphosate based herbicide is most effective in spring, however, this species is very difficult to control using herbicides because of the extensive and perennating rhizome network (Lucey et. al. 2021). If it is possible to excavate all plant material to a depth > 30cm, it may be possible to locally eradicate the plant. Excavated Winter heliotrope material (rhizomes or stems) must be carefully disposed of off-site or retained on-site on top of root barrier membrane or for local deep buried. Rhizomes that remain in the soil will re-sprout rapidly. If excavation is to be conducted, it is recommended to treat the vegetation with herbicide approximately three weeks before the works are conducted. It is important to monitor the treated areas annually and to schedule further treatment, as necessary.

Herbicide application should always follow the manufacturers guidelines and only be carried out by staff/volunteers wearing suitable PPE and in possession of the relevant qualifications. Records of herbicide use must be kept in accordance with all relevant legislation and must be retained after each treatment.

Table 3.10: Proposed management schedule for Winter heliotrope at the Blackglen site.

Year	Timing	Description of works	Treatment
Year 1	February/March	Foliar herbicide application	Foliar herbicide application
Year 1	Three weeks post herbicide application	Excavation of infested soils for disposal	Excavation and disposal
Year 2	February/March	Assessment of regrowth and foliar herbicide application, if required	Foliar herbicide application
Year 2	Three weeks post herbicide application	Excavation of infested soils for disposal, if required	Excavation and disposal
Year 3	February/March	Assessment of regrowth and foliar herbicide application, if required	Foliar herbicide application
Year 3	Three weeks post herbicide application	Excavation of infested soils for disposal, if required	Excavation and disposal
Year 4	February/March	Assessment of regrowth	N/A

3.6. Other species

Cotoneaster was recorded at three locations on the Blackglen Road site. Two infestations were recorded in the south of the site along the site boundary and one in the northwest of the site (Figure 2.4, Plate 2.4). Himalayan honeysuckle was recorded as one infestation in the northeast of the site near the site boundary (Figure 2.5, Plate 2.5). These species are not contained on any legislative lists but can crowd out native plants through rapid and dense growth and can be difficult to control once established. Both species may be managed as part of general site clearance works through flailing or extraction of vegetative material for disposal.

An infestation of Lesser knotweed was recorded off site, across the stream on the southeastern site boundary (Figure 2.6, Plate 2.6). This species may be managed through the excavation of infested soil. This species was not recorded on the Blackglen Road site. This species can become locally dominant and outcompete native plant species but is not yet contained on any legislative lists.

Sycamore was primarily recorded as mature trees along the site boundaries in the south and east of the site (Figure 2.8, Plate 2.8). This species is not contained on any legislative lists yet but can become locally dominant and outcompete native plant species. This species can reproduce vigorously by seed and is also capable of causing structural damage *via*. root extension. This species may be managed as part of general site clearance works through flailing or extraction of vegetative material for disposal.

4. BIOSECURITY

For the purposes of this document, biosecurity refers to all practical measures used to manage and prevent the introduction and spread of IAS.

A number of high impact aquatic and riparian invasive alien plant species (IAPS) are currently present in Ireland, and most are continuing to spread aggressively. Prominent among the terrestrial IAPS are: Japanese knotweed (*Reynoutria japonica*), Giant knotweed (*Reynoutria sachalinensis*), Bohemian knotweed (*Reynoutria x bohemica*), Giant hogweed (*Heracleum mantegazzianum*) and Himalayan balsam (*Impatiens glandulifera*). The above species are listed in the Third Schedule (Part 1) of the Habitats Directive (S.I. 477/2011) and some are included among the list of 88 EU IAS of Union Concern (http://ec.europa.eu/environment/nature/pdf/IAS_brochure_species.pd) in the EU Invasive Alien Species Regulations (1143/2014).

The ecological effects of IAPS are often irreversible and, once established, they are extremely difficult and costly to control and eradicate. Hence, the urgent need to prevent their introduction and spread. Prevention is clearly more cost-effective and less environmentally damaging than long-term containment, control or eradication. The most effective measure to reduce introductions and halt spread of IAS in aquatic situations is to promote and implement good biosecurity practice.

4.1. Biosecurity Standard Operating Procedure for Personnel and Equipment

This Biosecurity SOP applies to all equipment (hand tools and PPE) that are used during operations to control IAPS. The purpose of this SOP is to provide standardised practical methods for cleaning and disinfecting all equipment that comes into contact with IAPS while carrying out control works. This Biosecurity SOP will enhance existing biosecurity activity employed by the Council and will deliver an improved biosecurity system that will help limit the introduction and spread of IAPS during ongoing control operations.

All staff, be they Council or contract, that are involved in the control of IAPS should have access to cleaning and disinfection facilities that include, but is not limited to:

- detailed guide to proper cleaning and disinfection procedure, and instructions for making the correct disinfection concentration;
- clean water and Virkon Aquatic tablets or powder for the disinfection of equipment and PPE;

- hard-bristle brush;
- disposable non-latex gloves for equipment and PPE; and
- plastic bags and cable ties (for disposing of IAPS material removed from equipment).

[* Disinfectants must be used with care and in strict accordance with the manufacturer's instructions. Disposable gloves should be worn when using the disinfectant solution.]

Before commencing operations, a 1% Virkon Aquatic disinfection solution (10g Virkon Aquatic powder or 1 tablet in 1 litre of clean water) should be prepared for personnel working in infested areas. The disinfectant solution will remain pink in colour while it is still active. Additional clean water should be readily available for washing and for making up further disinfection solutions.

Best biosecurity practice will be achieved by ensuring that the following guidelines are adhered to when planning IAPS operations:

- Where possible, schedule operations so that uncontaminated sites can be accessed before sites that are known or suspected to support IAPS.
- Clean and disinfect all equipment prior to the commencement of operations.
- Clean and disinfect all equipment when moving between sites.
- Report suspected IAPS to personnel responsible for the control operations, accompanied by the location (GPS coordinates) and good quality photographs.

It is important that all PPE and equipment used are cleaned and disinfected according to the procedures below. These biosecurity measures should be conducted before leaving each site.

- Put on disposable gloves before cleaning and disinfecting the equipment.
- Visually inspect all equipment that has come into contact with water for evidence of attached IAPS material, or adherent mud or debris. Remove any such material before cleaning and disinfecting the equipment and leaving the site.
- Dispose of any IAPS material taken from the equipment using the plastic bags provided.
- Spray equipment with the disinfection solution to the point of run-off. Do not rinse in clean water for at least 15 minutes.

- Use the hard-bristle brush to remove all mud and debris from boots and equipment. Then spray with the prepared disinfectant solution onto the cleaned surfaces to the point of run-off. During inspection and cleaning, pay particular attention to places where IAPS could be accidentally trapped, such as the treads of boots and attachment points on equipment.
- Visually inspect all PPE that has been in contact with vector material and remove any attached IAPS material, or adherent mud or debris. Wipe down this PPE with an absorbent cloth soaked in the prepared disinfectant solution.
- Where time permits and it is practical, it is good biosecurity practice to air dry equipment following cleaning and disinfection.
- Remove disposable gloves and dispose of safely.

Appendices

Appendix 1: Survey details for the Blackglen Road site in September 2024.

Contactor name	INVAS Biosecurity Ltd.
Surveyor name	William Earle
Survey date/time	September 2024
County	Dublin
Area	Blackglen Road
Site ID	SUR_BlackglenRoad_Enviroguide
Risk assessment (Potential hazards)	Slips/trips/falls particularly in dense undergrowth, working in isolation, river, wildlife, public
Health and safety (PPE required)	Hi viz, Safety boots
Regulated species recorded	RHO, SIK
GPS details	Throughout survey area
Area located	Throughout survey area
Site details	Overgrown site adjacent to Blackglen Road
Pervious treatment/Interference	General maintenance of roadside boundaries and adjacent private property. Temporary use of north for road construction project
Infestation beyond fence line	Yes, several species crossing boundaries to private property.
Notes	No
Photos	Throughout survey area
Is the site within or proximate to an ecologically sensitive area (SAC/SPA)	The Wicklow Mountains SAC (IE0002122) and Wicklow Mountains SPA (IE0004040) 5km. Fitzsimons Wood pNHA (001753) 100m.
Other invasive species observed	BUD, CLE, PHE, WHO, CHL, COT, SYC, LKO

Appendix 2: Schedule of activities for the Blackglen Road site.

Schedule of Activities			
Site ID	SUR_BlackglenRoad_Enviroguide		
Project details	IAPS Management		
Biosecurity supervisor			
Date	September 2024		
	Phase	Date	Additional comments
Site survey and development of Management Plan	1	September 2024	Site survey complete September 2024
Establish and implement biosecurity protocol	2		
Toolbox talks to appropriate staff	3		
Implementation of Management Plan	4		
Decontamination of vehicles and equipment	5		
Sign off	6		



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