Preliminary Construction Environmental Management Plan

Gas Turbine Power Generation Station Phase 2, Kilshane, Co. Dublin

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Comments

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1. Introduction

Waterman Moylan in conjunction with the Project Design Team have prepared the following Preliminary Construction Environmental Management Plan, which is to accompany the design pack, for the implementation of the construction of Phase 2 of a proposed gas turbine power generation station in lands at Kilshane, Dublin 11.

This report outlines details, some of which are included in the reports of the wider project design team including the Project Ecologist, Project Archaeologist; and Project Arborist. This report should be read in conjunction with their work and should not be construed as a full amalgamation of other specialists' reports. Similarly, mitigation measures noted throughout this report should be referred to the specialists' report as appropriate for thoroughness.

This document sets out the typical and site/project specific arrangements and measures that are required to be implemented during the construction stage of the project for environmental protection. The measures recorded in this report will be fully incorporated by the Contractor, whom will be required to develop and implement the Construction Environmental Management Plan on site.

This management plan should not be construed as representing the exact method or sequence in which the construction works shall be carried out.

In advance of work starting on site, the works Contractor will prepare a detailed Construction Environmental Management Plan (CEMP). The detailed CEMP will set out the overarching vision of how the construction of the proposed development will be managed in a safe and organised manner by the Contractor. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works, and all planned works by the Contractor will be in compliance with the CEMP. It will set out requirements and standards which must be met during the construction stage and will include the relevant methods and mitigation measures outlined in this report, the reports of other specialists, and any subsequent planning conditions relevant to the proposed development.

As a minimum, the CEMP will be formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- CIRIA 697, The SUDS Manual, 2007; and
- UK pollution Prevention Guidelines (PPG) UK Environment Agency, 2004

This CEMP is submitted to outline the mitigation measures and construction methodologies which will be implemented during the construction period. The CEMP is, of course, a live document and will be updated by the Main Contractor, once appointed, prior to and during the course of construction to take account of

any conditions imposed as part of the consent received as well as conditions on-site as the construction progresses.

The Main Contractor will also prepare the project's Environmental Emergency Response Procedures (or incorporate this as part of the Construction Environmental Management Plan or Construction Management Plan). While this is a separate document to the Construction Environmental Management Plan, there is a considerable subject overlap between the documents.

2. Surrounding Environs and the Proposed Site

The site is located at Kilshane, Dublin 11, just west of the N2 Primary Road as shown in ***Figure 1***, approximately 300m west of the R135 and is located approx. 2 km north-west of the M50. The site is under ownership of the project client and mainly comprises of agricultural fields (mostly tillage). It totals c. 5.22 ha in area, as indicated in ***Figure 1*** below.

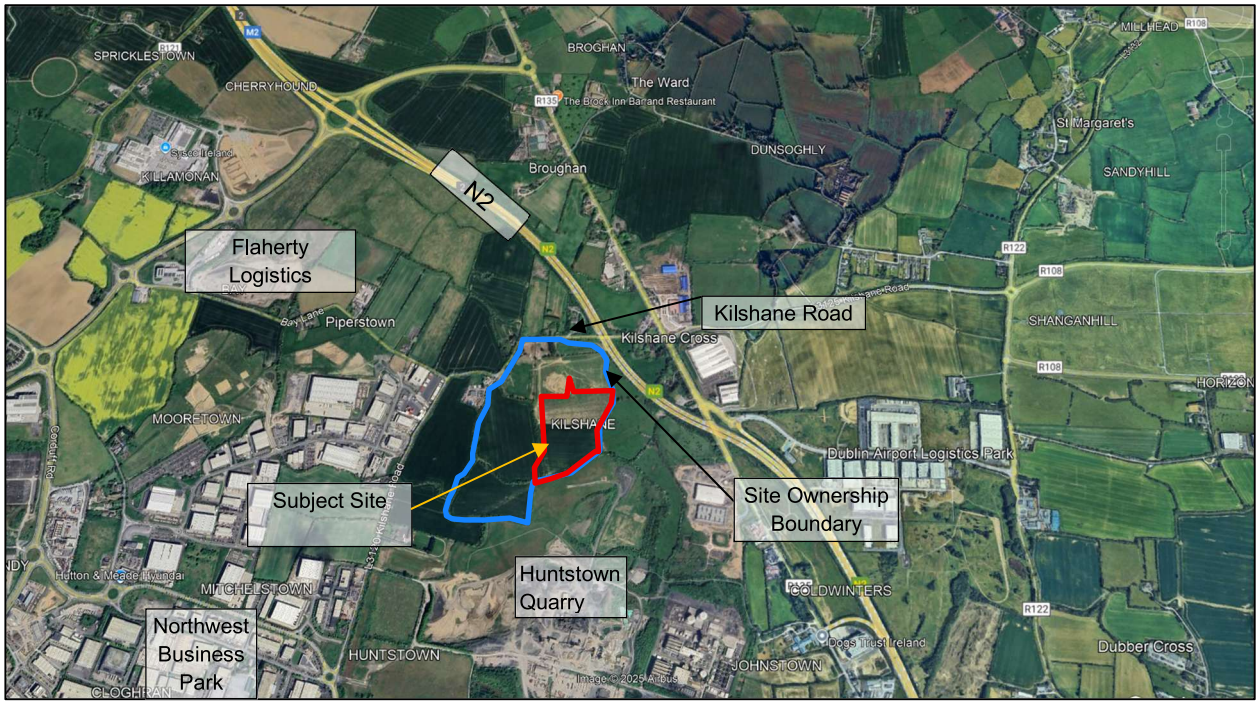

Figure 1 | *Site Location*

The subject lands are bound to the north and northwest by the Kilshane Road, to the west and southwest by an industrial site (Flaherty Logistics), and agricultural lands, to the south and southeast by Huntstown Quarry, and again to the east by agricultural lands.

A topographic survey of the area indicated that the site generally slopes from west to east with a high point of 80.75m OD Malin on the western boundary, and a low of 77.54m OD Malin on the eastern boundary.

The topographic survey and OS details also indicate that the boundary hedgerows separating the fields comprising the site contain local ditches which convey surface water flows from rainfall in a north-easterly direction. These ditches serve only the subject site and the adjacent agricultural lands to the west, between the site boundary and the Kilshane Road.

These local ditches merge to a ditch to the east of the site. This ditch becomes the Huntstown Stream as more ditches join, and generally flows in a north-easterly direction to join the River Ward at St. Margaret's Golf and Country Club. The River Ward is a tributary of the Broadmeadow River, which in turn outfalls to the Irish Sea at the Malahide Estuary. The Malahide Estuary is a Special Protection Area (SPA), a candidate Special Area of Conservation (cSAC), a proposed National heritage Area (pNHA) and a RAMSAR site.

2.1 Proposed Subject Development

Planning permission is being sought by Kilshane Energy Ltd. for the construction of a Gas Turbine Power Generation Station with an output of up to 680 Megawatts at this site address: Kilshane Road, Kilshane, Finglas, Dublin 11. The proposed development will consist of the following;

- 2 additional gas turbines producing 340MW each
- 400kV GIS building and associated compound
- Increasing diesel storage from 5000t to 15000t
- Extension to administration building
- Access roads
- Electrical substation

3. General Site Set Up and Pre-Commencement Measures

The following measures will be carried out by the Main Contractor:

- A general condition survey of the roads and infrastructure in the area prior to any work being carried out on the site.
- A site compound including offices and welfare facilities will be set up by the Main Contractor.
- Prior to any site works commencing, the Main Contractor will investigate/identify the exact location of and tag all existing services and utilities around and through the site with the assistance of the relevant FCC technical divisions and utility companies.
- The operational hours for the site shall be 08:00 to 17:00 Mondays to Fridays and 08:00 to 14:00 Saturdays. No work is permitted on Sundays or public holidays. Deviation from these hours will only be allowed in exceptional circumstance with prior written approval from the planning authority.
- Hoarding lines and site security will be set up within the development site as required, including around the perimeter of the construction zone and at access to the public road network.
- Fencing will be set up in order to keep construction activity separated from the existing bodies of water.

Access gates will be provided at all site and compound access points. The construction access will be from the site entrance located on Kilshane Road via a c.182m temporary construction access road (7m wide) from the permitted Phase 1 development, as illustrated in ***Figure 2*** overleaf. A detailed traffic management plan will be prepared and implemented by the Main Contractor and agreed with the Local Authority prior to commencing works.

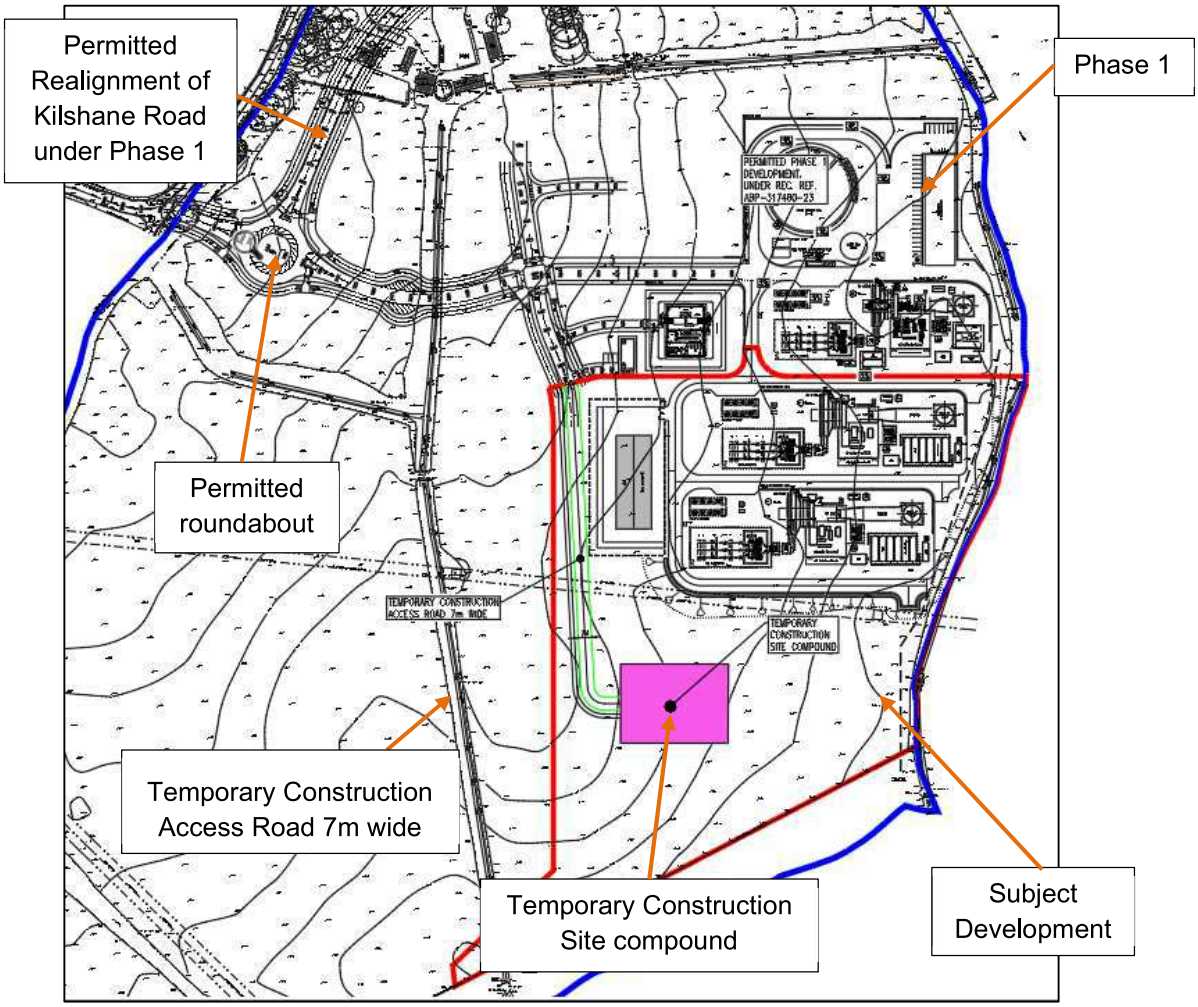

Figure 2 | *Temporary Construction Access Road*

4. Site Security and Hoarding Lines

Hoarding lines and site security will be set up within the development site as required.

A detailed traffic management plan will be prepared by the Contractor and agreed with the Roads Authority prior to commencing works on the public road.

Access gates will be operated by a flagman who will divert incoming/outgoing vehicles/pedestrians and general traffic as necessary.

It is envisaged that CCTV will be operational on-site for the duration of the construction programme. The CCTV cameras will cover all main entry points to site and the site compound including material storage and plant parking areas. It may be required to extend the scope of this coverage should there be incidents of vandalism, theft, or attempted entry to site by unauthorised persons.

Further security measures may also be provided if required by the introduction of permanent, temporary, or intermittent static or roving security personnel patrols.

5. Construction Exclusion Zones

An Uisce Eireann distribution main has been identified traversing the southern portion of the site as per *Figure 3* below. Excavation will be undertaken for drainage works near to the watermain in the south west of the site, where hand digging will be implemented within 0.5 meters.

Figure 3 | *Uisce Eireann Distribution Main*

1 no. set of ESB transmission lines have been identified traversing the site, to the south of most of the work. However, a portion of the paved surface and some length of road will be constructed under the cables, as well as drainage works. The main contractor (or the appointed electrical engineering consultant as appropriate) will liaise with ESB networks to identify the works required in rerouting or undergrounding any

networks that may be impacted by the construction of the development. Alternatively, if these overhead networks are permitted to remain in place, the main contractor shall agree with ESB networks the location of any temporary crossing points (and other similar works which may impact the transmission networks), and further agree the extent of the safety requirements to be implemented on site, and the implementation of the agreed items during the course of construction works.

Further exclusion zones have been identified by the project arborist, and details are discussed in full in the arborist's reports.

6. Construction Waste Management

The main sources of construction waste arising from this project will be:

- Topsoil and subsoil
- Packaging and general waste from construction activities
- General site clearance waste including tree stumps, etc.

6.1 Policy and Legislation

The principles and objectives to deliver sustainable waste management for this project have been incorporated in the preparation of this report and are based on the following strategic objectives:-

- National Policy: The Waste Management Acts 1996 to 2005.
- Local Policy: Waste Management Plan for the Dublin Region 2005 – 2010, November 2005.

This Waste Management Plan is also in accordance with the following guidelines published by the Environmental Protection Agency in 2021:-

- Best Practice Guidelines the Preparation of Resource & Waste Management Plans for Construction and Demolition (C&D) Projects.

The hierarchy of waste management sets out the guiding principles in order of importance as follows:-

1. Reduction of the amount of waste generated by the construction process.
2. Segregation of waste is a key concept that will be implemented during the course of the construction phase of the development to enable ease of re-use and recycling, wherever appropriate.
3. Recycle waste material where feasible, including the use of excess excavations as fill material, recycling of various waste fractions such as; metals, packaging etc.

6.2 On site Waste Management

An estimate of the quantities of surplus construction and demolition (C&D) waste and materials which will arise during the course of the construction phase shall be created by the main contractor.

The Purchasing Manager shall ensure that materials are ordered so that the quantity delivered, the timing of the delivery and the storage is not conducive to the creation of unnecessary waste.

6.3 Off Site Waste Management Licensing/Permitting

All waste materials (where necessary, after in-situ reuse and recycling options have been fully considered) shall be disposed of off-site, under the appropriate Duty of Care and subject to approvals/consents from the relevant statutory bodies. It is the responsibility of the Main Contractor to ensure that any company to whom waste is transferred is legally permitted to do so and that the facility they bring the waste to is licensed to handle that type of waste as outlined in the Waste Management Acts 1996-2005. The Waste Collection Permit Register, in accordance with the Waste Management (Collection Permit) Regulations 2001 will be consulted to ensure that waste carriers hold the appropriate permit.

It is anticipated that there is the possibility that waste materials will have to be moved off-site. It is the intention to engage specialist waste service contractors, who will possess the requisite authorisations, for the collection and movement of waste off-site, and to transport the material to a facility which currently holds a Waste Licence, Waste Permit, or Certificate of Registration. Details of waste service contractors and demolitions are not confirmed at the time of writing. The following waste authorisations will be arranged specifically for the project:

Authorisation Type	**Specific Need for Project** (Yes / No?)
Waste Licence	Yes
Waste Permit	Yes
Waste Collection Permit	Yes
Transfrontier Shipment Notification	Not expected
Movement of Hazardous Waste Form	Not expected

Table 1 | *Specific Waste Authorisation Necessary for the Scheme*

Any wastes that have to be disposed/recycled off site will be transported to the nearest appropriate facility in order to comply with the proximity principle and reduce the associated emissions from the transportation of waste. The Environmental Protection Agency holds details of waste facilities, which will be consulted where necessary.

An inspection of the site shall be made by the Main Contractor for hazardous substances, gas cylinders and the like. If such substances are encountered during the course of construction, then works must be halted. The project supervisor for construction stage (PSCS) and the responsible Statutory Authority shall be informed immediately.

The Contractor shall prepare a detailed inventory of construction based hazardous waste generated, such as tars, adhesives, sealants, and other dangerous substances, and these will be kept segregated from other non-hazardous waste to prevent possible contamination. Arrangements shall be made for such substances for disposal in a safe manner to an authorized disposal site or by means acceptable to the relevant Authority.

Certificates and licenses of waste hauliers and recycling/ disposal facilities shall be held by the main contractor for inspection as part of the contractor's own construction waste management plan

The Contractor shall ensure that the excavation works are carried out in accordance with best standard practice and excavation materials are well segregated to minimize any potential cross-contamination.

As noted previously, further details on this topic are included in the Resource and Waste Management Plan produced by AWN consulting.

It has been calculated that the site preparation works will include the stripping of c.10,200m³ of topsoil and the further excavation of c.63,856m³ of subsoils. All excavated materials will be stored on site in the Spoil heap/stockpile area of the construction compound as per the Proposed Construction Compound Layout Plan. The Landscaping Plan has been optimised to ensure that all cut materials will be incorporated to the

site as part of the final reinstatement and regrading works. Please refer to the Landscape Architects reports and drawings in this regard.

In the unlikely event that there is a surplus of soil, or the importation of soils is required, and these soils are suitable for reuse on other projects or importation, transportation of subsoil between sites is subject to an article 27 notification to the EPA, and the environmental requirements of this application procedure.

If the surplus soil/topsoil is to be disposed of, the Contractor shall carry out appropriate environmental chemistry testing in order to determine the waste classification of the soils that are to be excavated and that shall include Waste Acceptance Criteria testing. Should the surplus soil not be suitable for reuse and transfer, the test regime shall be agreed with the receiving landfill operator and the testing shall be carried out by an accredited laboratory.

Should excavation materials be assessed to be hazardous, the Contractor shall carry out pre-treatment of the waste soils to a methodology that is agreed with the receiving landfill operator and in accordance with Environmental Protection Agency guidance.

The Main Contractor is encouraged to reuse and recycle any waste materials as far as is reasonably practicable.

Topsoil generated will be used for landscaping purposes and should be handled as discussed in section 6.6.

The Main Contractor shall manage and carry out the works in accordance with best environmental practice and in accordance with the requirements of Local Authority, EPA and all requirements as specified in this document.

6.4 Appointment of C&D Waste Manager

A C&D Waste Manager shall be appointed from the Contractor's Staff and have overall responsibility for the implementation of the project Waste Management Plan (WMP) during the construction phase. The C&D Waste Manager will be appropriately trained and assigned the authority to instruct all site personnel to comply with the specific provisions of the WMP. At the operational level, a designated person from the main contractor and from each sub-contractor on the site shall be assigned the direct responsibility to ensure that the operations stated in the WMP are performed on an on-going basis.

Copies of the WMP will be made available to all relevant personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the WMP and informed of the responsibilities which fall upon them as a consequence of its provisions. Where source segregation, selective demolition and material reuse techniques apply, each member of staff will be given instructions on how to comply with the WMP. Posters will be designed to reinforce the key messages within the WMP and will be displayed prominently for the benefit of site staff.

6.5 C&D Record Keeping

Details of all arisings, movement and treatment of C&D waste shall be recorded as part of the Waste Auditing regime.

It is the duty of the C&D Waste Manager to ensure that necessary licenses have been obtained as needed. Each consignment of C&D waste taken from the site will be subject to documentation which will conform

with *Table 2* along with Transportation Dockets to ensure full traceability of the material to its final destination.

Detail	Particulars
Project of Origin	Kilshane, Dublin 11.
Material being Transported	Soil, Construction waste
Quantity of Material	TBC by Contractor prior to starting works
Date of Material Movement	TBC by Contractor prior to starting works
Name of Carrier	TBC by Contractor prior to starting works
Destination of Material	TBC by Contractor prior to starting works
Proposed Use	TBC by Contractor prior to starting works

***Table 2** | Details of Materials Taken from Site*

6.6 Topsoil

In the case of topsoil careful planning and on-site storage can ensure that this resource is reused on-site as much as possible. Any surplus of soil not reused on site can be sold. However, topsoil is quite sensitive and can be rendered useless if not stored and cared for properly.

- It is important that topsoil is kept completely separate from all other construction waste as any cross-contamination of the topsoil can render it useless for reuse.
- It is important to ensure that topsoil is protected from all kinds of vehicle damage and kept away from site-track, delivery vehicle turning areas and site plant and vehicle storage areas.

If topsoil is stored in piles of greater than two metres in height the soil matrix (internal structure) can be damaged beyond repair. It should also be kept as dry as possible and used as soon as possible to reduce any deterioration through lengthy storage and excess moving around the site.

Records of topsoil storage, movements and transfer from site should be kept by the C&D Waste Manager.

6.7 Earthworks (Subsoil) – Cut and Fill Policy

In general earthworks for basement and structure foundation forms a major part of the quantity of waste that will be generated by the construction phase of this project. Levels on site have been designed to minimise the impact of excavations. As such, it is expected that all generated subsoil will be reused on-site for the purposes of landscaping.

In order to optimise the impact of the generation of excavated material the following principles have been considered during the detail design and construction phase:-

- The quantity of excavated materials to be removed from or imported to the site has been greatly reduced, by establishing levels of the proposed buildings which optimise the volume of cut and fill where possible.
- Surplus subsoil excavated from the site will be reviewed for possible reuse as engineering fill.
- Surplus unsuitable sub-soils generated by excavations on site will be reviewed for reuse as landscaping or non-engineering fills on site.

- Careful separation of builder's rubble, packaging, and contaminated waste from re-usable material will result in the minimisation of the disposal of material to landfill.

The site investigation report undertaken by Site Investigations Ltd. is included as Appendix A.

7. Deliveries

It is intended that deliveries to the construction site will typically be made to one main site access, which is expected to be the main entrance via the eastern arm of the proposed roundabout as part of the Kilshane Road realignment works.

Materials should be ordered and delivered to site on an “as needed” basis in order to prevent over supply to site. Deliveries will be managed upon arrival to the site and systems should be provided in order to avoid any queuing of delivery vehicles, for example: in the event that large concrete pours are required, which may result in congestion at the entrance to the site, the deliveries will be organised such that concrete trucks will queue at a pre-determined staging point (such that they do not cause an obstruction to general traffic in the area) and will then be called in by radio as appropriate to the site. A number of the construction traffic movements will be undertaken by heavy goods vehicles, though there will also be vehicle movements associated with the appointed contractors and their staff.

The specifics of the day-to-day traffic movements associated with the construction and operational stages are discussed in detail in the Traffic and Transport Assessment, submitted under a separate cover.

It is noted that due to the nature of the proposed industrial development, that the transportation of large, specialised, pre-fabricated and indivisible mechanical component of the plant (Gas Turbine) will be required. This oversized load will be subject to planning, surveys, permitting and permissions etc. A specialised transport contractor will be commissioned at the appropriate time to undertake the transfer of this load. The load is likely to be shipped to Dublin Port as part of an intermodal journey. The transport contractor will need to liaise with Dublin City Council, Fingal County Council, and An Garda Síochána, to determine the optimal transport route and obtain all required licences and agreements. Preliminarily, the vehicle details for undertaking this delivery are indicated in *Figure 4*, below.

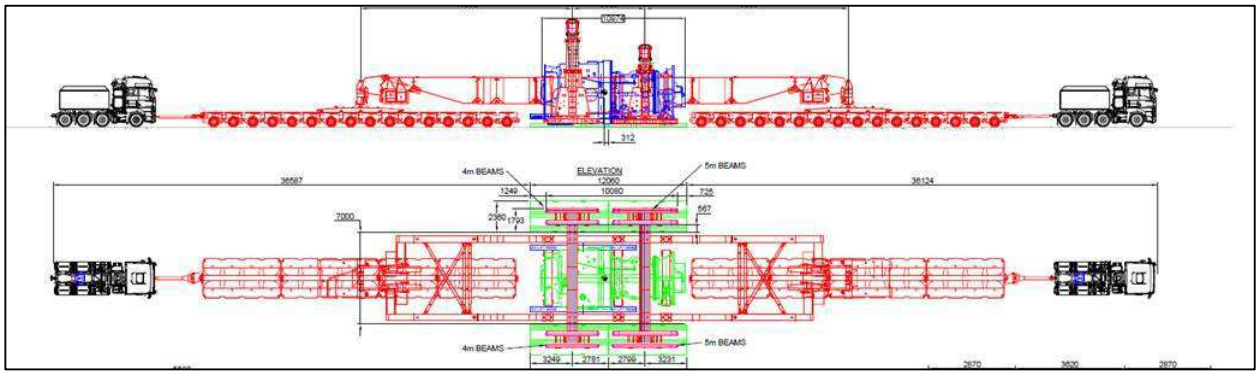

Figure 4 | *Preliminary Dimensions of Oversized Load Delivery Vehicle*

The general construction workforce, which equates to 250 employees and with an allowance for shared journeys could equate to a maximum of around 100 arrivals and departures per day by private vehicle.

This number of construction vehicle movements is high compared to the number of trips expected to be generated by the proposed development during the operational phase however, this is typical for industrial developments. It should further be noted that the majority of such vehicle movements would be undertaken outside of the traditional peak hours. Construction traffic volumes are discussed in detail in the traffic and Transport Assessment, submitted under a separate cover.

Care will be taken to ensure existing pedestrian routes are suitably maintained as necessary during the construction period, and temporary car parking is provided within the site for contractor's vehicles.

It is proposed that a Construction Management Plan (CMP) would be prepared by the appointed contractor in order to minimise the potential impact of the construction phase of the proposed development on the safety and amenity of other users of the public road. The CMP will consider the following aspects:

- Minimise the volume of material removed from site by optimising the cut to fill requirements within the site;
- Segregation of waste material produced during the construction process to minimise the contamination or reusable fill material resulting from excavation on the site;
- Wheel wash to be provided for vehicles leaving the site when earthworks are being carried out during winter periods;
- Ensure that deliveries to the site and removal of spoil material from this site are restricted to off peak periods where possible and practicable.
- Optimise routes to be used by heavy vehicles and detail construction traffic forecast;
- Determine the working hours of the site;
- Facilities for loading and unloading and;
- Facilities to parking cars and other vehicles.

Set procedures and designated wash-out areas will be provided, or alternatively vehicle wash-out will be prohibited if a suitable wash-out area is not identified.

All delivery vehicles will be co-ordinated by the flagman on duty at the relevant access gate.

Refer to the Preliminary Construction Traffic Management Plan which accompanies this submission under separate cover.

8. Parking and Storage

There is adequate space to accommodate on-site parking during the construction programme.

The main contractor will be required to schedule delivery of materials strictly on a daily basis. If necessary, the main contractor will be required to provide a secure materials staging compound remote from the site, in which to temporarily store materials from suppliers, until such time as these can be accommodated on site. This is not envisaged due to the availability of space on site.

9. Dust and Dirt Control

Nuisance dust emissions from construction activities are a common and well recognised problem. Fine particles from these sources are recognised as a potential significant cause of pollution.

The main contractor will be required to demonstrate that both nuisance dust and fine particle emissions from the site is adequately controlled and are within acceptable limits.

Dust and fine particle generation from construction and demolition activities on the site can be substantially reduced through carefully selected mitigation techniques and effective management. Once particles are airborne it is very difficult to prevent them from dispersing into the surrounding area. The most effective technique is to control dust at source and prevent it from becoming air borne, since suppression is virtually impossible once it has become air borne.

The following are techniques and methods which are widely used currently throughout the construction industry, and which may be used in the development.

1. The roads around the site are all surfaced, and no dust is anticipated arising from unsealed surfaces.
2. A regime of 'wet' road sweeping can be set up to ensure the roads around the immediate site are as clean and free from dirt / dust arising from the site, as is reasonably practicable. This cleaning will be carried out by approved mechanical sweepers.
3. Footpaths immediately around the site can be cleaned by hand regularly, with damping, as necessary.
4. High level walkways and surfaces such as scaffolding can be cleaned regularly using safe 'wet' methods, as opposed to dry methods.
5. Vehicle waiting areas or hard standings can be regularly inspected and kept clean by brushing or vacuum sweeping and will be regularly sprayed to keep moist, if necessary.
6. Vehicle and wheel washing facilities can be provided at site exit(s) where practicable. If necessary, vehicles can be washed down before exiting the site.
7. Netting can be provided to enclose scaffolding in order to mitigate escape of air borne dust from the existing and new buildings.
8. Vehicles and equipment shall not emit black smoke from exhaust system, except during ignition at start up.
9. Engines and exhaust systems should be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
10. Servicing of vehicles and plant should be carried out regularly, rather than just following breakdowns.
11. Internal combustion plant should not be left running unnecessarily.
12. Exhaust direction and heights should be such as not to disturb dust on the ground and to ensure adequate local dispersal of emissions.
13. Where possible fixed plant such as generators should be located away from residential areas.

14. The number of handling operations for materials will be kept to a minimum in order to ensure that dusty material is not moved or handled unnecessarily.
15. The transport of dusty materials and aggregates should be carried out using covered / sheeted lorries.
16. Material handling areas should be clean, tidy, and free from dust.
17. Vehicle loading should be dampened down and drop heights for material to be kept to a minimum.
18. Drop heights for chutes / skips should be kept to a minimum.
19. Dust dispersal over the site boundary should be minimised using static sprinklers or other watering methods, as necessary.
20. Stockpiles of materials should be kept to a minimum and if necessary, they should be kept away from sensitive receptors such as residential areas etc.
21. Stockpiles where necessary, should be sheeted or watered down.
22. Methods and equipment should be in place for immediate clean-up of spillages of dusty material.
23. No burning of materials will be permitted on site.
24. Earthworks excavations should be kept damp where necessary and where reasonably practicable.
25. Cutting on site should be avoided where possible by using pre-fabrication methods.
26. Equipment and techniques for cutting / grinding / drilling / sawing / sanding etc, which minimise dust emissions and which have the best available dust suppression measures, should be employed.
27. Where scabbling is to be employed, tools should be fitted with dust bags, residual dust should be vacuumed up rather than swept away, and areas to be scabbled should be screened off.
28. Wet processes should be used to clean building facades if possible. If dry grit blasting is unavoidable, then ensure areas of work are sealed off and dust extraction systems used.
29. Where possible pre-mixed plasters and masonry compounds should be used to minimise dust arising from on-site mixing.
30. Prior to commencement, the main contractor should identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions. Furthermore, the main contractor should prepare environmental risk assessments for all dust generating processes, which are envisaged.
31. The main contractor should allocate suitably qualified personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.
32. Speed limits will be imposed on unsurfaced haul roads by the main contractor as part of the production and implementation of the Construction Traffic Management Plan.

10. Ground Water

The excavations for the drainage pipes, water supply, utilities and foundations have been designed to be as shallow as possible in order to reduce excavation depths. Careful attention will be required to maintain the excavations clear of ground water.

A discharge licence will be required for all water pumped from the excavations to any public water course or sewer.

All water pumped from the excavations will require to be treated for silt and deleterious matter. During any discharge of surface water from the excavations, the quality of the water will be regularly monitored visually for hydrocarbon sheen and suspended solids. Periodic laboratory testing of discharge water samples will be carried out in accordance with the requirements of the discharge licence obtained from the Local Authority.

11. Noise Assessment and Control Measures

The contractor is to meet the requirements of the Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition.

This Guide has been produced with reference to the London Good Practice Guide: Noise and Vibration Control for Demolition and Construction produced by the London Authorities Noise Action Forum, July 2016.

11.1 Environmental Noise Mitigation Measures:

General Considerations:

1. All site staff shall be briefed on noise mitigation measures and the application of best practicable means to be employed to control noise.
2. Site hoarding should be erected to maximise the reduction in noise levels.
3. The contact details of the Main Contractor and site manager shall be displayed to the public, together with the permitted operating hours, including any special permissions given for out of hours work.
4. In the event that the Main Contractor gets a complaint about noise from a neighbour they will act immediately to remedy the situation.
5. The site entrance shall be located to minimise disturbance to noise sensitive receptors.
6. Internal haul routes shall be maintained, and steep gradients shall be avoided.
7. Material and plant loading and unloading shall only take place during normal working hours unless the requirement for extended hours is for traffic management (i.e., road closure) or health and safety reasons (advance notification, or possibly an application to the local council would be required if proposing to work outside non-typical hours).
8. Use rubber linings in chutes, dumpers, and hoppers to reduce impact noise.
9. Minimise opening and shutting of gates through good coordination of deliveries and vehicle movements.

Plant:

1. Ensure that each item of plant and equipment complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC.
2. Fit all plant and equipment with appropriate mufflers or silencers of the type recommended by the manufacturer.
3. Use all plant and equipment only for the tasks for which it has been designed.
4. Shut down all plant and equipment in intermittent use in the intervening periods between work or throttle down to a minimum.
5. Power all plant by mains electricity where possible rather than generators.

6. Maximise screening from existing features or structures and employ the use of partial or full enclosures for fixed plant.
7. Locate movable plant away from noise sensitive receptors where possible
8. All plant operators to be qualified in their specific piece of plant.
9. Compressors and generators will be sited in areas least likely to give rise to nuisance where practicable.

Vehicle activity:

1. Ensure all vehicle movement (on site) occur within normal working hours. (Other than where extension of work requiring such movements has been granted in cases of required road closures or for health and safety reasons).
2. Plan deliveries and vehicle movements so that vehicles are not waiting or queuing on the public highway, if unavoidable engines should be turned off.
3. Plan the site layout to ensure that reversing is kept to a minimum.
4. Where reversing is required use broadband reverse sirens or where it is safe to do so disengage all sirens and use banks-men.
5. Rubber/neoprene or similar non-metal lining material matting to line the inside of material transportation vehicles to avoid first drop high noise levels.
6. Wheel washing of vehicles prior to exiting the site shall take place to ensure that adjoining roads are kept clean of dirt and debris. Regular washing of adjoining streets should also take place as required by road sweepers.

Demolition Phase:

1. Employ the use of acoustic screening; this can include planning the demolition sequence to utilise screening afforded by buildings to be demolished.
2. If working out of hours for Health and Safety reasons (following approval by council) limit demolition activities to low level noise activity (unless absolutely unavoidable).
3. Use low impact demolition methods such as non-percussive plant where practicable.
4. Use rotary drills and ‘bursters’ activated by hydraulic or electrical power or chemically based expansion compounds to facilitate fragmentation and excavation of hard material.
5. Avoid the transfer of noise and vibration from demolition activities to adjoining occupied buildings through cutting any vibration transmission path or by structural separation of buildings.
6. Consider the removal of larger sections by lifting them out and breaking them down either in an area away from sensitive receptors or off site.

Ground Works and Piling Phase:

1. The following hierarchy of groundwork/piling methods should be used if ground conditions, design and safety allow;
    - Pressed in methods, e.g., hydraulic jacking

- Auger/bored piling
- Diaphragm walling
- Vibratory piling or vibro-replacement
- Driven Piling or dynamic consolidation

2. The location and layout of the piling plant should be designed to minimise potential noise impact of generators and motors.
3. Where impact piling is the only option utilise a non-metallic dolly between the hammer and driving helmet or enclose the hammer and helmet with an acoustic shroud.
4. Consider concrete pour sizes and pump locations. Plan the start of concrete pours as early as possible to avoid overruns.
5. Where obstructions are encountered, work should be stopped, and a review undertaken to ensure that work methods that minimise noise are used.
6. When using an auger piling rig do not dislodge material from the auger by rotating it back and forth. Use alternate methods where safe to do so.
7. Prepare pile caps using methods which minimise the use of breakers, e.g., use hydraulic splitters to crack the top of the pile.

Monitoring:

1. Carry out regular on-site observation monitoring and checks/audits to ensure that BPM is being used at all times. Such checks shall include;

    - Hours of work
    - Presence of mitigation measures
    - Number and type of plant
    - Construction methods

2. In the event that the Main Contractor gets a complaint about noise from a neighbour they will act immediately to remedy the situation.
3. A sound level digital meter will be employed as necessary to monitor noise, with results recorded to inform the contractor of noise level.
4. Site reviews must be recorded and made available for inspection.
5. Appraise and review working methods, processes, and procedures on a regular basis to ensure continuous development of BPM.

Communication and Liaison:

1. A Community Liaison Plan should be developed by the developer in consultation with local residents/businesses and a single point of contact nominated to engage with Fingal County Council and the residents/businesses and to handle complaints and communication of site information.
2. All site staff should be briefed on the complaints procedure and mitigation requirements and their responsibilities to register and escalate complaints received.

11.2 Risk Assessment & Mitigation

The main contractor will deal with the immediate dangers to hearing etc. associated with high noise levels and the impact of same on construction operatives, by means of risk assessment and mitigation / precautionary measures and equipment, all pursuant to the current health and safety legislation.

Current legislation limits, assessment period of 8 hours of one week (noisiest 8 hours likely to experience):

- Lower Action Value (LAV) – 80 dBA $L_{EX,8}$, 135 dB Peak – Hearing Protection shall be made available and information shall be provided.
- Upper Action Value (UAV) – 85 dBA $L_{EX,8}$, 137 dB Peak – Use of Hearing Protection is mandatory, measures to eliminate the noise as much as possible shall be applied.
- Exposure Limit Value (ELV) – 87 dBA $L_{EX,8}$, 140 dB Peak – Not to be exceeded.

Protection by ear plugs/muffs given by their Signal-to-Noise Ratio (SRN) or Noise Reduction Rating (NRR) is typically 20 – 30 dB.

$$\text{Exposure} = L_{EX,8} - (\text{SNR} - 10)$$

As a guide, if it is difficult to hear a normal conversation at a distance of 2m or a workplace is consistently noisier than a busy street, it is likely that the noise levels in the area are above 80 dBA.

It is not envisaged that any excessively noisy activities will be carried out over extended periods of time during the construction stage. However, due to the nature of the construction works, exposure to noise levels in excess of 80 dBA (Safe Working Limit) may occur occasionally. The Main Contractor will carry out a noise assessment in relation to the proposed works at construction stage. The noise assessment identified the following steps in its analysis;-

1. **Potentially Hazardous Activities**: Use of site machinery and power tools. For example, concrete saws, angle grinders, vibratory plate compactors etc.
2. **Potential Hazards**: Excessive noise
3. **Persons as Risk**: People in the vicinity of the work generating an excessive noise. These persons include employees, contractors and members of the public.
4. **Risk of Exposure to the Potential Hazard**: Temporary or permanent hearing loss.
5. **Risk Assessment before the Implementation of Control Measures**: Medium.
6. **Risk Assessment after the Implementation of Control Measures**: Low.
7. **Control Measures Implemented by**: Site Manager / Works Supervisor.

The following control measure are to be implemented for persons at risk:-

1. Site Manager shall monitor a likelihood of prolonged exposure to excessive noise and commission noise surveying/monitoring programme where necessary.
2. Works Supervisor shall assess risk arising from noise prior to each particular activity taking place and determine appropriate action. The aim shall be to minimise the exposure to excessive noise levels.
3. If it is likely that the noise exposure exceeds Lower Action Value, then hearing protection must be made available.

4. If it is likely that the noise exposure exceeds Upper Action Value, then hearing protection is mandatory to be used. Work Supervisor shall decide on the most suitable hearing protection to be used based on Exposure (see formula above) and worker's personal preference (earmuffs or earplugs).
5. Works Supervisor shall ensure proposed measures are put in place and that their effectiveness and suitability is evaluated on a regular basis.
6. Site management shall minimise noise at work by looking for alternative processes and/or working methods, which would make the work quieter and/or exposure times shorter.
7. Site Manager shall liaise with all site contractors in order to effectively control noise exposure.
8. Number of people working near source of the noise shall be minimised.
9. Employees must use hearing protection where its use is made compulsory.
10. Hearing protection zones shall be identified where necessary.
11. Spot checks on appropriate use of hearing protection shall be carried out.
12. Operators of rock breaking machines and workers nearby must wear adequate ear protection.

11.3 Proper use of hearing protection

1. Earmuffs: Workers must make sure that they totally cover their ears, fit tightly and that there are no gaps around the seals. Hair, glasses, jewellery, hats etc. shall not interfere with the seal. Seals and insides of earmuffs shall be kept clean. Workers shall make sure that any headband keeps its tension.
2. Earplugs: Workers shall make sure that they are wearing them properly. They shall practice fitting them and get help if they are having trouble. Hands shall be clean before fitting earplugs. Earplugs must not be shared with other workers.
3. Semi-inserts/caps: Same applies as for earplugs. Worker shall make sure that any headband keeps its tension.

All workers are expected to:

1. Co-operate: Help the Company to do what is needed to protect their hearing. Make sure that they use properly any noise control device and follow any working methods that are put in place.
2. Wear any hearing protection they are given: Make sure that they are wearing it properly. They shall wear it all the time when they are exposed to a noisy environment (over UAV). Taking it off even for a short while means that the hearing could still be damaged.
3. Maintain their hearing protection so as to preserve its working condition.
4. Report any problems: Report any problems with the hearing protection or effectiveness of the measures to the work supervisor.

12. Proposed Construction Phasing and Programme

It is anticipated that construction of the proposed development will commence in Q1 2027 for completion in Q3 2029 (Approximately 30 months). The development is estimated to be operational in Q4 2029.

13. Runoff Pollution and Sediment Control

13.1 Runoff Pollution Control

Significant quantities of waste and potential pollutants can be generated during construction. Controls will be put in place to prevent these pollutants from washing into the local storm water system during storm events.

The Inland Fisheries Ireland document: Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters 2006, outlines the following areas to be considered for the protection of adjacent water courses during the construction stage

1. Damage to the aquatic and associated riparian habitat due to loss of vegetation, damage to banks & changes in watercourse morphology & hydrology.

2. Pollution of waters due to construction materials.

3. Introduction of non-native species such as plants, algae, fish & shellfish.

4. Interference to the movement of aquatic life.

5. Timing of in-stream works on seasonal salmonid activity.

6. Temporary crossing structures in waters.

7. Permanent crossing structures in waters.

8. Construction impacts such as cast in-situ concrete, sediment laden surface water, hydrocarbon leaks & water abstraction.

In consideration of the above list the following methods listed, but not limited to, will be implemented on site as appropriate:

1. Fuels, oils, greases, and hydraulic fluids will be stored in bunded compounds well away from the watercourse/ditches. Refuelling of machinery, etc., will be carried out in bunded areas.

2. Runoff from machine service and concrete mixing areas will not enter the watercourse.

3. Stockpile areas for sands and gravel will be kept to minimum size, well away from the watercourse.

4. Runoff from the above will only be routed to the watercourse via suitably designed and sited settlement ponds/filter channels.

5. Settlement ponds will be inspected daily and maintained regularly.

6. Temporary crossings will be designed to the criteria laid down for permanent works.

7. Watercourse banks will be left intact if possible. If they have to be disturbed, all practicable measures should be taken to prevent soils from entering the watercourses.

The main pollutants of site water are silt, fuel/oil, concrete, and chemicals. See the *Table 3* overleaf, for a list and brief description of pollution prevention measures.

Source	Action
Detergents	Use of detergents will be carried out in designated areas draining to the foul sewer.
Fuel/Oil	Fuel/oil stores will be located away from the site drainage system and the edge of watercourses.
Fuel/Oil	Ensure adequate measures are identified to prevent or contain any spillage such as creating a fall away from any drainage grid or blocking drainage points.
	Prevent oil pollution by • Suitable bunded storage of fuel/oil, and use of drip trays under plant, and • An oil separator, and/or • On-site spill-kit • Commercially available absorbent granules, pads, or booms.
Material Storage	Store drums, oil, and chemicals on an impervious base and within a secured bund.
	Ensure topsoil and/or spoil heaps are located at least 10m away from water courses. Consider seeding them or covering with a tarpaulin to prevent silty runoff and losses due to wind.
Leaks and Spills	Storage facilities will be checked on a regular basis to ensure any leaks or drips are fixed to prevent loss and pollution.
	Ensure appropriate spill response equipment is located near to the material in case of containment failure or material spills and ensure site staff know how to use it.
	Adequate stocks of absorbent materials, such as sand or commercially available spill kits and booms will be available at all times.
Litter	Provide waste bins on-site as appropriate.
Construction Vehicles	Provide vehicle wheel washing.
Concrete, Cement and Bentonite	Washout of these materials will be carried out in a designated, impermeable contained areas. The washout water itself should be disposed of off-site, or discharged to the foul sewer if authorised.

Table 3 | *Pollution Protection Measures*

13.2 Sediment Control

Construction runoff is heavily laden with silt which can block road gullies and reduce the hydraulic capacity in pipes and watercourses, contributing to ponding and flooding. Continued development without appropriate controls will ultimately keep maintenance costs elevated, whether that be in cleaning gullies, jetting pipes, or dredging. Sediment control plans can be implemented on-site to mitigate these issues.

Sediment basins and traps should be installed before any major site grading takes place. Additional sediment traps and silt fences should be installed as grading takes place to keep sediment contained on site at appropriate locations.

Key runoff-control measures should be located in conjunction with sediment traps to divert water from planned undisturbed areas away from the traps and sediment-laden water into the traps. Diversions should be installed above the areas to be disturbed before any grading operations. Any perimeter drains should be installed with stable outlets before opening major areas for development. Any additional facilities needed for runoff control should be installed as grading takes place.

During grading operations temporary diversions, slope drains, and inlet and outlet protection installed in a timely manner can be very effective in controlling erosion and sediment build up.

The main run-off conveyance system with inlet and outlet protection measures should be installed early and used to convey stormwater run-off through the development site without creating gullies or channels. Install inlet protection for storm drains as soon as the drain is functional to trap sediment on site in shallow pools and to allow the flood flows to enter the storm drainage system safely. Install outlet protection at the same time as the conveyance system to prevent damage to the receiving watercourse.

During the final stages of construction unstable sediment from sediment basins and traps should be removed and if possible incorporated into the topsoil, not just spread on the surface.

13.2.1 Sediment Control Measures

Sediment entrapment facilities are necessary to reduce sediment discharges to downstream properties and receiving waters. All run-off leaving a disturbed area should pass through a sediment entrapment facility before it exits the site and flows downstream.

Straw Bales:

Straw bales can be placed at the base of a slope to act as a sediment barrier. These are not recommended for use within a swale or channel. Straw bales are temporary in nature and may perform for only a period of weeks or months. Proper installation and maintenance is necessary to ensure their performance.

Silt Fencing

A silt fence is made of a woven synthetic material, geotextile, and acts to filter run-off. Silt fencing can be placed as a temporary barrier along the contour at the base of a disturbed area but is not recommended for use in a channel or swale. The material is durable and will last for more than one season if properly installed and maintained. Silt fencing is not intended to be used as a perimeter fence or in area of concentrated flow. If concentrated flow conditions exist, a more robust filter should be considered.

Silt Barriers

Silt barriers can also be temporarily installed in any road gullies of partially constructed roads to prevent sediment movement into downstream drainage systems or SUDS components.

When the catchment area is greater than that allowed for straw bale barriers or silt fences, runoff should be collected in diversion drains and routed through temporary sediment basins.

Diversion Drains

Diversion drains are simple linear ditches, often with an earth bund, for channelling water to a desired location. If the drains are being eroded, they can be lined with geotextile fabric or large stones or boulders.

Appendices

A. Site Investigation Report

S.I. Ltd Contract No: 5898

Client: Go Power
Engineer: Waterman Moylan
Contractor: Site Investigations Ltd

Kilshane,
Kilshane, Ballycoolin, Dublin 15
Site Investigation Report

Prepared by:

.....
Stephen Letch

Issue Date:	08/12/2021
Status	Final
Revision	2

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Appendices:

1. Cable Percussive Borehole and Rotary Corehole Logs and Photographs
2. Trial Pit Logs with Dynamic Probe Results and Photographs
3. Soakaway Test Results and Photographs
4. Percolation Test Reports
5. Geotechnical Soil Laboratory Test Results
6. Geotechnical Rock Laboratory Test Results
7. Environmental Laboratory Test Results
8. Waste Classification Report
9. Survey Data

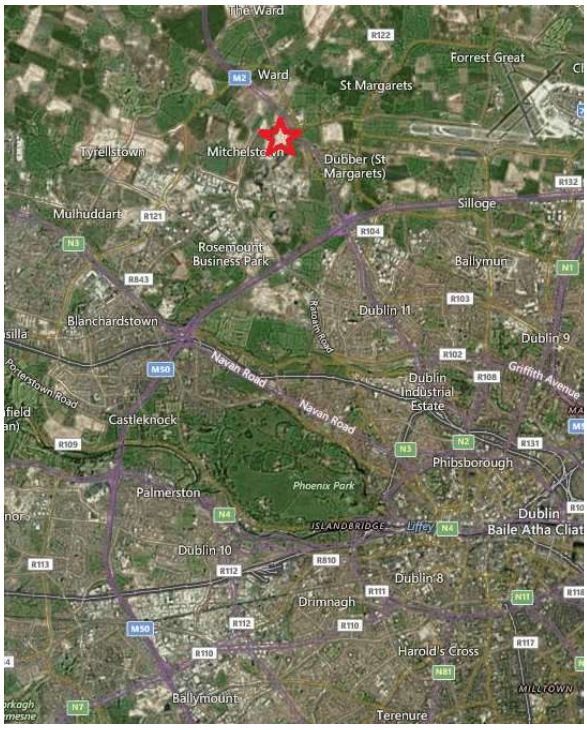
1. Introduction

On the instructions of Waterman Moylan, Site Investigations Ltd (SIL) was appointed to complete a ground investigation at Kilshane, Ballycoolin, Dublin 15. The investigation was for a commercial development on the site and was completed on behalf of the Client, Go Power. This investigation was completed in November 2021.

This report presents the factual geotechnical data obtained from the field and laboratory testing with interpretation of the ground conditions discussed.

2. Site Location

The site is located to the north west of Dublin city centre, adjacent to the N2 national carriageway and to the north east of Ballycoolin industrial estates. The first map below shows the location of the site to the north west of the city centre and the second map shows the location of the site adjacent to the N2 and to the north east of Ballycoolin.



3. Fieldwork

The fieldworks comprised a programme of cable percussive boreholes with rotary coreholes, trial pits with dynamic probes and soakaway tests. All fieldwork was carried out in accordance with BS 5930:2015, Engineers Ireland GI Specification and Related Document 2nd Edition 2016 and Eurocode 7: Geotechnical Design.

The fieldworks comprised of the following:

- 4 No. cable percussive boreholes with rotary coreholes
- 16 No. trial pits with dynamic probes
- 8 No. soakaway tests

3.1. Cable Percussive Boreholes with Rotary Coreholes

Cable percussion boring was undertaken at 4 No. locations using a Dando 150 rig and constructed 200mm diameter boreholes. The boreholes terminated at depths ranging from 2.30mbgl (BH03) to 3.60mbgl (BH01). It was not possible to collect undisturbed samples due to the granular soils encountered so bulk disturbed samples were recovered at regular intervals.

To test the strength of the stratum, Standard Penetration Tests (SPT's) were performed at 1.00m intervals in accordance with BS 1377 (1990). In soils with high gravel and cobble content it is appropriate to use a solid cone (60°) (CPT) instead of the split spoon and this was used throughout the testing. The test is completed over 450mm and the cone is driven 150mm into the stratum to ensure that the test is conducted over an undisturbed zone. The cone is then driven the remaining 300mm and the blows recorded to report the N-Value. The report shows the N-Value with the 75mm incremental blows listed in brackets (e.g., BH01 at 1.00mbgl where N=15-(2,3/4,4,3,4)). Where refusal of 50 blows across the test zone was encountered was achieved during testing, the penetration depth is also reported (e.g., BH01 at 3.60mbgl where N=50-(25 for 5mm/50 for 5mm)).

Following completion of the cable percussive boreholes, rotary coreholes were completed at the locations to investigate the depth of bedrock. The rotary drilling was carried out using a Sondeq SS71 top drive rig and open hole drilling techniques were used to advance through the overburden to the bedrock. The coreholes were then terminated when 3m of core was recovered and returned to SIL, where they were logged and photographed by a SIL geotechnical engineer.

Provided on the logs are engineering geological descriptions of the rock cores with details of the bedding/discontinuities and mechanical indices for each core run, i.e., TCR, SCR, RQD and Fracture Index.

The combined cable percussive and rotary corehole logs are presented in Appendix 1.

3.2. Trial Pits with Dynamic Probes

16 No. trial pits were excavated using a wheeled excavator. The pits were logged and photographed by SIL geotechnical engineer and representative disturbed bulk samples were

recovered as the pits were excavated, which were returned to the laboratory for geotechnical testing.

Adjacent to the trial pits, dynamic probes were completed using a track mounted Competitor 130 machine. The testing complies with the requirements of BS1377: Part 9 (1990) and Eurocode 7: Part 3. The configuration utilised standard DPH (Heavy) probing method comprising a 50kg weight, 500mm drop height and a 50mm diameter (90°) cone. The number of blows required to drive the cone each 100mm increment into the sub soil is recorded in accordance with the standards. The dynamic probe provides no information regarding soil type or groundwater conditions.

The dynamic probe results can be used to analyse the strength of the soil strata encountered by the probe. 'Proceedings of the Trinity College Dublin Symposium of Field and Laboratory Testing of Soils for Foundations and Embankments' presents a paper by Foirbart that is most relevant to Irish soil conditions and within this paper the following equations were included:

Granular Soils: DPH N_{100} x 2.5 = SPT N value

Cohesive Soils: C_u = 15 x DPH N_{100} + 30 kN/m^2

These equations present a relationship between the probe N_{100} value and the SPT N value for granular soils and the undrained shear strength of cohesive soils.

The trial pit logs with the dynamic probe results are presented in Appendix 2 along with the photographs.

3.3. Soakaway Tests

Adjacent to 8 No. trial pit locations, soakaway tests were completed and logged by SIL geotechnical engineer. BRE Special Digest 365 stipulates that the pit should be filled three times and that the final cycle is used to provide the infiltration rate. The time taken for the water level to fall from 75% volume to 25% volume is required to calculate the rate of infiltration. However, if the water level does not fall at a steady rate, then the test is deemed to have failed and the area is unsuitable for storm water drainage.

The soakaway test results and photographs are presented in Appendix 3.

3.4. Percolation Tests

Testing was undertaken by Declan Kearns & Associates to provide analysis for possible percolation areas at four areas of the site. The reports compiled by Declan Kearns & Associates are provided in Appendix 4.

3.5. Surveying

Following completion of all the fieldworks, a survey of the exploratory hole locations was completed using a GeoMax GPS Rover. The data is supplied on each individual log and along with a site plan in Appendix 9.

4. Laboratory Testing

4.1. Geotechnical Testing

Soil laboratory testing was completed on representative samples in accordance with BS 1377 (1990). Testing included:

- 3 No. Moisture contents
- 3 No. Atterberg limits
- 3 No. Particle size gradings
- 5 No. California Bearing Ratio tests
- 3 No. pH, sulphate and chloride content

Rock laboratory testing was completed on the core samples returned for logging and this consisted of the following:

- 8 No. Point loads

The geotechnical laboratory test results are presented in Appendix 5 with the rock laboratory test results in Appendix 6.

4.2. Environmental Testing

Environmental testing was completed by ALS Environmental Ltd and this allows for a Waste Classification report to be produced. The environmental testing consists of the following:

- 8 No. Suite I analysis
- 3 No. loss on ignition tests

The environmental test results are presented in Appendix 7 with the Waste Classification report in Appendix 8.

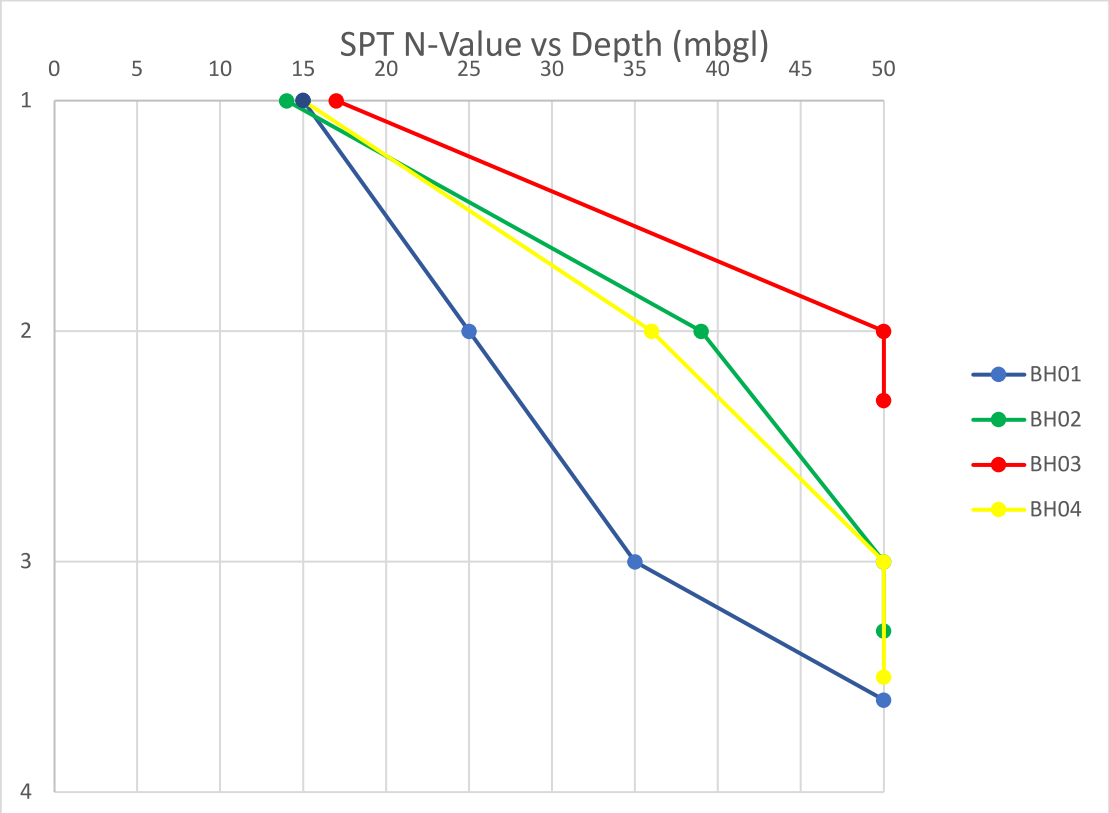
5. Ground Conditions

5.1. Overburden

The natural ground conditions are consistent with cohesive soils encountered across the site. This includes brown and brown grey slightly sandy slightly gravelly silty CLAY with high cobble

and low boulder content with black CLAY soils occasionally encountered. These ground conditions are encountered across the north Co. Dublin region with the boreholes terminating at similar depths ranging from 2.30mbgl to 3.60mbgl on boulder obstruction or bedrock.

The SPT N-values at 1.00mbgl range from 14 to 17 indicating firm to stiff soils. The full N-values then increase to 25 to 39 at 2.00mbgl and 35 at 3.00mbgl. The graph below shows the SPT N-values against depth.



Laboratory tests of the shallow cohesive soils confirm that CLAY soils dominate the site with low to intermediate plasticity indexes of 14% to 20% recorded. The particle size distribution curves were poorly sorted straight-line curves with 37% to 46% fines content.

5.2. Bedrock

Bedrock was encountered between 3.30mbgl to 3.70mbgl and consisted of weak to moderately strong, dark grey, calcareous MUDSTONE interbedded with very strong, grey, argillaceous LIMESTONE with occasional to frequent fossils, occasional pyrite crystals and occasional calcite veins (up to 10mm). The weathering state was fresh to slightly weathered. The discontinuities are smooth, planar, tight to open, 40-50° dip, occasionally sub-horizontal and sub-vertical dip, clean surfaces with occasional brown and grey staining and calcite veins.

5.3. Groundwater

Groundwater details in the boreholes and trial pits during the fieldworks are noted on the logs in Appendix 1 and 2. Groundwater ingress was recorded in BH04 at 3.20mbgl near the base of the cable percussive borehole. Two trial pits, TP05 and TP07, also recorded groundwater ingresses at 1.90mbgl and 2.30mbgl respectively with ingress rates recorded as a seepage and a medium ingress rate.

6. Recommendations and Conclusions

Please note the following caveats:

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 the exploratory hole locations or below the final level of excavation, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for adjacent unexpected conditions that have not been revealed by the exploratory holes. It is further recommended that all bearing surfaces when excavated should be inspected by a suitably qualified Engineer to verify the information given in this report.

Excavated surfaces in clay strata should be kept dry to avoid softening prior to foundation placement. Foundations should always be taken to a minimum depth of 0.50mBGL to avoid the effects of frost action and possible seasonal shrinkage/swelling.

If it is intended that on-site materials are to be used as fill, then the necessary laboratory testing should be specified by the Client to confirm the suitability. Also, relevant lab testing should be specified where stability of side slopes to excavations is a concern, or where contamination may be an issue.

6.1. Shallow Foundations

Due to the unknown depth of foundation and no longer-term groundwater information, this analysis assumes the groundwater will not influence the construction or performance of these foundations.

The boreholes and the trial pits encountered firm to stiff brown and grey brown slightly sandy slightly gravelly silty CLAY at 1.00mbgl and the SPT N-values at these depths range from 14 to 17.

Using a correlation proposed by Stroud and Butler between SPT N-values and plasticity indices, the SPT N-value can be used to calculate the undrained shear strength. With the low to intermediate plasticity indexes recorded in the laboratory for the soils encountered on site, this correlation is C_u=6N. Therefore, using the lower value of 14, this indicates that the undrained

shear strength of the CLAY is 84kN/m^2. This can be used to calculate the ultimate bearing capacity, and this has been calculated to be 445kN/m^2. Finally, a factor of safety is applied and with a factor of 3, an allowable bearing capacity of 150kN/m^2 would be anticipated using the lower SPT values.

The following assumptions were made as part of these analyses. If any of these assumptions are not in accordance with detailed design or observations made during construction these recommendations should be re-evaluated.

- Foundations are to be constructed on a level formation of uniform material type (described above).
- The bulk unit weight of the material in this stratum has a minimum density of 19kN/m^3.
- All bearing capacity calculations allow for a settlement of 25mm.

The trial pit walls mainly remained stable during excavation although at TP29 the pit walls collapsed, forcing the completion of the pit. Therefore, it would be recommended that all excavations should be checked immediately and regular inspection of temporary excavations should be completed during construction to ensure that all slopes are stable. Temporary support should be used on any excavation that will be left open for an extended period.

6.2. Groundwater

The caveats below relating to interpretation of groundwater levels should be noted:
There is always considerable uncertainty as to the likely rates of water ingress into excavations in clayey soil sites due to the possibility of localised unforeseen sand and gravel lenses acting as permeable conduits for unknown volumes of water.

Furthermore, water levels noted on the borehole and trial pit logs do not generally give an accurate indication of the actual groundwater conditions as the borehole or trial pit is rarely left open for sufficient time for the water level to reach equilibrium.

Also, during boring procedures, a permeable stratum may have been sealed off by the borehole casing, or water may have been added to aid drilling. Therefore, an extended period of groundwater monitoring using any constructed standpipes is required to provide more accurate information regarding groundwater conditions. Finally, groundwater levels vary with time of year, rainfall, nearby construction and tides.

Pumping tests would be required to determine likely seepage rates and persistence into excavations taken below the groundwater level. Deep trial pits also aid estimation of seepage rates.

As discussed previously, groundwater was recorded in BH04 and two trial pits during the fieldworks. There is always considerable uncertainty as to the likely rates of water ingress into excavations in cohesive soil sites due to the possibility of localised unforeseen sand and gravel lenses acting as permeable conduits for unknown volumes of water. Based on this information at the exploratory hole locations to date, it is considered likely that any shallow ingress (less than 2.00mbgl) into excavations of the CLAY will be slow to medium. If granular soils are encountered in shallow excavations, then the possibility of water ingressing into an excavation increase.

If groundwater is encountered during excavations then mechanical pumps will be required to remove the groundwater from sumps. Sumps should be carefully located and constructed to ensure that groundwater is efficiently removed from excavations and trenches.

6.3. Soakaway Test

The soakaway tests failed the specification as the water level did not fall sufficiently enough to complete the test. The BRE Digest stipulates that the pit should half empty within 24hrs, and extrapolation indicates this condition would not be satisfied. The tests were terminated at the end of the first (of a possible three) fill/empty cycle since further testing would give even slower fall rates due to increased soil saturation. The unsuitability of the soils for soakaways is further suggested by the soil descriptions of the materials in this area of the site where the soakaway was completed, i.e., well compacted clay soils.

6.4. Pavement Design

The CBR test results in Appendix 5 indicate CBR values ranging from 6.8% to 8.5%.

The CBR samples were recovered at 0.50mbgl and inspection of the formation strata should be completed prior to construction of the pavement. Once the exact formation levels are finalised then additional in-situ testing could be completed to assist with the detailed pavement design.

6.5. Contamination

Environmental testing was carried out on eight samples from the investigation and the results are shown in Appendix 7. For material to be removed from site, Suite I testing was carried out to determine if the material is hazardous or non-hazardous and then the leachate results were compared with the published waste acceptance limits of BS EN 12457-2 to determine whether the material on the site could be accepted as ‘inert material’ by an Irish landfill.

The Waste Classification report in Appendix 8, created using HazWasteOnline™ software, shows that the material tested can be classified as non-hazardous material.

Following this analysis of the solid test results, the leachate disposal suite results showed that the determinands remained within the Inert waste thresholds.

Eight samples were tested for analysis but it cannot be discounted that any localised contamination may have been missed. Any MADE GROUND excavated on site should be stockpiled separately to natural soils to avoid any potential cross contamination of the soils. Additional testing of these soils may be requested by the individual landfill before acceptance and a testing regime designed by an environmental engineer would be recommended to satisfy the landfill.

6.6. Aggressive Ground Conditions

The chemical test results in Appendix 5 indicate a general pH value between 8.11 and 8.35, which is close to neutral and below the level of 9, therefore no special precautions are required. The maximum value obtained for water soluble sulphate was 126mg/l as SO_3. The BRE Special Digest 1:2005 – '*Concrete in Aggressive Ground*' guidelines require SO_4 values and after conversion ($SO_4 = SO_3 \times 1.2$), the maximum value of 151mg/l shows Class 1 conditions and no special precautions are required.

Appendix 1
Cable Percussive Borehole and Rotary Corehole Logs and Photographs

Contract No: 5898	**Cable Percussion and Rotary Corehole Log**				Corehole No: **BH01**
Contract:	Kilshane	Easting:	710778.385	Date Started:	03/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742304.266	Date Completed:	16/11/2021
Client:	Go Power	Elevation:	79.66	Drilled By:	D. McEoin / MEDL
Engineer:	Waterman Moylan	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
		TOPSOIL.		79.5	79.46						
	0.20	Brown slightly sandy slightly gravelly silty CLAY with low cobble content.									
0.5				79.0							
1.0						N=15 (2,3/4,4,3,4) B / 1.00					
	1.10	Firm grey brown slightly sandy slightly gravelly silty CLAY with high cobble content.		78.5	78.56						
1.5				78.0							
2.0						N=25 (3,6/5,6,7,7) B / 2.00					
	2.30	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble content.		77.5	77.36						
2.5				77.0							
3.0						N=35 (4,7/9,9,8,9) B / 3.00					
3.5				76.5							
	3.60	Moderately strong dark grey calcareous MUDSTONE interbedded with very strong grey argillaceous LIMESTONE with occasional fossils, pyrite crystals and calcite veins (up to 5mm). Fresh to slightly weathered.		76.0	76.06	~~50 (25 for 5mm/50 for 5mm)~~					
4.0		*Discontinuities - non-intact.*				3.60 - 4.60	96	30	0	Ni	
4.5		*Discontinuities - smooth, planar, tight to open, 40-50° dip, occasionally sub-horizontal, clean surfaces.*		75.5							
5.0				75.0		4.60 - 5.60	100	100	13	26	
5.5		*Discontinuities - non-intact.*		74.5							
6.0		*Discontinuities - smooth, planar, tight to open, 40-50° dip, clean surfaces.*		74.0		5.60 - 6.60	96	60	0	Ni	
6.5				73.5						28	
	6.60	End of Corehole at 6.60m		73.0	73.06						

Chiselling: From:	To:	Time:	Water Strikes: Strike:	Rose:	Sealed:	Water Details: Date:	Hole Depth:	Water Depth:	Installations: From:	To:	Pipe:	Backfill: From:	To:	Type:	Remarks:
3.50	3.60	01:00				03/11	3.60	Dry				0.00	6.60	Arisings	Cable percussive borehole terminated due to obstruction. Rotary core completed to confirm bedrock.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 5898	**Cable Percussion and Rotary Corehole Log**		Corehole No: **BH02**

Contract:	Kilshane	Easting:	710828.053	Date Started:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742278.441	Date Completed:	15/11/2021
Client:	Go Power	Elevation:	78.61	Drilled By:	D. McEoin / MEDL
Engineer:	Waterman Moylan	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
0	0.20	TOPSOIL.		78.5	78.41						
0.5		Brown slightly sandy slightly gravelly silty CLAY with low cobble content.		78.0							
	0.80				77.81						
1.0		Firm becoming very stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content.		77.5		N=14 (2,2/3,3,4,4) B / 1.00					
1.5				77.0							
2.0				76.5		N=39 (4,8/10,9,9,11) B / 2.00					
2.5				76.0							
3.0				75.5		50 (7,10/50 for 80mm) B / 3.00					
	3.30				75.31	~~50 (25 for 5mm/50 for 5mm)~~				Ni	
3.5		Weak dark grey calcareous MUDSTONE interbedded with moderately strong grey argillaceous LIMESTONE with frequent fossils. Fresh to slightly weathered.		75.0						25	
		Discontinuities - non-intact.				3.30 - 4.30	100	85	60		
		Discontinuities - smooth, planar, tight to open, 40-50° and 70-80° dip, clean surfaces.									
4.0		*Discontinuities - smooth, planar, tight to open, 40-50° dip, clean with occasional brown and grey staining.*		74.5						4	
4.5				74.0		4.30 - 5.30	95	95	89		
5.0		*Discontinuities - smooth, planar, tight to open, 40-50° dip, occasionally sub-vertical, clean with occasional brown and grey staining.*		73.5							
5.5				73.0		5.30 - 6.30	95	95	60	12	
6.0				72.5							
	6.30	End of Corehole at 6.30m			72.31						
6.5				72.0							

Chiselling: From:	To:	Time:	Water Strikes: Strike:	Rose:	Sealed:	Water Details: Date:	Hole Depth:	Water Depth:	Installations: From:	To:	Pipe:	Backfill: From:	To:	Type:
3.20	3.30	01:00				02/11	3.30	Dry				0.00	6.30	Arisings

Remarks: Cable percussive borehole terminated due to obstruction. Rotary core completed to confirm bedrock.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 5898	**Cable Percussion and Rotary Corehole Log**				Corehole No: **BH03**
Contract:	Kilshane	Easting:	710874.843	Date Started:	03/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742327.339	Date Completed:	16/11/2021
Client:	Go Power	Elevation:	78.56	Drilled By:	D. McEoin / MEDL
Engineer:	Waterman Moylan	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
		TOPSOIL.		78.5							
	0.20	Brown slightly sandy slightly gravelly silty CLAY with low cobble content.			78.36						
0.5				78.0							
1.0	1.00	Stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content.		77.5	77.56	N=17 (2,3/4,5,4,4) B / 1.00					
1.5				77.0							
2.0				76.5		50 (5,9/50 for 40mm) B / 2.00					
	2.30	Obstruction - boulder. Open hole drilling: driller reports returns of sandy gravelly CLAY with cobbles.			76.26	50 (25 for 5mm/50 for 5mm)					
2.5				76.0							
3.0				75.5							
3.5				75.0							
	3.70	Moderately strong dark grey calcareous MUDSTONE interbedded with very strong grey argillaceous LIMESTONE with frequent fossils. Fresh to slightly weathered.			74.86					Ni	
4.0		*Discontinuities - non-intact.* *Discontinuities - smooth, planar, tight to open, 40-50° dip, occasionally sub-vertical, clean with occasional brown and grey staining.*		74.5		3.70 - 4.70	96	75	14		
4.5				74.0							
5.0				73.5		4.70 - 5.70	94	85	27	14	
5.5				73.0							
6.0				72.5		5.70 - 6.70	79	79	14		
6.5				72.0							
	6.70	End of Corehole at 6.70m			71.86						

Chiselling: From:	To:	Time:	Water Strikes: Strike:	Rose:	Sealed:	Water Details: Date:	Hole Depth:	Water Depth:	Installations: From:	To:	Pipe:	Backfill: From:	To:	Type:	Remarks:
2.20	2.30	01:00				03/11	2.30	Dry				0.00	6.70	Arisings	Cable percussive borehole terminated due to obstruction. Rotary core completed to confirm bedrock.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 5898	**Cable Percussion and Rotary Corehole Log**				Corehole No: **BH04**
Contract:	Kilshane	Easting:	710810.778	Date Started:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742357.380	Date Completed:	15/11/2021
Client:	Go Power	Elevation:	80.23	Drilled By:	D. McEoin / MEDL
Engineer:	Waterman Moylan	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
0		TOPSOIL.		80.0							
	0.30	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content.			79.93						
0.5				79.5							
1.0						N=15 (3,3/3,4,4,4) B / 1.00					
	1.20	Very stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content.		79.0	79.03						
1.5				78.5							
2.0						N=36 (5,7/8,9,9,10) B / 2.00					
2.5				78.0							
3.0				77.5		N=50 (5,11/50 for 235mm) B / 3.00					
3.5	3.50	Weak dark grey calcareous MUDSTONE interbedded with strong grey argillaceous LIMESTONE with occasional fossils and calcite veins (up to 10mm). Fresh to slightly weathered.		77.0	76.73	~~50 (25 for 5mm/50 for 5mm)~~					
		Discontinuities - smooth, planar, tight to open, 40-50° dip, occasionally sub-horizontal and sub-vertical dip, clean with occasional brown staining.		76.5		3.50 - 4.50	90	90	33	16	
4.0				76.0							
4.5		*Discontinuities - smooth, planar, tight to open, 40-50° dip, clean with occasional brown and grey staining.*		75.5		4.50 - 5.50	98	98	60	9	
5.0		*Discontinuities - smooth, planar, tight to open, 40-50° dip, occasionally sub-vertical dip, clean with occasional brown and grey staining and calcite veins.*		75.0						24	
5.5				74.5		5.50 - 6.50	98	98	35		
6.0		*Discontinuities - smooth, planar, tight to open, 40-50° dip, clean with occasional brown and grey staining.*		74.0						6	
6.5	6.50	End of Corehole at 6.50m		73.5	73.73						

Chiselling: From:	To:	Time:	Water Strikes: Strike:	Rose:	Sealed:	Water Details: Date:	Hole Depth:	Water Depth:	Installations: From:	To:	Pipe:	Backfill: From:	To:	Type:	Remarks:	Legend: B: Bulk D: Disturbed U: Undisturbed ES: Environmental W: Water
3.50	3.50	01:00	3.20	2.80	NS	02/11	3.50	3				0.00	6.50	Arisings	Cable percussive borehole terminated due to obstruction. Rotary core completed to confirm bedrock.	

BH01 Box 1 of 1

BH02 Box 1 of 1

BH03 Box 1 of 1

BH04 Box 1 of 1

Appendix 2

Trial Pit Logs with Dynamic Probe Results and Photographs

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP01**
Contract:	Kilshane	Easting:	710543.292	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742183.245	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	80.62	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.90 x 0.60 x 2.60	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
0	0.20	TOPSOIL.		80.5	80.42			1, 2, 3, 3	
0.5		Firm becoming stiff light grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 300mm diameter).		80.0		1.00	B	7, 7, 6, 6, 13, 11, 10, 8, 7, 7, 6, 7, 7, 8, 14, 16	
1.0									
1.5				79.5					
2.0	2.00	Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).		79.0	78.62				
2.5	2.60	**Pit terminated at 2.60m**		78.5		2.50	B	13, 19, 28, 26, 8, 10, 9, 13, 14, 21, 20, 23, 35	
3.0				78.0	78.02				
3.5				77.5					
4.0				77.0					
4.5				76.5					
				76.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Strength of soil.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP02**
Contract:	Kilshane	Easting:	710642.756	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742332.109	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	80.84	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.70 x 0.60 x 2.80	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
0	0.30	TOPSOIL.		80.5	80.54			1, 1, 1, 2, 5, 2, 2, 2, 3, 8, 7, 7, 6, 5, 5, 5, 9, 32, 20, 17, 17, 15, 21, 15, 16, 16, 16, 18, 35	
0.5		Firm becoming stiff light grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.							
1.0				80.0		1.00	B		
1.5				79.5					
2.0	2.10			79.0	78.74				
2.5		Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).		78.5		2.50	B		
3.0	2.80	**Pit terminated at 2.80m**		78.0	78.04				
3.5				77.5					
4.0				77.0					
4.5				76.5					
				76.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Strength of soil.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP03**
Contract:	Kilshane	Easting:	710596.166	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742470.886	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	82.85	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.80 x 0.65 x 2.50	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
		TOPSOIL.							
	0.30	Soft becoming firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.			82.55	0.50	ES	1 2 2 2 3 5 6 5 5 7 5 7 6 7 6 6 6 7 7 9 13 22 18 17 18 20 19 18 20 28 27 35	
	2.10	Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).			80.75	2.20	B		
	2.50	**Pit terminated at 2.50m**			80.35				

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Strength of soil.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP04**
Contract:	Kilshane	Easting:	710684.732	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742619.034	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	83.06	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	4.20 x 0.65 x 2.80	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
		TOPSOIL.		83.0				0	
	0.30	Soft becoming firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.			82.76			1	
0.5				82.5		0.50	ES	2	
	0.90	Firm becoming stiff grey brown slightly sandy gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 400mm diameter).			82.16			2	
1.0				82.0		1.00	B	3	
1.5				81.5				2	
	1.90	Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.			81.16			4	
2.0				81.0				5	
2.5				80.5		2.50	B	6	
	2.80	**Pit terminated at 2.80m**			80.26			6	
3.0				80.0				7	
3.5				79.5				9	
4.0				79.0				9	
4.5				78.5				8	
								8	
								9	
								11	
								13	
								10	
								11	
								16	
								35	

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Strength of soil.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP05**
Contract:	Kilshane	Easting:	710828.477	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742750.035	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	80.65	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.50 x 0.60 x 2.70	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
0		TOPSOIL.		80.5				0	
	0.30				80.35			0	
0.5		Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		80.0				1 4 5 6 8 15 9 8	
1.0						1.00	B	6 5 3 2 1 2 2	
1.5				79.5				3 5 8 9 9 13 10 10	
	1.70	Stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content and frequent gravel laminas. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		79.0	78.95				▼
2.0				78.5		2.00	B	35	
2.5									
	2.70	Obstruction - possible bedrock or boulders. **Pit terminated at 2.70m**		78.0	77.95				
3.0				77.5					
3.5				77.0					
4.0				76.5					
4.5				76.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible bedrock or boulders.	Pit walls stable.	1.90 Seepage	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP06**
Contract:	Kilshane	Easting:	710796.998	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742609.299	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	81.39	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.80 x 0.60 x 2.40	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
	0.00	TOPSOIL.			81.39			1	
	0.30	Soft becoming firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		81.0	81.09			1	
0.5	0.60	Firm becoming stiff grey brown slightly sandy gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 300mm diameter).			80.79			1	
				80.5				1	
1.0						1.00	B	2	
								3	
								10	
								12	
								8	
	1.40	Stiff becoming very stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 300mm diameter).		80.0	79.99			9	
1.5								10	
								9	
								10	
								9	
				79.5				16	
2.0						2.00	B	20	
								22	
								35	
	2.30	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).			79.09				
	2.40	Obstruction - possible bedrock or boulders.		79.0	78.99				
2.5		**Pit terminated at 2.40m**							
				78.5					
3.0									
				78.0					
3.5									
				77.5					
4.0									
				77.0					
4.5									
				76.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction -rock or boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP07**
Contract:	Kilshane	Easting:	710786.841	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742471.531	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	80.53	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.40 x 0.60 x 2.50	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
		TOPSOIL.			80.23			1 1 2 2 1	
	0.30	Soft becoming firm light grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		80.0		0.50	ES	2 2 2 2 2 2	
0.5									
1.0				79.5		1.00	B	2 3 3	
1.5				79.0				6 6 7 6 6 7 8	
2.0	2.00	Stiff becoming very stiff grey brown slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 300mm diameter).		78.5	78.53	2.20	B	12 14 14 14	
	2.30				78.23				
2.5	2.50	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).		78.0	78.03			35	
3.0		**Pit terminated at 2.50m**		77.5					
3.5				77.0					
4.0				76.5					
4.5				76.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Pit wall instability.	Pit walls unstable forcing completion.	2.30 Medium	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP08**
Contract:	Kilshane	Easting:	710953.440	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742658.661	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	78.59	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	4.70 x 0.60 x 2.00	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
0.5	0.30	TOPSOIL.		78.5	78.29			0 1 1 3 2 3 2 2 2 2	
1.0		Firm becoming stiff grey brown slightly sandy gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 400mm diameter).		78.0		1.00	B		
1.5				77.5				1 1 1 2 1 1	
2.0	2.00	Obstruction - possible bedrock or boulders. **Pit terminated at 2.00m**		77.0	76.59	2.00	B	4 4 8 9 9 35	
2.5				76.0					
3.0				75.5					
3.5				75.0					
4.0				74.5					
4.5				74.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible bedrock or boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP09**
Contract:	Kilshane	Easting:	710939.386	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742368.549	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	78.30	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	5.10 x 0.60 x 2.00	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
		TOPSOIL.						1 1 2 2	
	0.30	Soft light brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		78.0	78.00	0.50	ES	3 3	
0.5	0.60	Firm grey brown slightly sandy gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.			77.70			2 2	
				77.5				3 5	
1.0						1.00	B	3 3	
	1.20	Firm becoming stiff grey brown slightly sandy gravelly silty CLAY with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 400mm diameter).			77.10			3 2 3	
				77.0				10 10	
1.5									
				76.5		1.80	B	35	
2.0	2.00	Obstruction - possible bedrock or boulders. **Pit terminated at 2.00m**			76.30				
				76.0					
2.5									
				75.5					
3.0									
				75.0					
3.5									
				74.5					
4.0									
				74.0					
4.5									
				73.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible bedrock or boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP10**
Contract:	Kilshane	Easting:	710934.451	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742451.994	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	78.72	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	4.70 x 0.65 x 3.10	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
0.5	0.30	TOPSOIL.		78.5	78.42			1	
		Soft becoming firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 300mm diameter).		78.0		0.50	ES	2 2 3 2 2 2 2	
1.0	0.90	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		77.5	77.82	1.00	B	1 2 4 7 4 3 7 8 10 16 29 35	
2.5				77.0		2.50	B		
3.0	2.80	Stiff black slightly sandy gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.		76.0	75.92				
	3.10	Cobbles are angular to subangular of limestone. **Pit terminated at 3.10m**		75.5	75.62				
3.5				75.0					
4.0				74.5					
4.5				74.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Scheduled depth.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP11**
Contract:	Kilshane	Easting:	710973.862	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742525.011	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	78.26	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	4.50 x 0.65 x 1.50	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
0.5	0.30	TOPSOIL.		78.0	77.96			0 0 1 2 3 2 3 2 2 2 3	
1.0	1.00	Soft becoming firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		77.5	77.26	1.10	B	7 7 9 9 8	
1.5	1.50	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 400mm diameter).		77.0	76.76			3 3 4 5 4 6 9 8 8 29 8 7 16 35	
2.0		Obstruction - boulders.		76.5					
2.5		**Pit terminated at 1.50m**		76.0					
3.0				75.5					
3.5				75.0					
4.0				74.5					
4.5				74.0					
				73.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible bedrock or boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP12**
Contract:	Kilshane	Easting:	710986.675	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742598.125	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	77.96	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	4.90 x 0.65 x 3.00	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
0	0.20	TOPSOIL.		77.5	77.76	0.50	ES	1 1 2 3 3 3	
0.5	0.80	Soft becoming firm light brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		77.0	77.16	1.00	B	7 7 6 7 5 5	
1.0	1.70	Firm light grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		76.5	76.26	2.00	B	3 3 5 4 6 6 8 9 7 8 8 8	
1.5	2.20	Stiff light grey slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		76.0	75.76	2.50	B	7 9 9 21 17 21 22 35	
2.0	3.00	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone .		75.5	74.96				
2.5		**Pit terminated at 3.00m**		75.0					
3.0				74.5					
3.5				74.0					
4.0				73.5					
4.5				73.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Scheduled depth.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP13**
Contract:	Kilshane	Easting:	710901.565	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742581.879	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	78.74	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	4.80 x 0.65 x 2.70	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
		TOPSOIL.						1	
	0.20	Soft becoming firm light brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		78.5	78.54	0.50	ES	2 3 2 2 3	
0.5								6	
				78.0				5 4	
	0.90	Firm becoming stiff light grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 300mm diameter).			77.84	1.00	B	4 5 5	
1.0				77.5				6 6	
1.5								5 4	
				77.0				5 7	
2.0								9 9 8	
	2.20	Dark grey silty sandy fine to coarse angular GRAVEL of limestone with high cobble content. Sand is fine to coarse. Cobbles are angular of limestone.		76.5	76.54			9 9 9	
2.5						2.50	B	8 7	
	2.70	Obstruction - possible bedrock or boulders.		76.0	76.04			35	
		Pit terminated at 2.70m							
3.0									
				75.5					
3.5									
				75.0					
4.0									
				74.5					
4.5									
				74.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible bedrock or boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP14**
Contract:	Kilshane	Easting:	710822.578	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742313.118	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	79.48	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.50 x 0.60 x 2.50	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
		TOPSOIL.			79.28			1	
	0.20	Soft becoming firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.						2	
0.5								1	
								2	
				79.0		0.50	ES	2	
								3	
								6	
								4	
								5	
1.0				78.5		1.00	B	6	
								9	
								8	
								7	
								8	
1.5				78.0				8	
								10	
								10	
	1.80				77.68			14	
		Stiff becoming very stiff light grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 400mm diameter).						14	
2.0				77.5		2.00	B	13	
								12	
								12	
	2.30				77.18			14	
		Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone .						13	
2.5	2.50			77.0	76.98			15	
		Pit terminated at 2.50m						14	
								13	
								13	
								11	
3.0				76.5				13	
								11	
								10	
								7	
								7	
3.5				76.0				8	
								35	
4.0				75.5					
4.5				75.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Strength of soil.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP15**
Contract:	Kilshane	Easting:	710759.726	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742351.280	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	80.58	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.70 x 0.60 x 3.00	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
	0.00	TOPSOIL.		80.5	80.38			1	
	0.20	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.				0.50	ES	3 2 1 2 2 2 4 4 5 4 6 8 5 7 7 6 10 9 13 12 17 17 20 19 17 18 19 19 25 24 28 28 29 28 27 25 23 27 25 26 35	
0.5				80.0					
1.0				79.5		1.00	B		
	1.40	Stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles and boulders are angular to subrounded of limestone (up to 400mm diameter).			79.18				
1.5				79.0					
2.0									
	2.10	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone .		78.5	78.48				
2.5				78.0		2.50	B		
3.0	3.00	**Pit terminated at 3.00m**		77.5	77.58				
3.5				77.0					
4.0				76.5					
4.5				76.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Scheduled depth.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5898	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP16**
Contract:	Kilshane	Easting:	710872.062	Date:	02/11/2021
Location:	Kilshane, Ballycoolin, Dublin 15	Northing:	742360.647	Excavator:	JCB 3CX
Client:	Go Power	Elevation:	79.01	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.70 x 0.60 x 2.80	Scale:	1:25

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples Depth	Type	Probe	Water Strike
		TOPSOIL.						0	
	0.20				78.81			0	
		Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.						0	
0.5				78.5		0.50	ES	1	
								2	
								2	
								2	
								2	
1.0				78.0		1.00	B	2	
								2	
								3	
								5	
								6	
1.5	1.50	Stiff becoming very stiff light grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of limestone. Cobbles are angular to subrounded of limestone.		77.5	77.51			9	
								9	
								8	
								9	
								10	
2.0				77.0		2.00	B	12	
								12	
								13	
								14	
								19	
2.5				76.5				24	
								24	
								23	
	2.70				76.31				
	2.80	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone .			76.21			35	
3.0		**Pit terminated at 2.80m**		76.0					
3.5				75.5					
4.0				75.0					
4.5				74.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Strength of soil.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

TP01 Sidewall

TP01 Spoil

TP02 Sidewall

TP02 Spoil

TP03 Sidewall

TP03 Spoil

TP04 Sidewall

TP04 Spoil

TP05 Sidewall

TP05 Spoil

TP06 Sidewall

TP06 Spoil

TP07 Sidewall

TP07 Spoil

TP08 Sidewall

TP08 Spoil

TP09 Sidewall

TP09 Spoil

TP10 Sidewall

TP10 Spoil

TP11 Sidewall

TP11 Spoil

TP12 Sidewall

TP12 Spoil

TP13 Sidewall

TP13 Spoil

TP14 Sidewall

TP14 Spoil

TP15 Sidewall

TP15 Spoil

TP16 Sidewall

TP16 Spoil

Appendix 3

Soakaway Test Results and Photographs

SOAKAWAY TEST

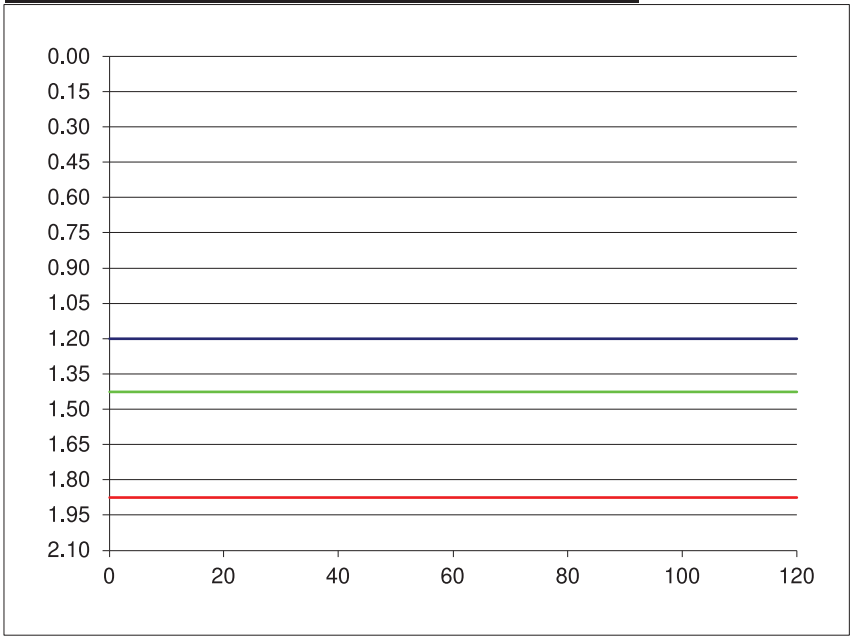
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK02
Date:	03/11/2021

Ground Conditions

From	To	
0.00	0.30	TOPSOIL.
0.30	2.00	Firm becoming stiff light grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content.
2.00	2.10	Stiff black slightly sandy slightly gravelly silty CLAY with medium cobble content.

Elapsed Time (mins)	Fall of Water (m)
0	1.20
0.5	1.20
1	1.20
1.5	1.20
2	1.20
2.5	1.20
3	1.20
3.5	1.20
4	1.20
4.5	1.20
5	1.20
6	1.20
7	1.20
8	1.20
9	1.20
10	1.20
12	1.20
14	1.20
16	1.20
18	1.20
20	1.20
25	1.20
30	1.20
40	1.20
50	1.20
60	1.20
75	1.20
90	1.20
120	1.20

Pit Dimensions (m)		
Length (m)	2.80	m
Width (m)	0.60	m
Depth	2.10	m
Water		
Start Depth of Water	1.20	m
Depth of Water	0.90	m
75% Full	1.43	m
25% Full	1.88	m
75%-25%	0.45	m
Volume of water (75%-25%)	**0.76**	m3
Area of Drainage	**14.28**	m2
Area of Drainage (75%-25%)	**4.74**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

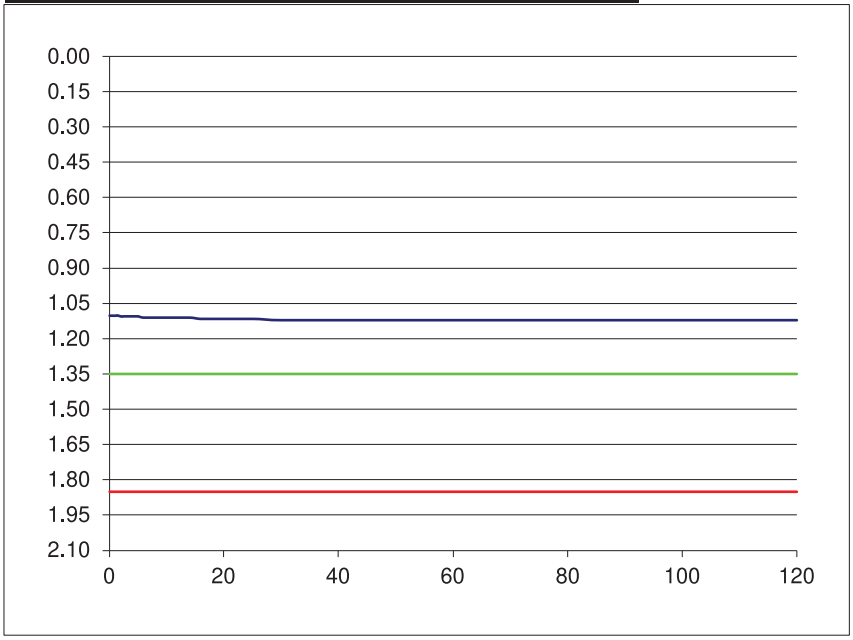
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK07
Date:	03/11/2021

Ground Conditions

From	To	
0.00	0.30	TOPSOIL.
0.30	2.00	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with low cobble content.
1.70	2.10	Stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content and frequent gravel laminas.

Elapsed Time (mins)	Fall of Water (m)
0	1.10
0.5	1.10
1	1.10
1.5	1.10
2	1.11
2.5	1.11
3	1.11
3.5	1.11
4	1.11
4.5	1.11
5	1.11
6	1.11
7	1.11
8	1.11
9	1.11
10	1.11
12	1.11
14	1.11
16	1.12
18	1.12
20	1.12
25	1.12
30	1.12
40	1.12
50	1.12
60	1.12
75	1.12
90	1.12
120	1.12

Pit Dimensions (m)		
Length (m)	2.70	m
Width (m)	0.60	m
Depth	2.10	m
Water		
Start Depth of Water	1.10	m
Depth of Water	1.00	m
75% Full	1.35	m
25% Full	1.85	m
75%-25%	0.50	m
Volume of water (75%-25%)	**0.81**	m3
Area of Drainage	**13.86**	m2
Area of Drainage (75%-25%)	**4.92**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

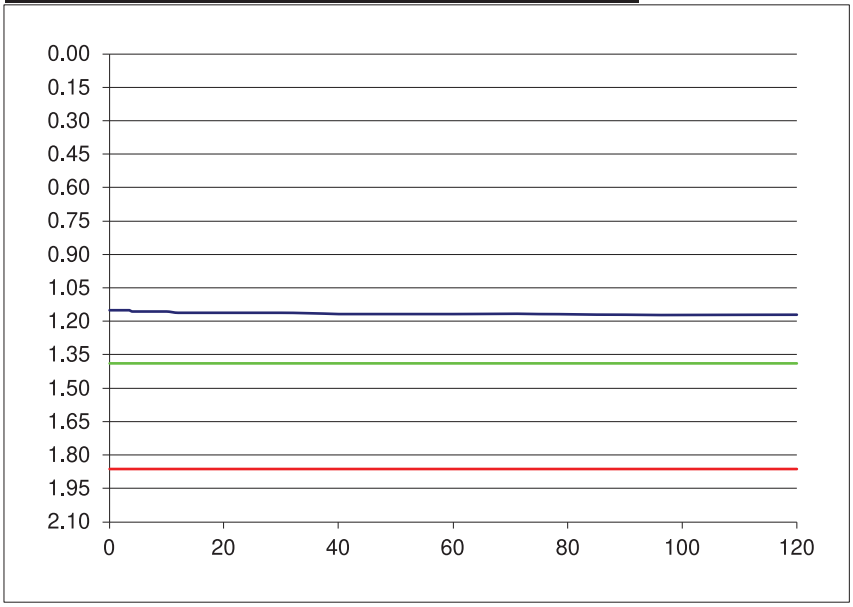
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK09
Date:	03/11/2021

Ground Conditions

From	To	
0.00	0.30	TOPSOIL.
0.30	0.60	Soft light brown slightly sandy slightly gravelly silty CLAY with low cobble content.
0.60	1.20	Firm grey brown slightly sandy gravelly silty CLAY with high cobble content.
1.20	2.10	Firm becoming stiff grey brown slightly sandy gravelly silty CLAY with high cobble and medium boulder content.

Elapsed Time (mins)	Fall of Water (m)
0	1.15
0.5	1.15
1	1.15
1.5	1.15
2	1.15
2.5	1.15
3	1.15
3.5	1.15
4	1.16
4.5	1.16
5	1.16
6	1.16
7	1.16
8	1.16
9	1.16
10	1.16
12	1.16
14	1.16
16	1.16
18	1.16
20	1.16
25	1.16
30	1.16
40	1.17
50	1.17
60	1.17
75	1.17
90	1.17
120	1.17

Pit Dimensions (m)		
Length (m)	2.50	m
Width (m)	0.60	m
Depth	2.10	m
Water		
Start Depth of Water	1.15	m
Depth of Water	0.95	m
75% Full	1.39	m
25% Full	1.86	m
75%-25%	0.48	m
Volume of water (75%-25%)	**0.71**	m3
Area of Drainage	**13.02**	m2
Area of Drainage (75%-25%)	**4.45**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

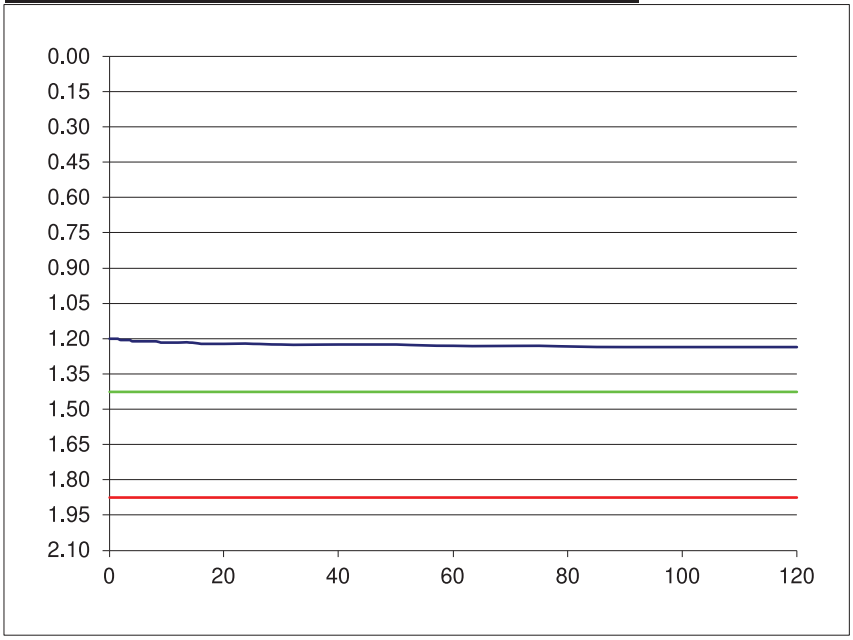
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK10
Date:	03/11/2021

Ground Conditions

From	To	
0.00	0.30	TOPSOIL.
0.30	0.90	Soft becoming firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble and low boulder content.
0.90	2.10	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content.

Elapsed Time (mins)	Fall of Water (m)
0	1.20
0.5	1.20
1	1.20
1.5	1.20
2	1.21
2.5	1.21
3	1.21
3.5	1.21
4	1.21
4.5	1.21
5	1.21
6	1.21
7	1.21
8	1.21
9	1.22
10	1.22
12	1.22
14	1.22
16	1.22
18	1.22
20	1.22
25	1.22
30	1.23
40	1.23
50	1.23
60	1.23
75	1.23
90	1.24
120	1.24

Pit Dimensions (m)		
Length (m)	2.80	m
Width (m)	0.60	m
Depth	2.10	m
Water		
Start Depth of Water	1.20	m
Depth of Water	0.90	m
75% Full	1.43	m
25% Full	1.88	m
75%-25%	0.45	m
Volume of water (75%-25%)	**0.76**	m3
Area of Drainage	**14.28**	m2
Area of Drainage (75%-25%)	**4.74**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

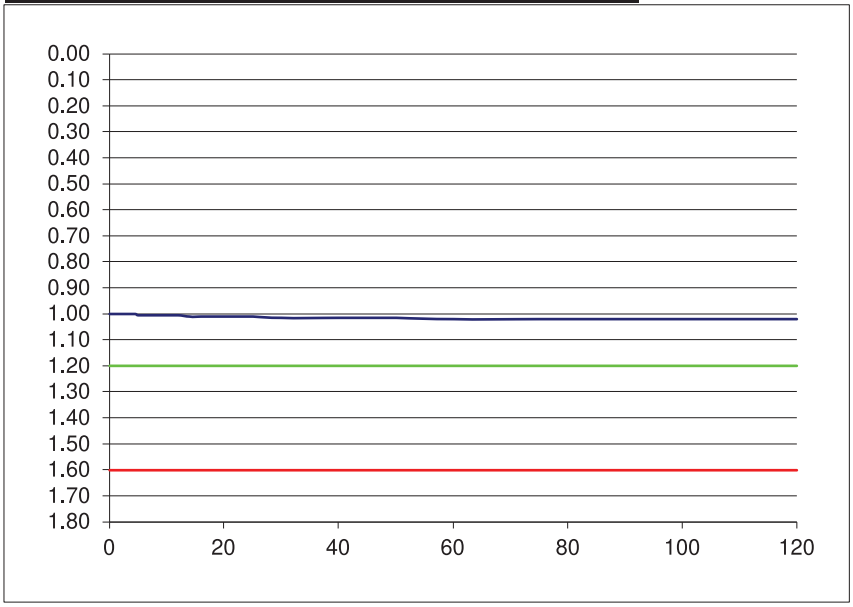
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK11
Date:	03/11/2021

Ground Conditions

From	To	
0.00	0.30	TOPSOIL.
0.30	0.90	Soft becoming firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content.
1.00	1.80	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content.
1.80		Obstruction - possible bedrock or boulders.

Elapsed Time (mins)	Fall of Water (m)
0	1.00
0.5	1.00
1	1.00
1.5	1.00
2	1.00
2.5	1.00
3	1.00
3.5	1.00
4	1.00
4.5	1.00
5	1.01
6	1.01
7	1.01
8	1.01
9	1.01
10	1.01
12	1.01
14	1.01
16	1.01
18	1.01
20	1.01
25	1.01
30	1.02
40	1.02
50	1.02
60	1.02
75	1.02
90	1.02
120	1.02

Pit Dimensions (m)		
Length (m)	2.70	m
Width (m)	0.60	m
Depth	1.80	m
Water		
Start Depth of Water	1.00	m
Depth of Water	0.80	m
75% Full	1.20	m
25% Full	1.60	m
75%-25%	0.40	m
Volume of water (75%-25%)	**0.65**	m3
Area of Drainage	**11.88**	m2
Area of Drainage (75%-25%)	**4.26**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

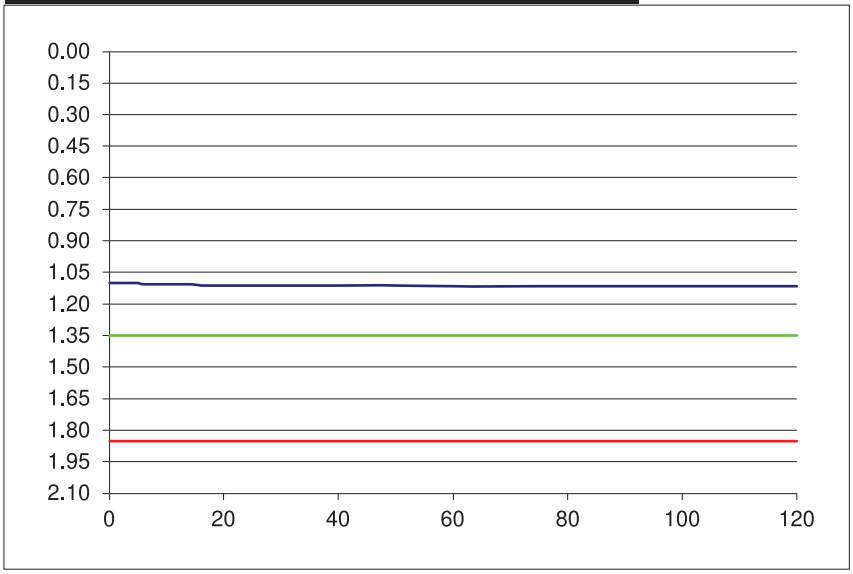
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK12
Date:	03/11/2021

Ground Conditions

From	To	
0.00	0.20	TOPSOIL.
0.20	0.80	Soft becoming firm light brown slightly sandy slightly gravelly silty CLAY with low cobble content.
0.80	1.70	Firm light grey slightly sandy slightly gravelly silty CLAY with medium cobble content.
1.70	2.10	Stiff light grey slightly sandy slightly gravelly silty CLAY with high cobble content.

Elapsed Time (mins)	Fall of Water (m)
0	1.10
0.5	1.10
1	1.10
1.5	1.10
2	1.10
2.5	1.10
3	1.10
3.5	1.10
4	1.10
4.5	1.10
5	1.10
6	1.11
7	1.11
8	1.11
9	1.11
10	1.11
12	1.11
14	1.11
16	1.11
18	1.11
20	1.11
25	1.11
30	1.11
40	1.11
50	1.11
60	1.12
75	1.12
90	1.12
120	1.12

Pit Dimensions (m)		
Length (m)	2.80	m
Width (m)	0.60	m
Depth	2.10	m
Water		
Start Depth of Water	1.10	m
Depth of Water	1.00	m
75% Full	1.35	m
25% Full	1.85	m
75%-25%	0.50	m
Volume of water (75%-25%)	**0.84**	m3
Area of Drainage	**14.28**	m2
Area of Drainage (75%-25%)	**5.08**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

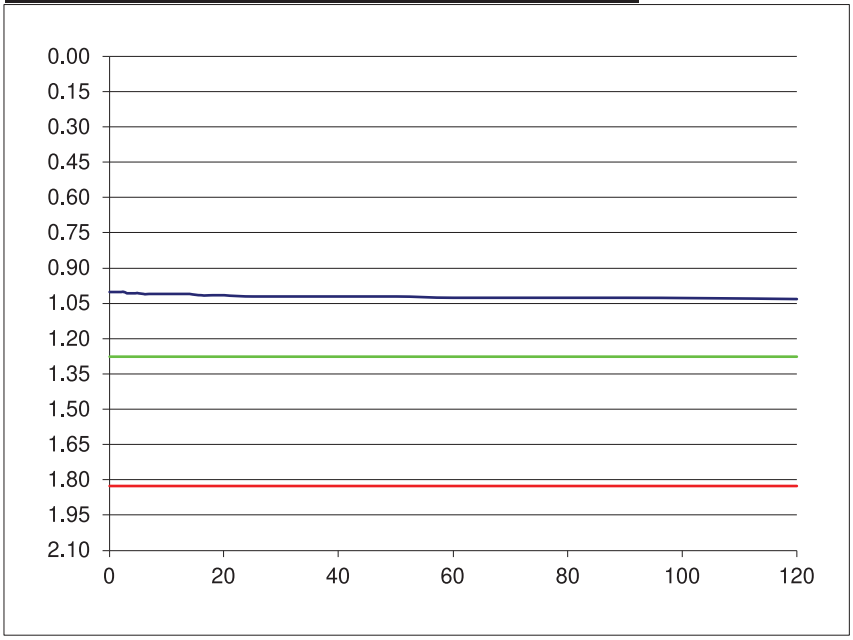
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK13
Date:	03/11/2021

Ground Conditions

From	To	
0.00	0.20	TOPSOIL.
0.20	0.90	Soft becoming firm light brown slightly sandy slightly gravelly silty CLAY with low cobble content.
0.90	2.10	Firm becoming stiff light grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content.

Elapsed Time (mins)	Fall of Water (m)
0	1.00
0.5	1.00
1	1.00
1.5	1.00
2	1.00
2.5	1.00
3	1.01
3.5	1.01
4	1.01
4.5	1.01
5	1.01
6	1.01
7	1.01
8	1.01
9	1.01
10	1.01
12	1.01
14	1.01
16	1.02
18	1.02
20	1.02
25	1.02
30	1.02
40	1.02
50	1.02
60	1.03
75	1.03
90	1.03
120	1.03

Pit Dimensions (m)		
Length (m)	3.00	m
Width (m)	0.60	m
Depth	2.10	m
Water		
Start Depth of Water	1.00	m
Depth of Water	1.10	m
75% Full	1.28	m
25% Full	1.83	m
75%-25%	0.55	m
Volume of water (75%-25%)	**0.99**	m3
Area of Drainage	**15.12**	m2
Area of Drainage (75%-25%)	**5.76**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

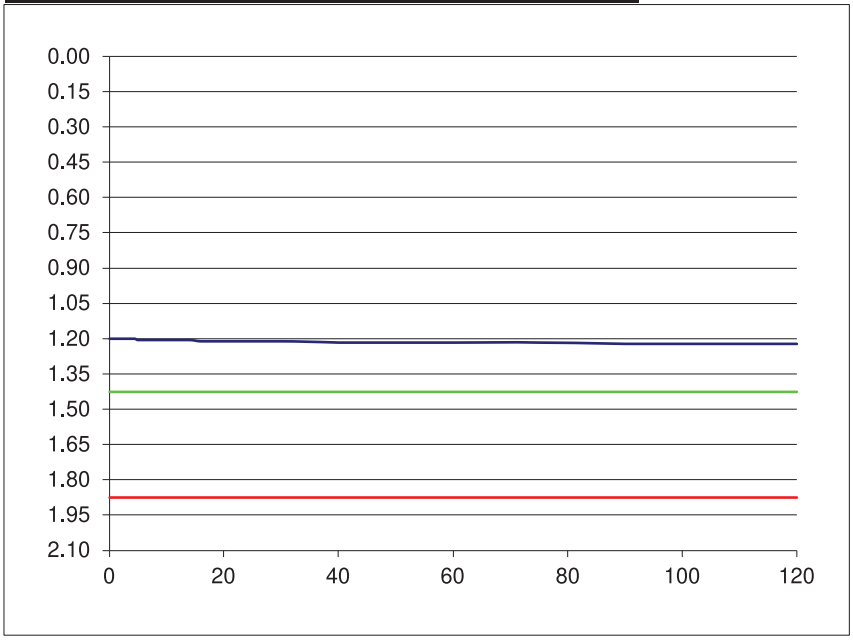
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK16
Date:	03/11/2021

Ground Conditions

From	To	
0.00	0.20	TOPSOIL.
0.20	1.50	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content.
1.50	2.10	Stiff becoming very stiff light grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content.

Elapsed Time (mins)	Fall of Water (m)
0	1.20
0.5	1.20
1	1.20
1.5	1.20
2	1.20
2.5	1.20
3	1.20
3.5	1.20
4	1.20
4.5	1.20
5	1.21
6	1.21
7	1.21
8	1.21
9	1.21
10	1.21
12	1.21
14	1.21
16	1.21
18	1.21
20	1.21
25	1.21
30	1.21
40	1.22
50	1.22
60	1.22
75	1.22
90	1.22
120	1.22

Pit Dimensions (m)		
Length (m)	2.70	m
Width (m)	0.60	m
Depth	2.10	m
Water		
Start Depth of Water	1.20	m
Depth of Water	0.90	m
75% Full	1.43	m
25% Full	1.88	m
75%-25%	0.45	m
Volume of water (75%-25%)	**0.73**	m3
Area of Drainage	**13.86**	m2
Area of Drainage (75%-25%)	**4.59**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SK02 Sidewall

SK02 Spoil

SK07 Sidewall

SK07 Spoil

SK09 Sidewall

SK09 Spoil

SK10 Sidewall

SK10 Spoil

SK11 Sidewall

SK11 Spoil

SK12 Sidewall

SK12 Spoil

SK13 Sidewall

SK13 Spoil

SK16 Sidewall

SK16 Spoil

Appendix 4

Percolation Test Reports

KILSHANE ENERGY LTD. - TEST NO. 1

3.2 Trial Hole (should be a minimum of 2.1m deep (3m for regionally important aquifers))

To avoid any accidental damage, a trial hole assessment or percolation tests should not be undertaken in areas which are at or adjacent to significant sites, (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from National Parks and Wildlife Service or the Heritage Service.

Depth of trial hole (m): 2.1

Depth from ground surface to bedrock (m) (if present):

Depth from ground surface to water table (m) (if present):

Depth of water ingress:

Rock type (if present):

Date and time of excavation: 29-Nov-2021 11:03 Date and time of examination: 01-Dec-2021 11:29

Depth of Surface and Subsurface Percolation Tests	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m	TOPSOIL		Crumb	Firm	Brown	Random
0.2 m						
0.3 m						
0.4 m S123						
0.5 m						
0.6 m	Sandy gravelly CLAY (mottled from 0.40m)		Structureless massive	Firm	Brown	Random
0.7 m						
0.8 m SS123						
0.9 m						
1.0 m						
1.1 m						
1.2 m						
1.3 m						
1.4 m						
1.5 m	Sandy gravelly CLAY		Structureless massive	Stiff	Dark grey brown	Random
1.6 m						
1.7 m						
1.8 m						
1.9 m						
2.0 m						
2.1 m						
2.2 m						
2.3 m						
2.4 m						
2.5 m						
2.6 m						
2.7 m						
2.8 m						
2.9 m						
3.0 m						
3.1 m						
3.2 m						
3.3 m						
3.4 m						
3.5 m						

Likely Subsurface Percolation Value:

Likely Surface Percolation Value:

Note: *Depth of percolation test holes should be indicated on log above. ('Enter Surface or Subsurface at depths as appropriate).
** See Appendix E for BS 5930 classification.
*** 3 samples to be tested for each horizon and results should be entered above for each horizon.
**** All signs of mottling should be recorded.

3.2 Trial Hole (contd.) Evaluation:

No bedrock or groundwater was encountered at the excavated depth of 2.10m

3.3(a) Subsurface Percolation Test for Subsoil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm) (A)	500	500	500
Depth from ground surface to base of hole (mm) (B)	900	900	900
Depth of hole (mm) [B - A]	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

		1	2	3
Pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	11:31	11:31	11:31
2nd pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	13:46	13:46	13:46

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	02-12-2021	02-12-2021	02-12-2021
Time filled to 400 mm	09:26	09:26	09:26
Time water level at 300 mm	11:58	11:22	11:38
Time (min.) to drop 100 mm (T_{100})	152.00	116.00	132.00
Average T_{100}			133.33

If T_{100} > 300 minutes then Subsurface Percolation value >120 – site unsuitable for discharge to ground
If $T_{100} \leq 210$ minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	11:58	14:58	180.00	11:22	13:38	136.00	11:38	14:10	152.00
2	15:02	18:38	216.00	13:41	16:25	164.00	14:14	17:15	181.00
3	18:42	23:06	264.00	16:29	19:49	200.00	17:20	20:17	177.00
Average Δt Value			220.00			166.67			170.00
	Average Δt/4 = [Hole No.1]		55.00 (t_1)	Average Δt/4 = [Hole No.2]		41.67 (t_2)	Average Δt/4 = [Hole No.3]		42.50 (t_3)

Result of Test: Subsurface Percolation Value = 46.39 (min/25 mm)

Comments:

T = 46. T Test Passed.

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No.	1					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No.	2					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Percolation Test Hole No.	3					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Tim§e hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_2)			0.00

Result of Test: Subsurface Percolation Value =

0.00 (min/25 mm)

Comments:

3.3(b) Surface Percolation Test for Soil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)	0	0	0
Depth from ground surface to base of hole (mm)	400	400	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

		1	2	3
Pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	11:33	11:33	11:33
2nd pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	15:56	15:56	15:56

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	02-Dec-21	02-Dec-21	02-Dec-2021
Time filled to 400 mm	09:26	09:26	09:26
Time water level at 300 mm	12:30	12:06	10:14
Time to drop 100 mm (T_{100})	184.00	160.00	48.00
Average T_{100}			130.67

If T_{100} > 300 minutes then Surface Percolation value >90 – site unsuitable for discharge to ground
If $T_{100} \leq$ 210 minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)
1	12:30	15:50	200.00	12:06	15:02	176.00	10:14	11:14	60.00
2	15:53	19:33	220.00	15:05	18:21	196.00	11:18	12:42	84.00
3	19:37	23:45	248.00	18:26	22:10	224.00	12:47	14:03	76.00
Average ΔT Value			222.67			198.67			73.33

Average ΔT/4 = [Hole No.1] 55.67 (T_1)

Average ΔT/4 = [Hole No.2] 49.67 (T_2)

Average ΔT/4 = [Hole No.3] 18.33 (T_3)

Result of Test: Surface Percolation Value = 41.22 (min/25 mm)

Comments:

P = 41. Test Passed.

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No. 1

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No. 2

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Result of Test: Surface Percolation Value = 0.00 (min/25 mm)

Percolation Test Hole No. 3

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_2)			0.00

Comments:

KILSHANE ENERGY LTD. SITE – Photos of Test 1

Figure 1. Trial Pit

Figure 2. T – Test 1

Figure 3. T – Test 2

Figure 4. T – Test 3

Figure 5. P – Test 1

Figure 6. P – Test 2

KILSHANE ENERGY LTD. SITE – Photos of Test 1

Figure 7. P – Test 3

Figure 8. View of site

KILSHANE ENERGY LTD. - TEST NO. 2

3.2 Trial Hole (should be a minimum of 2.1m deep (3m for regionally important aquifers))

To avoid any accidental damage, a trial hole assessment or percolation tests should not be undertaken in areas which are at or adjacent to significant sites, (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from National Parks and Wildlife Service or the Heritage Service.

Depth of trial hole (m): 2.1

Depth from ground surface to bedrock (m) (if present):

Depth from ground surface to water table (m) (if present):

Depth of water ingress:

Rock type (if present):

Date and time of excavation: 29-Nov-2021 10:31 Date and time of examination: 01-Dec-2021 11:10

Depth of Surface and Subsurface Percolation Tests	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m						
0.2 m	TOPSOIL		Crumb	Firm	Brown	Random
0.3 m						
0.4 m S123						
0.5 m						
0.6 m	Sandy gravelly CLAY (mottled from 0.50m)		Structureless massive	Firm	Brown	Random
0.7 m						
0.8 m SS123						
0.9 m						
1.0 m						
1.1 m						
1.2 m						
1.3 m						
1.4 m						
1.5 m						
1.6 m	Sandy gravelly CLAY		Structureless massive	Stiff	Dark grey brown	Random
1.7 m						
1.8 m						
1.9 m						
2.0 m						
2.1 m						
2.2 m						
2.3 m						
2.4 m						
2.5 m						
2.6 m						
2.7 m						
2.8 m						
2.9 m						
3.0 m						
3.1 m						
3.2 m						
3.3 m						
3.4 m						
3.5 m						

Likely Subsurface Percolation Value:

Likely Surface Percolation Value:

Note: *Depth of percolation test holes should be indicated on log above. ('Enter Surface or Subsurface at depths as appropriate).
** See Appendix E for BS 5930 classification.
*** 3 samples to be tested for each horizon and results should be entered above for each horizon.
**** All signs of mottling should be recorded.

3.2 Trial Hole (contd.) Evaluation:

No bedrock or groundwater was encountered at the excavated depth of 2.10m

3.3(a) Subsurface Percolation Test for Subsoil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm) (A)	500	500	500
Depth from ground surface to base of hole (mm) (B)	900	900	900
Depth of hole (mm) [B - A]	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

Pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	11:02	11:02	11:02
2nd pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	13:16	13:16	13:16

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	02-12-2021	02-12-2021	02-12-2021
Time filled to 400 mm	09:11	09:11	09:11
Time water level at 300 mm	10:13	11:03	10:39
Time (min.) to drop 100 mm (T_{100})	62.00	112.00	88.00
Average T_{100}			87.33

If T_{100} > 300 minutes then Subsurface Percolation value >120 – site unsuitable for discharge to ground
If $T_{100} \leq$ 210 minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	10:13	11:37	84.00	11:03	13:19	136.00	10:39	12:35	116.00
2	11:40	13:32	112.00	13:22	16:06	164.00	12:39	15:11	152.00
3	13:36	16:12	156.00	16:10	19:34	204.00	15:15	18:31	196.00
Average Δt Value			117.33			168.00			154.67
	Average Δt/4 = [Hole No.1]		29.33 (t_1)	Average Δt/4 = [Hole No.2]		42.00 (t_2)	Average Δt/4 = [Hole No.3]		38.67 (t_3)

Result of Test: Subsurface Percolation Value = 36.67 (min/25 mm)

Comments:

T = 37. T Test Passed.

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No. 1

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No. 2

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Result of Test: Subsurface Percolation Value = 0.00 (min/25 mm)

Percolation Test Hole No. 3

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Tim§e hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_2)			0.00

Comments:

3.3(b) Surface Percolation Test for Soil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)	0	0	0
Depth from ground surface to base of hole (mm)	400	400	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

		1	2	3
Pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	11:05	11:05	11:05
2nd pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	14:52	14:52	14:52

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	02-Dec-21	02-Dec-21	02-Dec-2021
Time filled to 400 mm	09:11	09:11	09:11
Time water level at 300 mm			
Time to drop 100 mm (T_{100})	889.00	889.00	889.00
Average T_{100}			889.00

If T_{100} > 300 minutes then Surface Percolation value >90 – site unsuitable for discharge to ground
If $T_{100} \leq$ 210 minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)
1			0.00			0.00			0.00
2			0.00			0.00			0.00
3			0.00			0.00			0.00
Average ΔT Value			0.00			0.00			0.00

Average ΔT/4 = [Hole No.1] 0.00 (T_1)

Average ΔT/4 = [Hole No.2] 0.00 (T_2)

Average ΔT/4 = [Hole No.3] 0.00 (T_3)

Result of Test: Surface Percolation Value = 0.00 (min/25 mm)

Comments:

P Test failed as there was no percolation after120 minutes

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No. 1

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No. 2

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Result of Test: Surface Percolation Value = 0.00 (min/25 mm)

Percolation Test Hole No. 3

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_2)			0.00

Comments:

KILSHANE ENERGY LTD. SITE – Photos of Test 2

Figure 1. Trial Pit

Figure 2. T – Test 1

Figure 3. T – Test 2

Figure 4. T – Test 3

Figure 5. P – Test 1

Figure 6. P – Test 2

KILSHANE ENERGY LTD. SITE – Photos of Test 2

Figure 7. P – Test 3

Figure 8. View of site

APPENDIX A: SITE CHARACTERISATION FORM

File Reference:

1.0 GENERAL DETAILS (From planning application)

Prefix: First Name: Kilshane Energy Ltd. Surname:

Address:

Kilshane, Dublin 11

Site Location and Townland:

Kilshane, Dublin 11

Number of Bedrooms: Maximum Number of Residents: 4

Comments on population equivalent

Ignore above number of residents above. Project Engineers have provided a Population Equivalent of 12 for the proposed development.

Proposed Water Supply:

Mains ✓ Private Well/Borehole ☐ Group Well/Borehole ☐

2.0 GENERAL DETAILS (From planning application)

Soil Type, (Specify Type): Till derived chiefly from limestone

Subsoil, (Specify Type): Till derived from limestones. Deep well drained mineral (Mainly basic)

Bedrock Type: Tober Colleen Formation. Dinantian Upper Impure Limestones

Aquifer Category: Regionally Important Locally Important Poor Pl

Vulnerability: Extreme ✓ High ☐ Moderate ☐ Low ☐

Groundwater Body: Swords Status Good

Name of Public/Group Scheme Water Supply within 1 km:

Source Protection Area: ZOC ☐ SI ☐ SO ☐ Groundwater Protection Response: R2[1]

Presence of Significant Sites (Archaeological, Natural & Historical): NONE NOTED

Past experience in the area: NO

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, and/or any potential site restrictions).

From above assessment, the site is suitable for on site effluent treatment.
Groundwater is a target risk.

Note: Only information available at the desk study stage should be used in this section.

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment

Landscape Position: Flat Site

Slope: Steep (>1:5) ☐ Shallow (1:5-1:20) ☐ Relatively Flat (<1:20) ☑

Slope Comment | | | Area tested is <1:8

Surface Features within a minimum of 250m (Distance To Features Should Be Noted In Metres)

Houses:

Houses>50m

Existing Land Use:

AGRICULTURE

Vegetation Indicators:

None noted

Groundwater Flow Direction: North

Ground Condition:

Firm

Site Boundaries:

>3m

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment (contd.)

Roads:

>10m

Outcrops (Bedrock And/Or Subsoil):

None noted

Surface Water Ponding:

None noted

Lakes:

None noted

Beaches/Shellfish Areas:

None noted

Wetlands:

None noted

Karst Features:

None noted

Watercourses/Streams:*

None noted

***Note and record** water level

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment (contd.)

Drainage Ditches:*

>100m. Dry

Springs:*

None noted

Wells:*

None noted. Wells to be >40m from proposed/existing polishing filters/percolation areas.

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, the suitability of the site to treat the wastewater and the location of the proposed system within the site).

From above assessment, the site is suitable for on site effluent treatment.
Groundwater is a target risk.

***Note and record** water level

3.2 Trial Hole (should be a minimum of 2.1m deep (3m for regionally important aquifers))

To avoid any accidental damage, a trial hole assessment or percolation tests should not be undertaken in areas which are at or adjacent to significant sites, (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from National Parks and Wildlife Service or the Heritage Service.

Depth of trial hole (m): 2.1

Depth from ground surface to bedrock (m) (if present):

Depth from ground surface to water table (m) (if present):

Depth of water ingress:

Rock type (if present):

Date and time of excavation: 29-Nov-2021 09:15 Date and time of examination: 01-Dec-2021 10:05

Depth of Surface and Subsurface Percolation Tests	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m						
0.2 m	TOPSOIL		Crumb	Firm	Brown	Random
0.3 m						
0.4 m S123						
0.5 m						
0.6 m	Sandy gravelly CLAY	Threads 3, 3, 4 Ribbon100,100,110 Not dilatant	Structureless massive	Firm	Brown	Random
0.7 m						
0.8 m SS123						
0.9 m						
1.0 m						
1.1 m						
1.2 m						
1.3 m						
1.4 m	Sandy gravelly CLAY	Threads 3, 4, 4 Ribbon110,120,110 Not dilatant	Structureless massive	Stiff	Grey brown	Random
1.5 m						
1.6 m						
1.7 m						
1.8 m						
1.9 m						
2.0 m						
2.1 m						
2.2 m						
2.3 m						
2.4 m						
2.5 m						
2.6 m						
2.7 m						
2.8 m						
2.9 m						
3.0 m						
3.1 m						
3.2 m						
3.3 m						
3.4 m						
3.5 m						

Likely Subsurface Percolation Value:

Likely Surface Percolation Value:

Note: *Depth of percolation test holes should be indicated on log above. ('Enter Surface or Subsurface at depths as appropriate).
** See Appendix E for BS 5930 classification.
*** 3 samples to be tested for each horizon and results should be entered above for each horizon.
**** All signs of mottling should be recorded.

3.2 Trial Hole (contd.) Evaluation:

No bedrock or groundwater was encountered at the excavated depth of 2.10m

3.3(a) Subsurface Percolation Test for Subsoil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm) (A)	500	500	500
Depth from ground surface to base of hole (mm) (B)	900	900	900
Depth of hole (mm) [B - A]	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

Pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	10:22	10:22	10:22
2nd pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	11:36	11:36	11:36

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	02-12-2021	02-12-2021	02-12-2021
Time filled to 400 mm	10:18	10:18	10:18
Time water level at 300 mm	10:46	11:34	11:32
Time (min.) to drop 100 mm (T_{100})	28.00	76.00	74.00
Average T_{100}			59.33

If T_{100} > 300 minutes then Subsurface Percolation value >120 – site unsuitable for discharge to ground
If $T_{100} \leq 210$ minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	10:46	11:22	36.00	11:34	13:02	88.00	11:32	12:57	85.00
2	11:25	12:12	47.00	13:06	14:49	103.00	13:01	14:40	99.00
3	12:15	13:21	66.00	14:53	16:58	125.00	14:44	16:45	121.00
Average Δt Value			49.67			105.33			101.67
	Average Δt/4 = [Hole No.1]		12.42 (t_1)	Average Δt/4 = [Hole No.2]		26.33 (t_2)	Average Δt/4 = [Hole No.3]		25.42 (t_3)

Result of Test: Subsurface Percolation Value = 21.39 (min/25 mm)

Comments:

T = 22. T Test Passed.

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No.	1					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No.	2					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Percolation Test Hole No.	3					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Tim§e hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_2)			0.00

Result of Test: Subsurface Percolation Value =

0.00 (min/25 mm)

Comments:

3.3(b) Surface Percolation Test for Soil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)	0	0	0
Depth from ground surface to base of hole (mm)	400	400	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

		1	2	3
Pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	10:31	10:31	10:31
2nd pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	12:28	12:28	12:28

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	02-Dec-21	02-Dec-21	02-Dec-2021
Time filled to 400 mm	10:18	10:18	10:18
Time water level at 300 mm	11:06	10:30	10:58
Time to drop 100 mm (T_{100})	48.00	12.00	40.00
Average T_{100}			33.33

If T_{100} > 300 minutes then Surface Percolation value >90 – site unsuitable for discharge to ground
If $T_{100} \leq$ 210 minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)
1	11:06	11:59	53.00	10:30	10:42	12.00	10:58	11:44	46.00
2	12:03	13:04	61.00	10:45	11:00	15.00	11:48	12:43	55.00
3	13:08	14:22	74.00	11:03	11:24	21.00	12:46	13:54	68.00
Average ΔT Value			62.67			16.00			56.33
	Average ΔT/4 = [Hole No.1]		15.67 (T_1)	Average ΔT/4 = [Hole No.2]		4.00 (T_2)	Average ΔT/4 = [Hole No.3]		14.08 (T_3)

Result of Test: Surface Percolation Value = 11.25 (min/25 mm)

Comments:

P = 11. Test Passed.

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No. 1

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No. 2

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Result of Test: Surface Percolation Value = 0.00 (min/25 mm)

Percolation Test Hole No. 3

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_2)			0.00

Comments:

3.4 The following associated Maps, Drawings and Photographs should be appended to this site characterisation form.

1. Discovery Series 1:50,000 Map indicating overall drainage, groundwater flow direction and housing density in the area.
2. Supporting maps for vulnerability, aquifer classification, soil, subsoil, bedrock.
3. North point should always be included.
4. (a) Scaled sketch of site showing measurements to Trial Hole location and
   (b) Percolation Test Hole locations,
   (c) wells and
   (d) direction of groundwater flow (if known),
   (e) proposed house (incl. distances from boundaries)
   (f) adjacent houses,
   (g) watercourses,
   (h) significant sites
   (i) and other relevant features.
5. Site specific cross sectional drawing of the site and the proposed layout[1] should be submitted.
6. Photographs of the trial hole, test holes and site including landmarks (date and time referenced).
7. Pumped design must be designed by a suitably qualified person.

[1] The calculated percolation area or polishing filter area should be set out accurately on the site layout drawing in accordance with the code of practice's requirements.

4.0 CONCLUSION of SITE CHARACTERISATION

Integrate the information from the desk study and on-site assessment (i.e. visual assessment, trial hole and percolation tests) above and conclude the type of system(s) that is (are) appropriate. This information is also used to choose the optimum final disposal route of the treated wastewater.

Slope of proposed infiltration / treatment area: 0-1%

Are all minimum separation distances met? ✓

Depth of unsaturated soil and/or subsoil beneath invert of gravel (or drip tubing in the case of drip dispersal system) 0.90

Percolation test result: Surface: 11.00 Sub-surface: 22.00

Not Suitable for Development ☐ **Suitable for Development** ✓

Identify all suitable options

1. Septic tank system (septic tank and percolation area) **(Chapter 7)** — No
2. Secondary Treatment System **(Chapters 8 and 9)** and soil polishing filter **(Section 10.1)** — Yes
3. Tertiary Treatment System and Infiltration / treatment area **(Section 10.2)** — Yes

Discharge Route [1]

Groundwater

5.0 SELECTED DWWTS

Propose to install: Secondary Treatment System and soil polishing filter

and discharge to: Ground Water

Invert level of the trench/bed gravel or drip tubing (m) 0.75

Site Specific Conditions (e.g. special works, site improvement works testing etc.

The polishing filter must have a minimum thickness of 900mm of free draining unsaturated soil between the point of infiltration of the effluent and the water table or bedrock. The Polishing filter must be constructed in accordance with section 10.1, EPA CoP 2021, Treatment Systems for Small Communities, Business, Leisure Centres and Hotels and under the supervision of a suitably qualified person.

All works must be supervised and certified by a suitably qualified Civil Engineer or similar qualified person approved by the Local Authority.
Confirmation from the effluent treatment system suppliers that the system has been installed and is functioning correctly, should be obtained by the client.

The client must enter a maintenance contract and the system should be serviced periodically. The tank should be de-sludged periodically by a licensed contractor.

[1] A discharge of sewage effluent to "waters" (definition includes any or any part of any river, stream, lake, canal, reservoir, aquifer, pond, watercourse or other inland waters, whether natural or artificial) will require a licence under the Water Pollution Acts 1977-90. Refer to Section 2.4.

6.0 TREATMENT SYSTEM DETAILS

SYSTEM TYPE: Septic Tank Systems (Chapter 7)

Tank Capacity (m^3)		Percolation Area		Mounded Percolation Area	
		No. of Trenches		No. of Trenches	
		Length of Trenches (m)		Length of Trenches (m)	
		Invert Level (m)		Invert Level (m)	

SYSTEM TYPE: Secondary Treatment System (Chapters 8 and 9) and polishing filter (Section 10.1)

Secondary Treatment Systems receiving septic tank effluent (Chapter 8)

Media Type	Area (m^2)*	Depth of Filter	Invert Level
Sand/Soil			
Soil			
Constructed Wetland			
Other			

Packaged Secondary Treatment Systems receiving raw wastewater (Chapter 9)

Type	See site suitability report
Capacity PE	12
Sizing of Primary Compartment	1.80 m^3

Polishing Filter*: (Section 10.1)

Surface Area (m^2)*		Option 3 - Gravity Discharge Trench length (m)	
Option 1 - Direct Discharge Surface area (m^2)		Option 4 - Low Pressure Pipe Distribution Trench length (m)	
Option 2 - Pumped Discharge Surface area (m^2)	180.00	Option 5 - Drip Dispersal Surface area (m^2)	

SYSTEM TYPE: Tertiary Treatment System and infiltration / treatment area (Section 10.2)

Identify purpose of tertiary treatment	Provide performance information demonstrating system will provide required treatment levels	Provide design information
Provide adequate treatment of effluent.	See site suitability report	See site suitability report and drawing attached

DISCHARGE ROUTE:

Groundwater	✓	Hydraulic Loading Rate * ($l/m^2.d$)		Surface area (m^2)	
Surface Water **		Discharge Rate (m^3/hr)			

* Hydraulic loading rate is determined by the percolation rate of subsoil

** Water Pollution Act discharge licence required

6.0 TREATMENT SYSTEM DETAILS

QUALITY ASSURANCE:

Installation & Commissioning

Installation should be supervised and certified by a suitably qualified Civil Engineer or similar qualified person approved by the Local Authority. Confirmation from the mechanical aeration system suppliers that the system has been installed and is functioning correctly, should be obtained by the client.

On-going Maintenance

The client must enter a maintenance contract and the system should be serviced periodically. The tank should be de-sludged periodically by a licensed contractor.

7.0 SITE ASSESSOR DETAILS

Company: DECLAN KEARNS & ASSOCIATES LTD.

Prefix: Mr First Name: DECLAN Surname: KEARNS

Address: Tullywest, Kildare, Co. Kildare

Qualifications/Experience: B.Eng., NCEA Dip. Env. Eng., NCEA, Cert. Eng., MIEI, FETAC CERT EF 241859 722383

Date of Report: 03-Dec-2021

Phone: 086 211 1590 E-mail info@dkassociates.ie

Indemnity Insurance Number: PI0003097

Signature: Declan Kearns Digitally signed by Declan Kearns Date: 2021.12.03 12:05:34 Z

KILSHANE ENERGY LTD. SITE – Photos of Test 3

Figure 1. Trial Pit

Figure 2. T – Test 1

Figure 3. T – Test 2

Figure 4. T – Test 3

Figure 5. P – Test 1

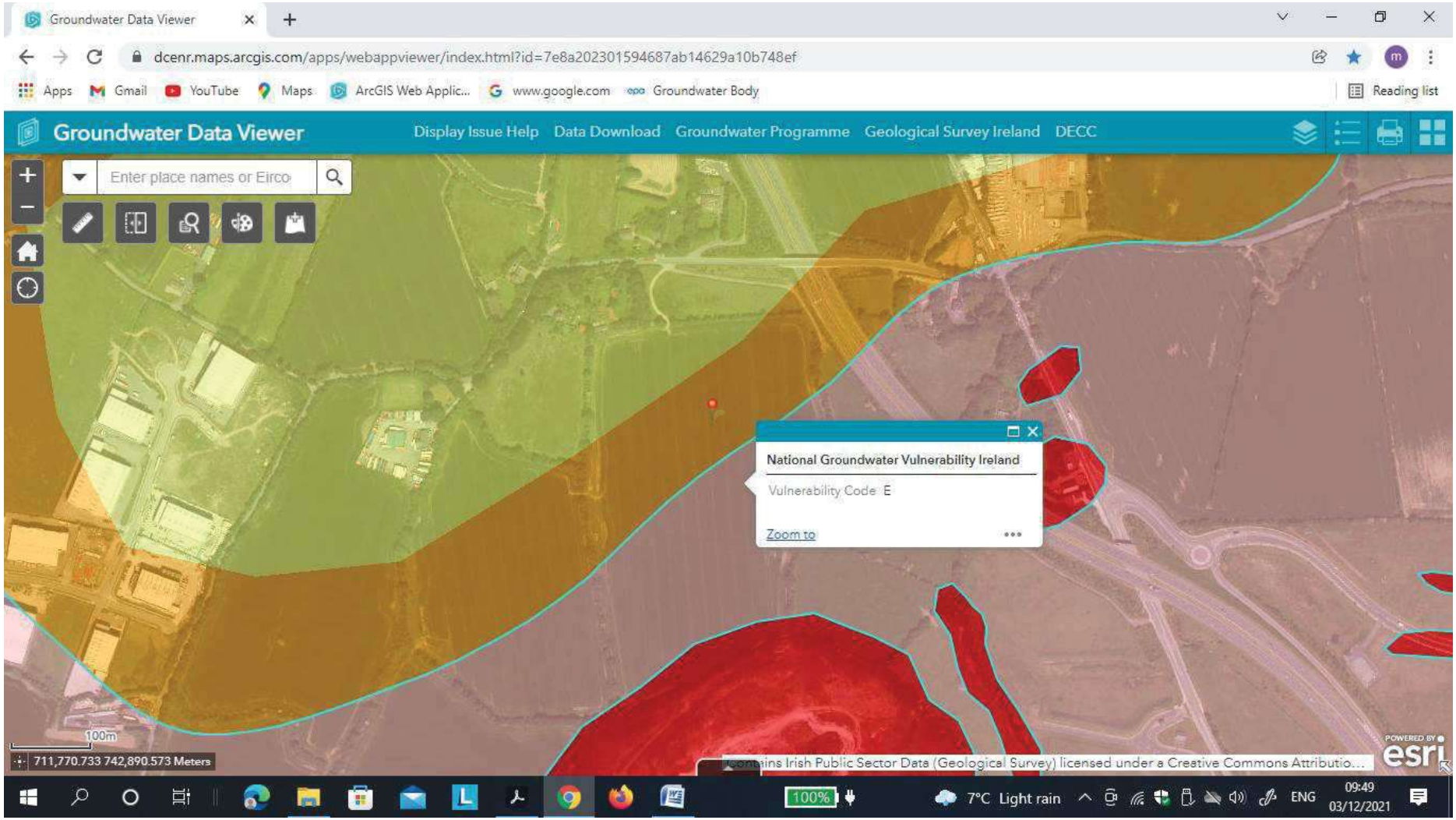
Figure 6. P – Test 2

KILSHANE ENERGY LTD. SITE – Photos of Test 3

Figure 7. P – Test 3

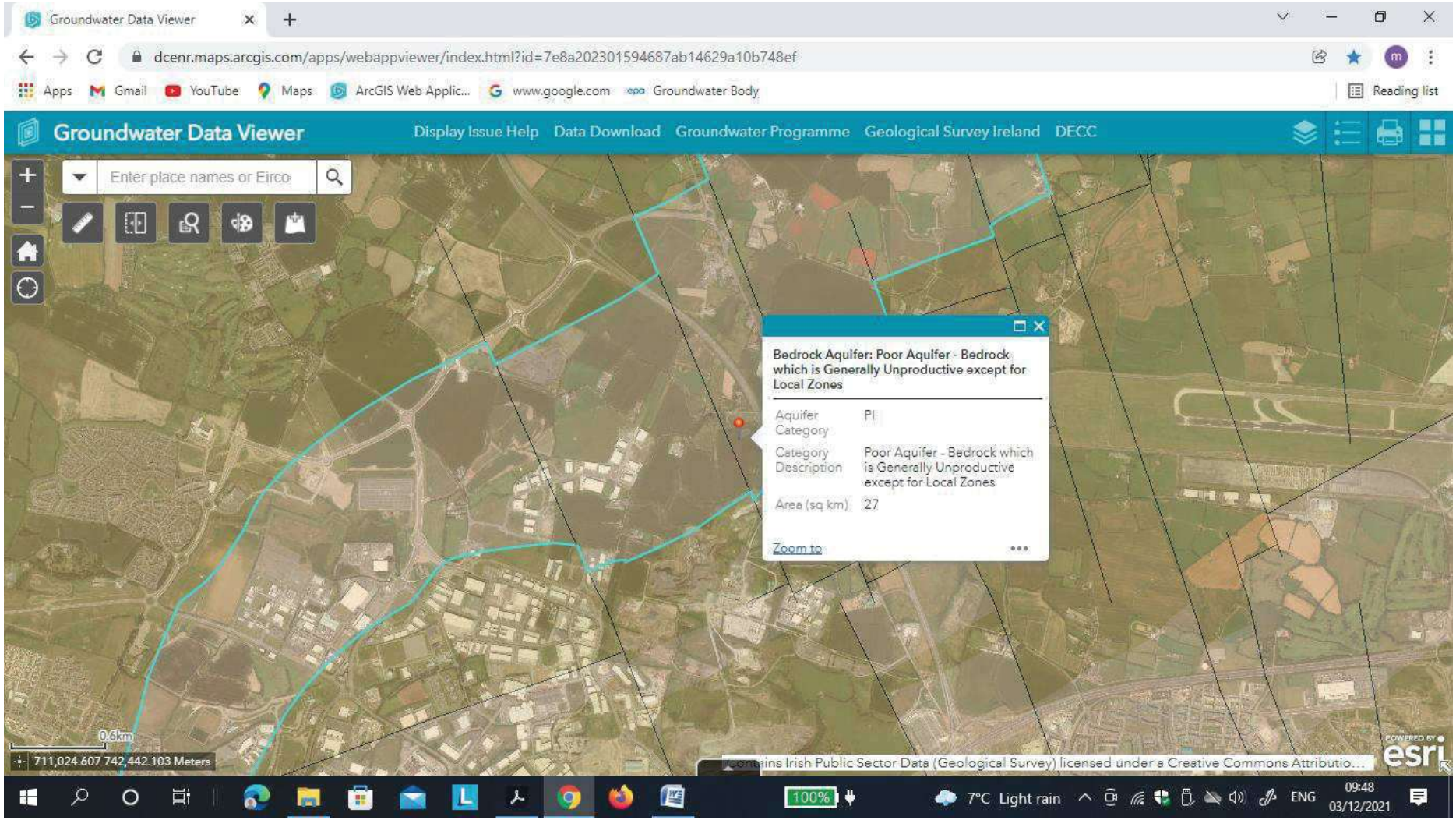
Figure 8. View of site

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4

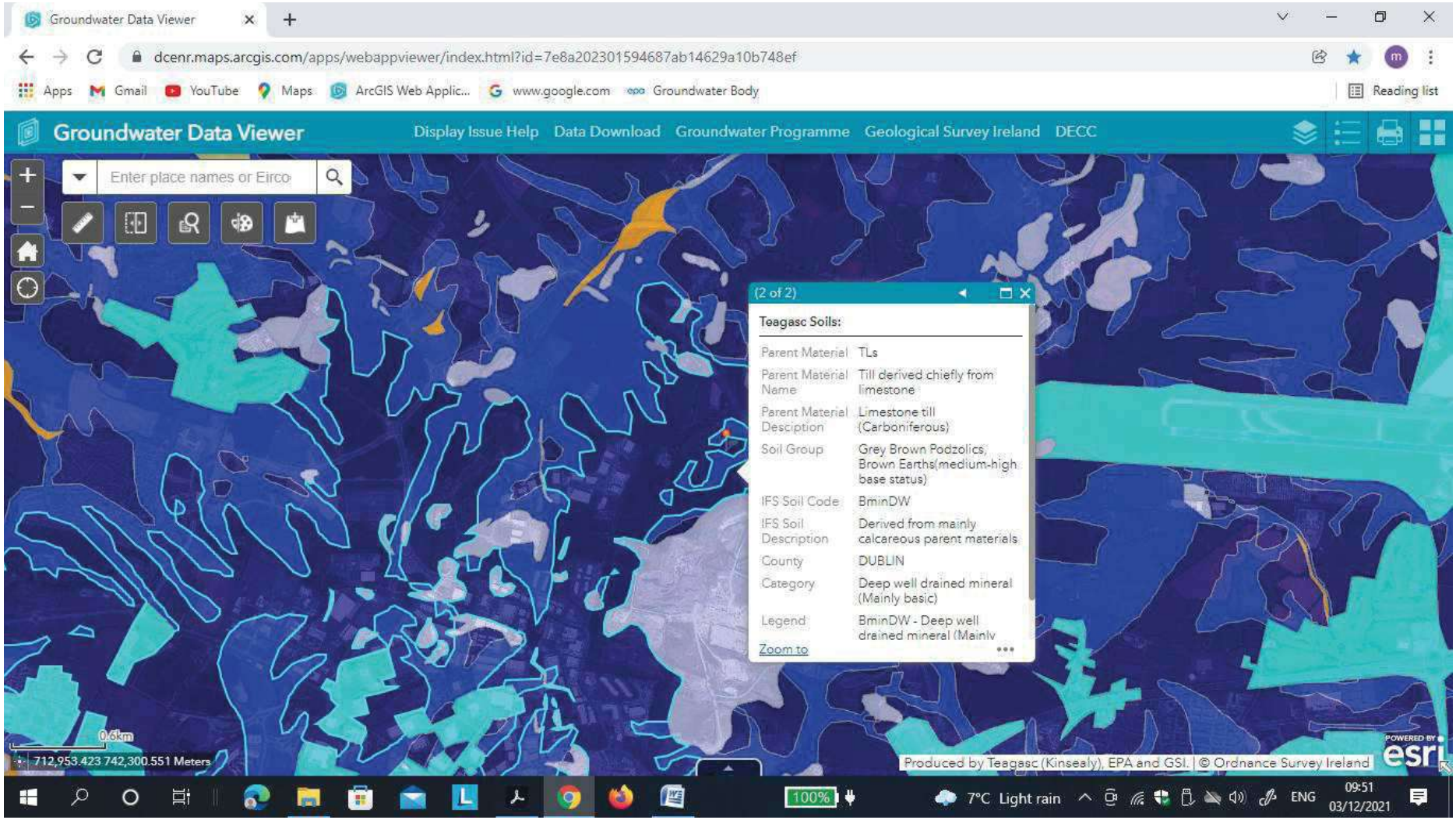


VULNERABILITY MAP

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4

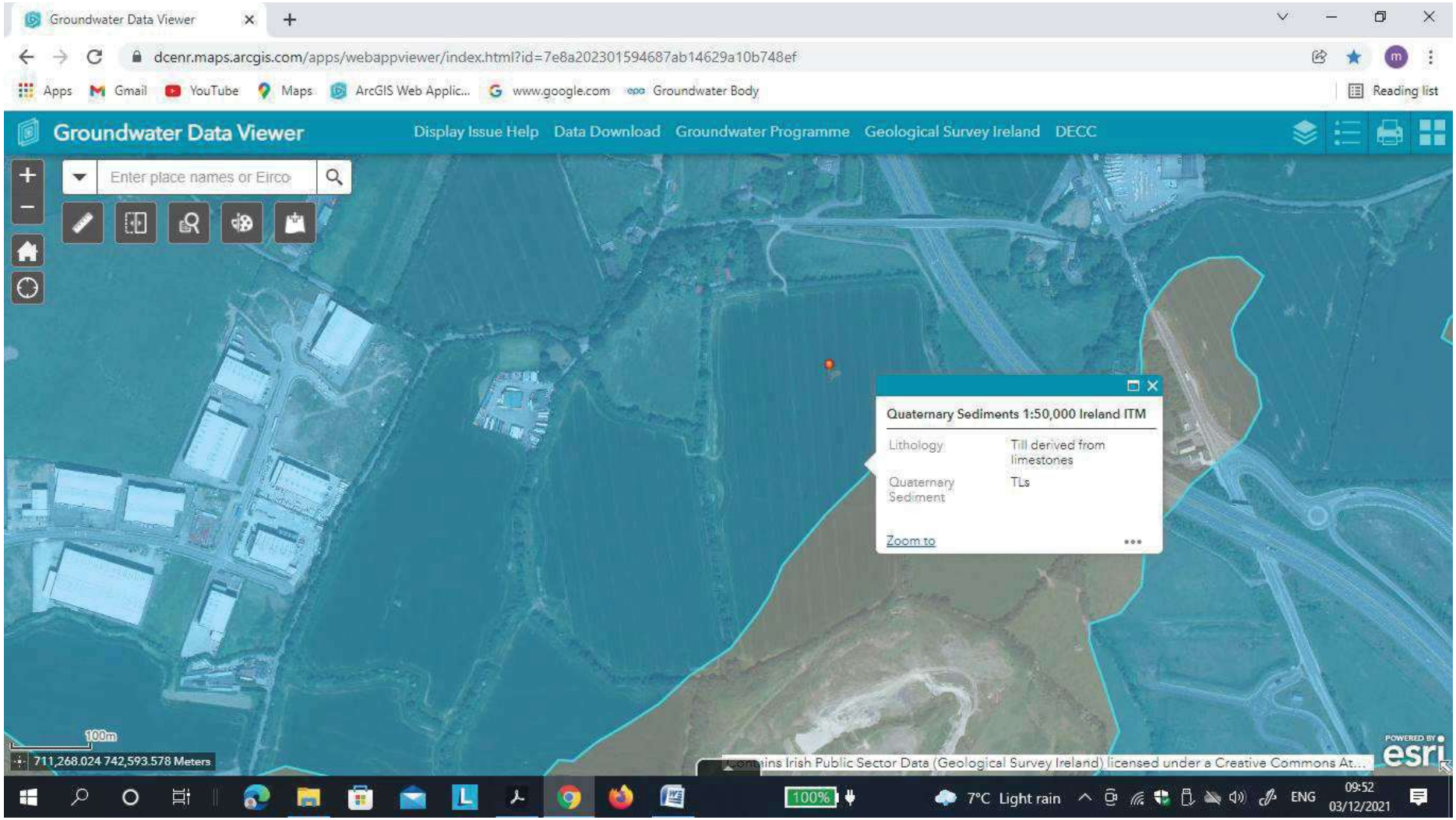


AQUIFER MAP


Groundwater Data Viewer
dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=7e8a202301594687ab14629a10b748ef
Apps
Gmail
YouTube
Maps
ArcGIS Web Applic...
www.google.com
Groundwater Body
Reading list
Groundwater Data Viewer
Display Issue Help
Data Download
Groundwater Programme
Geological Survey Ireland
DECC
Enter place names or Eirco
(2 of 2)
Teagasc Soils:
Parent Material
TLs
Parent Material Name
Till derived chiefly from limestone
Parent Material Description
Limestone till (Carboniferous)
Soil Group
Grey Brown Podzolics, Brown Earths(medium-high base status)
IFS Soil Code
BminDW
IFS Soil Description
Derived from mainly calcareous parent materials
County
DUBLIN
Category
Deep well drained mineral (Mainly basic)
Legend
BminDW - Deep well drained mineral (Mainly
Zoom to
0.6km
712,953.423 742,300.551 Meters
Produced by Teagasc (Kinsealy), EPA and GSI. | © Ordnance Survey Ireland
POWERED BY esri
100%
7°C Light rain
ENG
09:51
03/12/2021

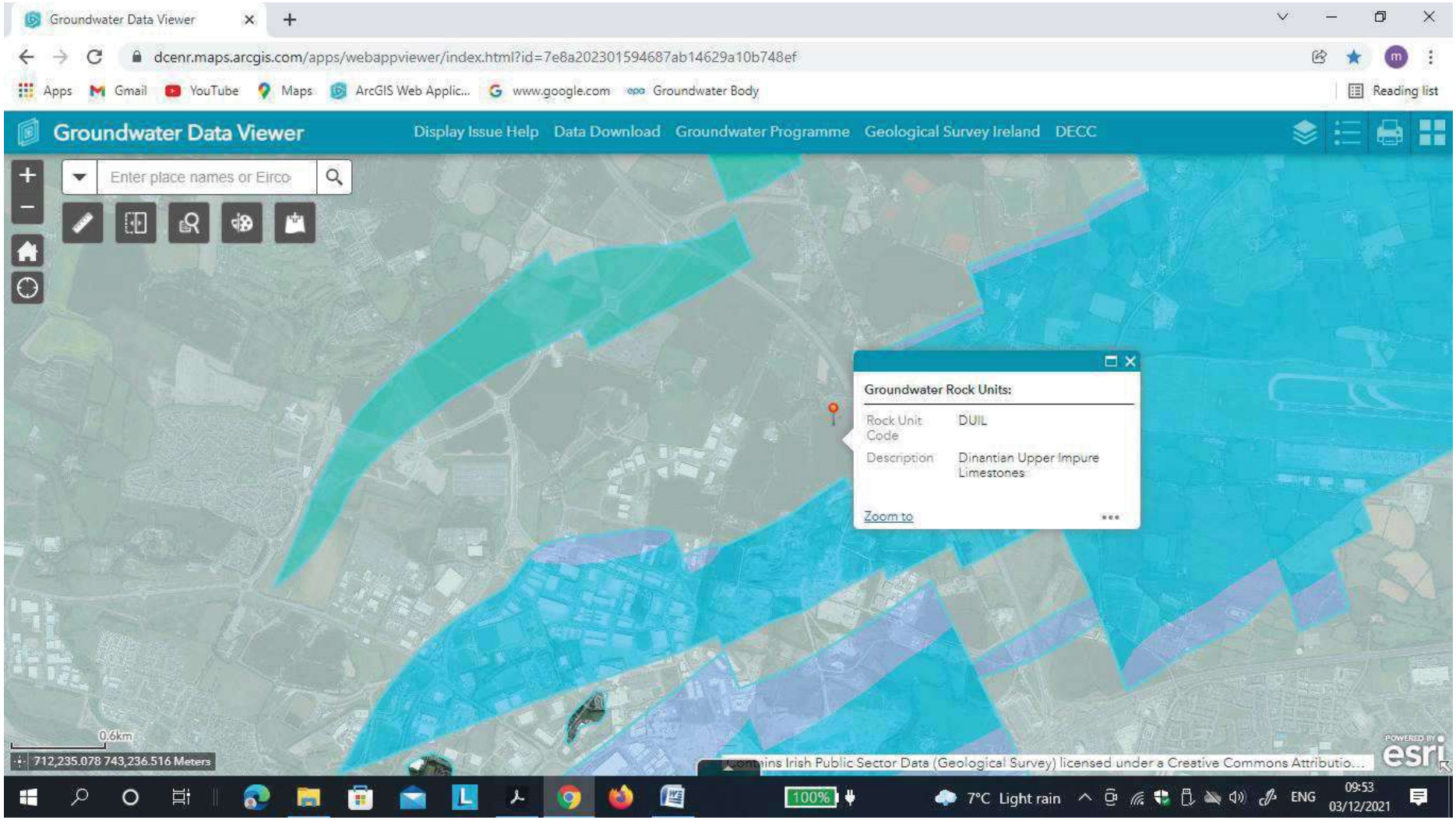
SOILS MAP

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4



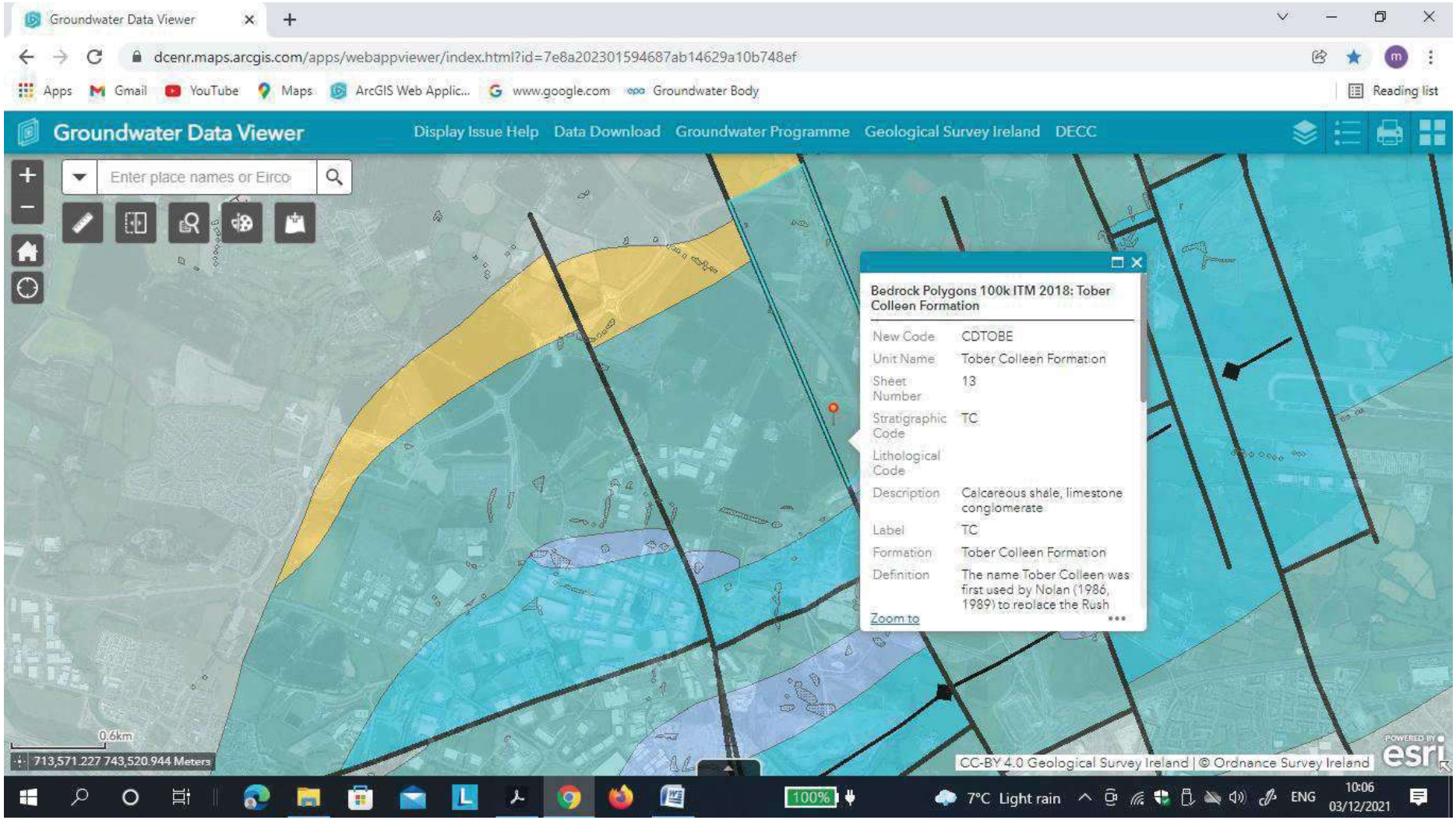
QUATERNARY SEDIMENTS MAP

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4



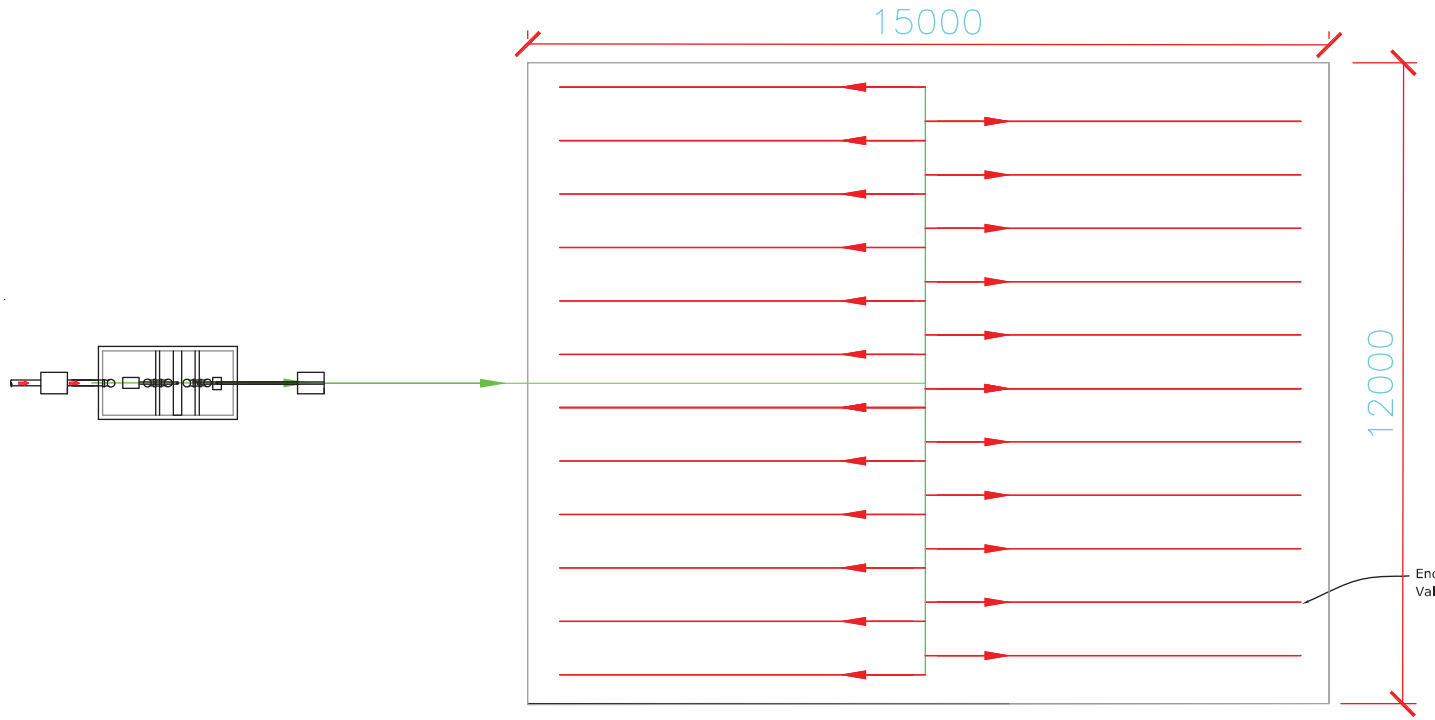
GROUNDWATER ROCK MAP

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4



BEDROCK MAP

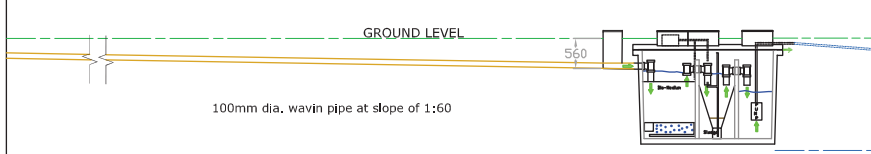
ALL WORKS TO BE SUPERVISED AND CERTIFIED BY A SUITABLY QUALIFIED ENGINEER



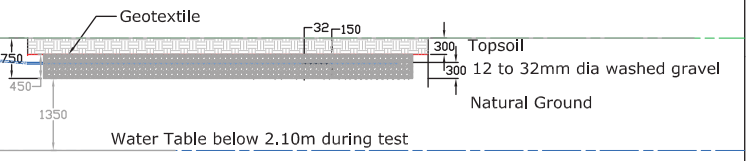
PUMP SYSTEM AND PIPE NETWORK TO BE DESIGNED SPECIFICALLY FOR THE PROPOSED SYSTEM

1. MINIMUM SOIL THICKNESS BENEATH INVERT OF DISTRIBUTION SYSTEM = >900MM
2. GRAVEL PROTECTION LAYER : 150MM OF 12 TO 32MM WASHED GRAVEL
3. INFILTRATION LATERALS : 32MM DIA. PVC
4. GRAVEL DISTRIBUTION LAYER : 300MM OF 12 TO 32MM WASHED GRAVEL
5. EFFLUENT TREATMENT SYSTEM AND POLISHING FILTER TO BE INSTALLED AND CONSTRUCTED IN STRICT ACCORDANCE WITH EPA CoP 2021

TYPICAL PLAN OF ETS AND SOIL POLISHING FILTER TO EPA CoP 2021



TYPICAL SECTION THORUGH PROPOSED ETS



SOIL POLISHING FILTER TO EPA CoP 2021

Rev.	DESCRIPTION	DATE

Declan Kearns & Associates Ltd.
Tullywest, Kildare, Co. Kildare

Phone : 045 520642 / 086 2111590
Email: info@dkassociates.ie

DKA

Project: PROPOSED DEVELOPMENT AT KILSHANE, DUBLIN 11

Client: KILSHANE ENERGY LTD.

Drawing Title: ETS AND SOIL POLISHING FILTER DETAILS

Date	Scale (A3)	Drawn by
03/12/21	NTS	DK

Status: PLANNING ☒ TENDER ☐ FOR APPROVAL ☐ FOR CONSTRUCTION ☐ AS BUILT ☐

Dwg. No. PF1

KILSHANE ENERGY LTD. - TEST NO. 4

3.2 Trial Hole (should be a minimum of 2.1m deep (3m for regionally important aquifers))

To avoid any accidental damage, a trial hole assessment or percolation tests should not be undertaken in areas which are at or adjacent to significant sites, (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from National Parks and Wildlife Service or the Heritage Service.

Depth of trial hole (m): 2.1

Depth from ground surface to bedrock (m) (if present):

Depth from ground surface to water table (m) (if present):

Depth of water ingress:

Rock type (if present):

Date and time of excavation: 29-Nov-2021 09:15 Date and time of examination: 01-Dec-2021 10:25

Depth of Surface and Subsurface Percolation Tests		Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m							
0.2 m		TOPSOIL		Crumb	Firm	Brown	Random
0.3 m							
0.4 m	S123						
0.5 m							
0.6 m		Sandy gravelly CLAY		Structureless massive	Firm	Brown	Random
0.7 m							
0.8 m	SS123						
0.9 m							
1.0 m							
1.1 m							
1.2 m							
1.3 m							
1.4 m		Sandy gravelly CLAY		Structureless massive	Stiff	Grey brown	Random
1.5 m							
1.6 m							
1.7 m							
1.8 m							
1.9 m							
2.0 m							
2.1 m							
2.2 m							
2.3 m							
2.4 m							
2.5 m							
2.6 m							
2.7 m							
2.8 m							
2.9 m							
3.0 m							
3.1 m							
3.2 m							
3.3 m							
3.4 m							
3.5 m							

Likely Subsurface Percolation Value:

Likely Surface Percolation Value:

Note: *Depth of percolation test holes should be indicated on log above. ('Enter Surface or Subsurface at depths as appropriate).
** See Appendix E for BS 5930 classification.
*** 3 samples to be tested for each horizon and results should be entered above for each horizon.
**** All signs of mottling should be recorded.

3.2 Trial Hole (contd.) Evaluation:

No bedrock or groundwater was encountered at the excavated depth of 2.10m

3.3(a) Subsurface Percolation Test for Subsoil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm) (A)	500	500	500
Depth from ground surface to base of hole (mm) (B)	900	900	900
Depth of hole (mm) [B - A]	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

		1	2	3
Pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	10:45	10:45	10:45
2nd pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	12:01	12:01	12:01

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	02-12-2021	02-12-2021	02-12-2021
Time filled to 400 mm	10:42	10:42	10:42
Time water level at 300 mm	11:26	11:38	11:46
Time (min.) to drop 100 mm (T_{100})	44.00	56.00	64.00
Average T_{100}			54.67

If T_{100} > 300 minutes then Subsurface Percolation value >120 – site unsuitable for discharge to ground
If $T_{100} \leq$ 210 minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	11:26	12:22	56.00	11:38	12:42	64.00	11:46	13:02	76.00
2	12:26	13:42	76.00	12:46	14:10	84.00	13:06	14:38	92.00
3	13:46	15:26	100.00	14:15	15:59	104.00	14:42	16:30	108.00
Average Δt Value			77.33			84.00			92.00
	Average Δt/4 = [Hole No.1]		19.33 (t_1)	Average Δt/4 = [Hole No.2]		21.00 (t_2)	Average Δt/4 = [Hole No.3]		23.00 (t_3)

Result of Test: Subsurface Percolation Value = 21.11 (min/25 mm)

Comments:

T = 21. T Test Passed.

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No. 1

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No. 2

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Percolation Test Hole No. 3

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Tim§e hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_2)			0.00

Result of Test: Subsurface Percolation Value = 0.00 (min/25 mm)

Comments:

3.3(b) Surface Percolation Test for Soil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)	0	0	0
Depth from ground surface to base of hole (mm)	400	400	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

		1	2	3
Pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	10:46	10:46	10:46
2nd pre-soak start	Date	01-Dec-2021	01-Dec-2021	01-Dec-2021
	Time	12:16	12:16	12:16

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	02-Dec-21	02-Dec-21	02-Dec-2021
Time filled to 400 mm	10:42	10:42	10:42
Time water level at 300 mm	11:26	11:10	11:18
Time to drop 100 mm (T_{100})	44.00	28.00	36.00
Average T_{100}			36.00

If T_{100} > 300 minutes then Surface Percolation value >90 – site unsuitable for discharge to ground
If $T_{100} \leq$ 210 minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)
1	11:26	12:22	56.00	11:10	11:46	36.00	11:18	12:06	48.00
2	12:26	13:38	72.00	11:50	12:38	48.00	12:10	13:10	60.00
3	13:41	15:13	92.00	12:42	13:50	68.00	13:14	14:38	84.00
Average ΔT Value			73.33			50.67			64.00
	Average ΔT/4 = [Hole No.1]		18.33 (T_1)	Average ΔT/4 = [Hole No.2]		12.67 (T_2)	Average ΔT/4 = [Hole No.3]		16.00 (T_3)

Result of Test: Surface Percolation Value = 15.67 (min/25 mm)

Comments:

P = 16. Test Passed.

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No. 1

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 1 = (T_1)			0.00

Percolation Test Hole No. 2

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)			0.00

Result of Test: Surface Percolation Value = 0.00 (min/25 mm)

Percolation Test Hole No. 3

Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_2)			0.00

Comments:

KILSHANE ENERGY LTD. SITE – Photos of Test 4

Figure 1. Trial Pit

Figure 2. T – Test 1

Figure 3. T – Test 2

Figure 4. T – Test 3

Figure 5. P – Test 1

Figure 6. P – Test 2

KILSHANE ENERGY LTD. SITE – Photos of Test 4

Figure 7. P – Test 3

Figure 8. View of site

Appendix 5

Geotechnical Soil Laboratory Test Results

Classification Tests in accordance with BS1377: Part 4

Client	GoPower
Site	Kilshane
S.I. File No	5898 / 21
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email info@siteinvestigations.ie
Report Date	18th November 2021

Hole ID	Depth	Sample No	Lab Ref No.	Sample Type	Natural Moisture Content %	Liquid Limit %	Plastic Limit %	Plastic Index %	Min. Dry Density Mg/m^3	Particle Density Mg/m^3	% passing 425um	Comments	**Remarks** **C**=Clay; **M**=Silt **Plasticity**: **L**=Low; **I**=Intermediate; **H**=High; **V**=Very High; **E**=Extremely High
TP06	1.00		21/1234	B	10.1	33	19	14			50.2		CL
TP14	1.00		21/1235	B	12.8	38	18	20			60.5		CI
TP15	1.00		21/1236	B	15.5	36	21	15			60.1		CI

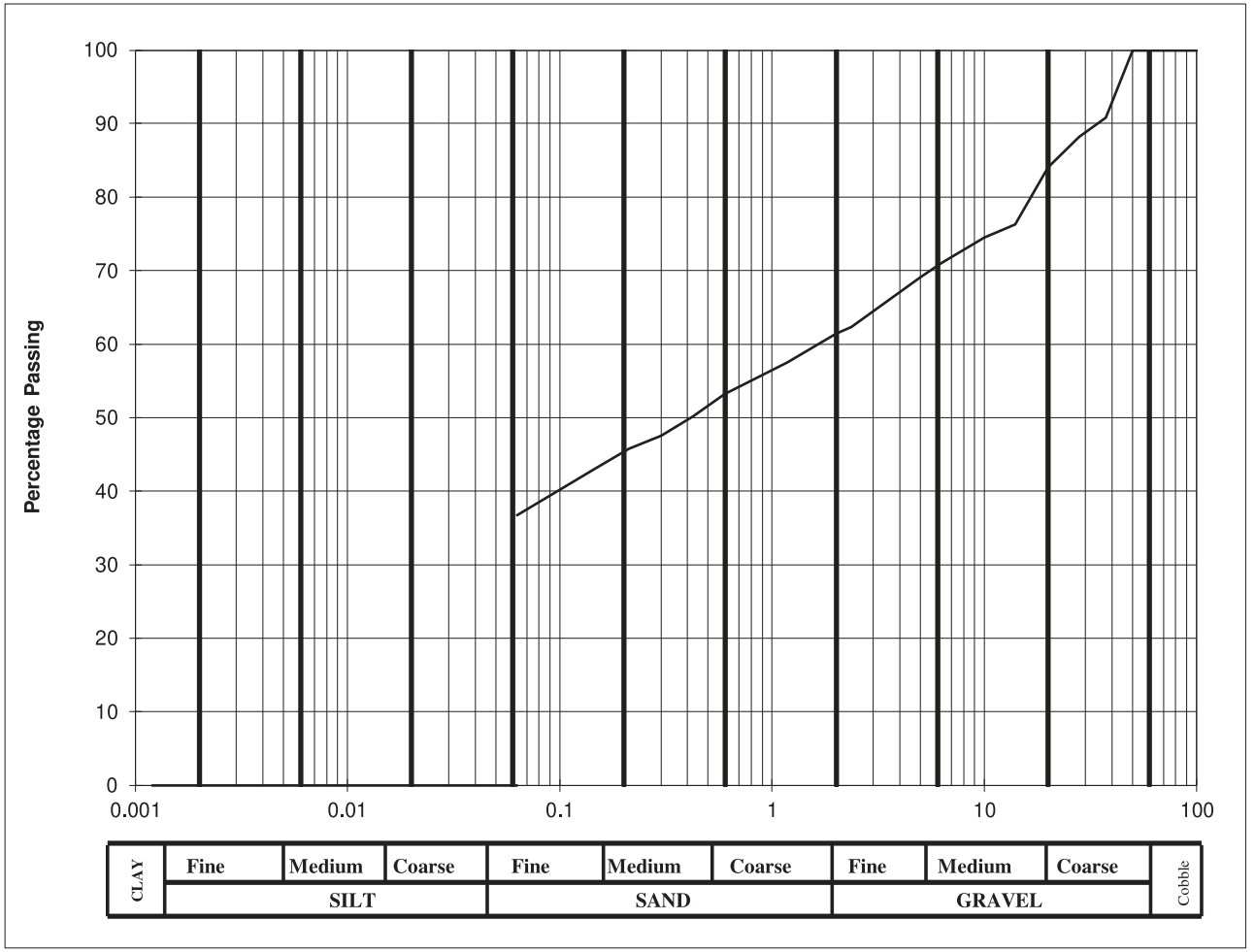
Paddy McGonagle
Site Investigations Ltd

BS 1377 Particle Size Analysis

Site Investigations Limited

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	**0.0630**	
90	100	**0.0200**	
75	100	**0.0060**	
63	100	**0.0020**	
50	100		
37.5	90.8		
28	88.2		
20	84		
14	76.3		
10	74.5		
6.3	71		
5.0	69.1		
2.36	62.3		
2.00	61.4		
1.18	57.5		
0.600	53.2		
0.425	50.2		
0.300	47.5		
0.212	45.8		
0.150	43.2		
0.063	37		

Cobbles, %	0
Gravel, %	39
Sand, %	24
Clay / Silt, %	37



Client :	GoPower
Project :	Kilshane

Lab. No :	21/1234
Sample No :	

Hole ID :	TP 06
Depth, m :	1.00

Material description :	slightly sandy gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

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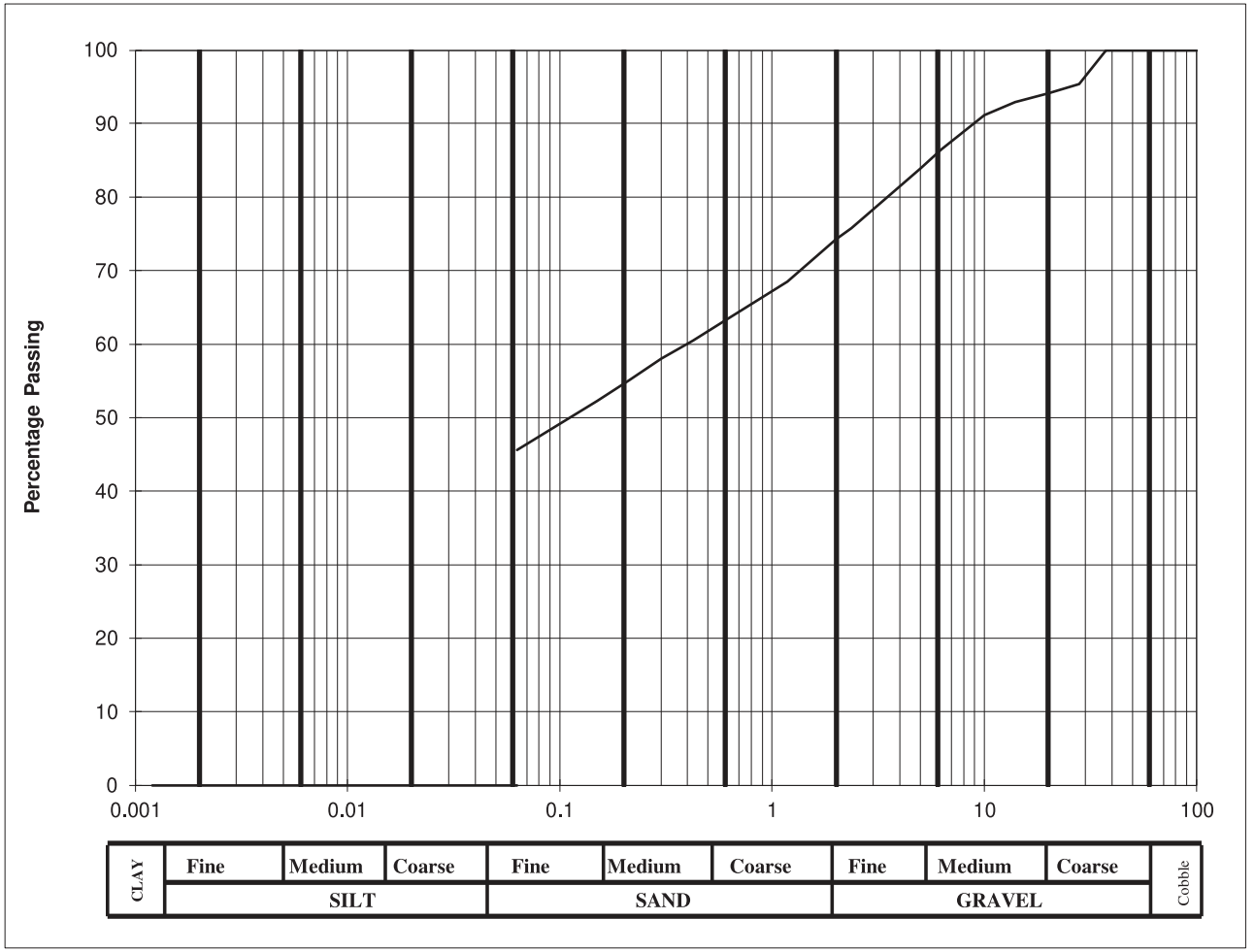
Paddy McGonagle
Site Investigations Ltd

BS 1377 Particle Size Analysis

Site Investigations Limited

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	**0.0630**	
90	100	**0.0200**	
75	100	**0.0060**	
63	100	**0.0020**	
50	100		
37.5	100		
28	95.4		
20	94.1		
14	92.9		
10	91.1		
6.3	86.5		
5.0	83.9		
2.36	75.8		
2.00	74.2		
1.18	68.5		
0.600	63.2		
0.425	60.5		
0.300	58		
0.212	55.1		
0.150	52.3		
0.063	46		

Cobbles, %	0
Gravel, %	26
Sand, %	28
Clay / Silt, %	46



Client :	GoPower
Project :	Kilshane

Lab. No :	21/1235
Sample No :	

Hole ID :	TP 14
Depth, m :	1.00

Material description :	slightly sandy slightly gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

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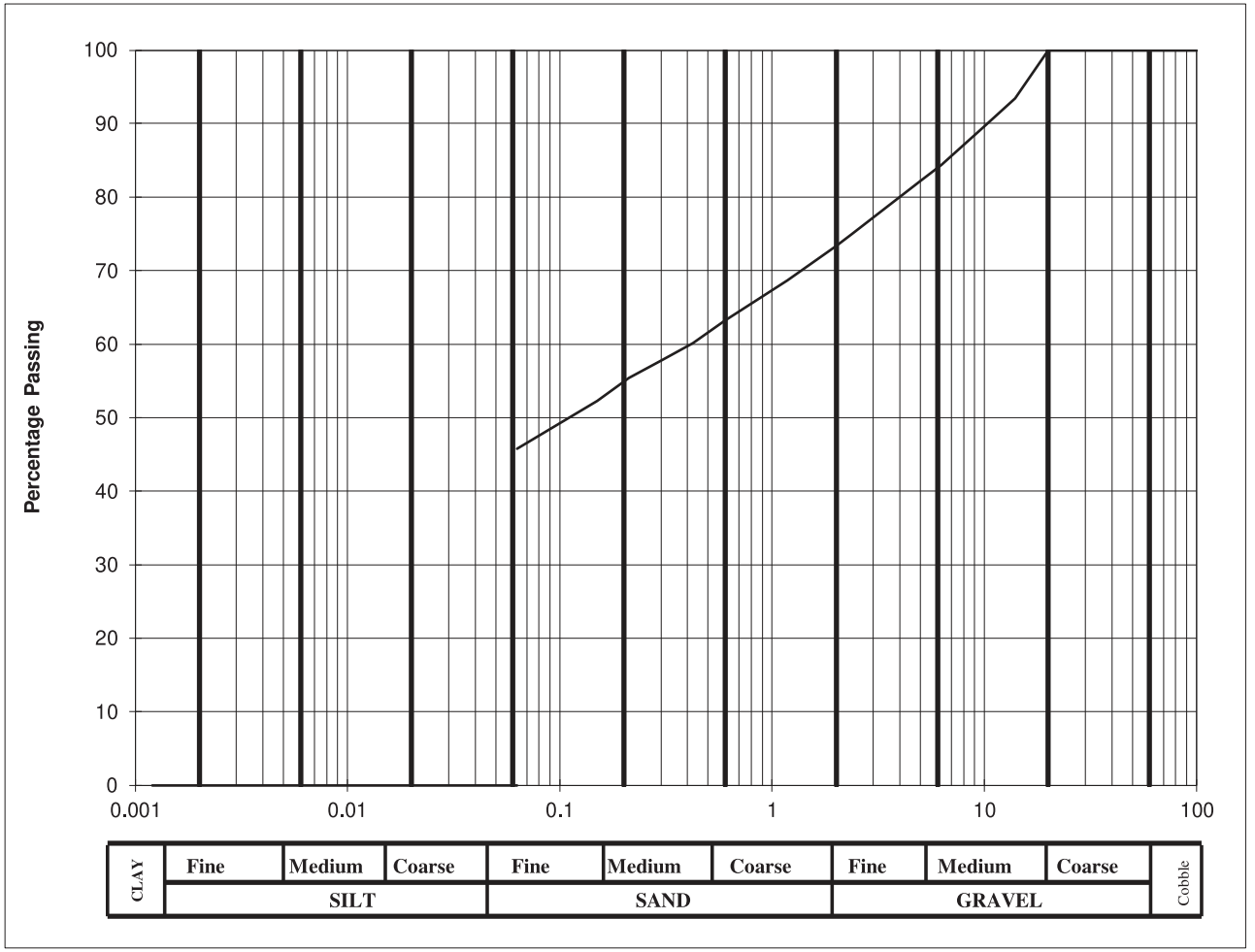
Paddy McGonagle
Site Investigations Ltd

BS 1377 Particle Size Analysis

Site Investigations Limited

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	**0.0630**	
90	100	**0.0200**	
75	100	**0.0060**	
63	100	**0.0020**	
50	100		
37.5	100		
28	100		
20	100		
14	93.4		
10	89.6		
6.3	84.4		
5.0	82.2		
2.36	74.9		
2.00	73.3		
1.18	68.7		
0.600	63.2		
0.425	60.1		
0.300	57.8		
0.212	55.4		
0.150	52.3		
0.063	46		

Cobbles, %	0
Gravel, %	27
Sand, %	27
Clay / Silt, %	46



Client :	GoPower
Project :	Kilshane

Lab. No :	21/1236
Sample No :	

Hole ID :	TP 15
Depth, m :	1.00

Material description :	slightly sandy slightly gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

Printed 23/11/2021

Paddy McGonagle
Site Investigations Ltd

California Bearing Ratio (CBR) In accordance with BS1377: Part 4: Method 7

Client	GoPower
Site	Kilshane
S.I. File No	5898 / 21
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email info@siteinvestigations.ie
Report Date	18th November 2021

CBR No	Depth (mBGL)	Sample No	Sample Type	Lab Ref	Moisture Content (%)	CBR Value (%)	Location / Remarks
CBR01	0.50	PM01	CBR	21/1195	11.6	7.2	
CBR02	0.50	PM02	CBR	21/1196	10.5	7.5	
CBR03	0.50	PM03	CBR	21/1197	12.2	6.8	
CBR04	0.50	PM04	CBR	21/1198	9.9	7.9	
CBR05	0.50	PM05	CBR	21/1199	10.4	8.5	

Printed 23/11/2021

Paddy McGonagle
Site Investigations Ltd

Chemical Testing
In accordance with BS 1377: Part 3

Client	GoPower
Site	Kilshane
S.I. File No	5898 / 21
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	18th November 2021

Hole Id	Depth (mBGL)	Sample No	Lab Ref	pH Value	Water Soluble Sulphate Content (2:1 Water-soil extract) (SO_3) g/L	Water Soluble Sulphate Content (2:1 Water-soil extract) (SO_3) %	Loss on Ignition (Organic Content) %	Chloride ion Content (water:soil ratio 2:1) %	% passing 2mm	Remarks
TP06	1.00		21/1234	8.22	0.126	0.077		0.19	61.4	
TP14	1.00		21/1235	8.35	0.126	0.093		0.21	74.2	
TP15	1.00		21/1236	8.11	0.122	0.089		0.17	73.3	

Printed 23/11/2021

Paddy McGonagle
Site Investigations Ltd.

Appendix 6

Geotechnical Rock Laboratory Test Results

Point Load Test Broch,E. & Franklin,J.A.,IRSM Point Load Test Method

Uniaxial Compressive Strength in accordance with BS1881

Client	Go Power
Site	Kilshane
S.I. File No	5898 / 21
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	23rd November 2021

Hole ID	Depth (m)	Lab Ref No.	Sample Type	Diameter / Height (mm)	Test Type	Is (MN/m^2)	Compressive Strength (MPa)	Strength Designation	Approx. Equivalent UCS Value (MPa)	Remarks
BH01	5.40	21/1290	C	64	PL	3.91		Strong	98.5	Tested Diametrically
BH01	6.50	21/1291	C	64	PL	0.27		Weak	7.0	Tested Diametrically
BH02	3.90	21/1292	C	64	PL	0.56		Weak	14.0	Tested Diametrically
BH02	5.60	21/1293	C	64	PL	0.59		Moderately Strong	15.0	Tested Diametrically
BH03	4.20	21/1294	C	64	PL	4.15		Very Strong	104.5	Tested Diametrically
BH03	6.30	21/1295	C	64	PL	1.95		Moderately Strong	49.0	Tested Diametrically
BH04	4.60	21/1296	C	64	PL	4.15		Very Strong	104.5	Tested Diametrically
BH04	6.10	21/1297	C	64	PL	1.27		Moderately Strong	32.0	Tested Diametrically

Paddy McGonagle
Site Investigations Ltd

Appendix 7

Environmental Laboratory Test Results

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Site Investigations Ltd
The Grange
Carhugar
12th Lock Road
Lucan
Co. Dublin

Attention: Stephen Letch

CERTIFICATE OF ANALYSIS

Date of report Generation:	21 November 2021
Customer:	Site Investigations Ltd
Sample Delivery Group (SDG):	211106-42
Your Reference:	5898
Location:	Kilshane
Report No:	622047
Order Number:	64/A/21

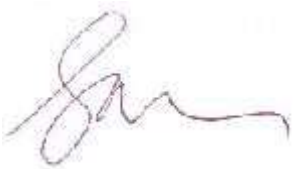
We received 11 samples on Friday November 05, 2021 and 11 of these samples were scheduled for analysis which was completed on Thursday November 18, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:



Sonia McWhan
Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
25288105	TP 03		0.50 - 0.50	
25288106	TP 04		0.50 - 0.50	
25288113	TP 06		1.00 - 1.00	
25288107	TP 07		0.50 - 0.50	
25288108	TP 10		0.50 - 0.50	
25288109	TP 12		0.50 - 0.50	
25288110	TP 13		0.50 - 0.50	
25288111	TP 14		0.50 - 0.50	
25288114	TP 14		1.00 - 1.00	
25288115	TP 15		1.00 - 1.00	
25288112	TP 16		0.50 - 0.50	

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG: 211106-42 **Report Number:** 622047 **Superseded Report:**
Client Ref.: 5898 **Location:** Kilshane

Results Legend
X Test
N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water
Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

			Lab Sample No(s)	25288105	25288106	25288113	25288107	25288108	25288109	25288110
			Customer Sample Reference	TP 03	TP 04	TP 06	TP 07	TP 10	TP 12	TP 13
			AGS Reference							
			Depth (m)	0.50 - 0.50	0.50 - 0.50	1.00 - 1.00	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50
			Container	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
			Sample Type	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Anions by Kone (w)	All	NDPs: 0 Tests: 8		X			X			X			X			X			X		
CEN Readings	All	NDPs: 0 Tests: 8		X			X			X			X			X			X		
Chromium III	All	NDPs: 0 Tests: 8			X			X			X			X			X			X	
Coronene	All	NDPs: 0 Tests: 8			X			X			X			X			X			X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 8		X			X			X			X			X			X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 8		X			X			X			X			X			X		
EPH by GCxGC-FID	All	NDPs: 0 Tests: 8			X			X			X			X			X			X	
EPH CWG GC (S)	All	NDPs: 0 Tests: 8			X			X			X			X			X			X	
Fluoride	All	NDPs: 0 Tests: 8		X			X			X			X			X			X		
GRO by GC-FID (S)	All	NDPs: 0 Tests: 8				X			X			X			X			X			X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 8			X			X			X			X			X			X	
Loss on Ignition in soils	All	NDPs: 0 Tests: 11			X			X		X	X			X			X			X	
Mercury Dissolved	All	NDPs: 0 Tests: 8		X			X			X			X			X			X		
Metals in solid samples by OES	All	NDPs: 0 Tests: 8			X			X			X			X			X			X	
PAH by GCMS	All	NDPs: 0 Tests: 8			X			X			X			X			X			X	

25288112	TP 16		0.50 - 0.50	60g VOC (ALE215)	S													X					
				250g Amber Jar (ALE210)	S				X		X				X		X			X		X		X	X
				1kg TUB with Handle (ALE260)	S		X		X				X		X			X					X		
25288115	TP 15		1.00 - 1.00	250g Amber Jar (ALE210)	S																	X			
25288114	TP 14		1.00 - 1.00	250g Amber Jar (ALE210)	S																	X			
25288111	TP 14		0.50 - 0.50	60g VOC (ALE215)	S													X					
				250g Amber Jar (ALE210)	S				X		X				X		X			X		X		X	X
				1kg TUB with Handle (ALE260)	S		X		X				X		X			X					X		

Validated

CERTIFICATE OF ANALYSIS

SDG: 211106-42 **Report Number:** 622047 **Superseded Report:**
Client Ref.: 5898 **Location:** Kilshane

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water
Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
			25288105	TP 03		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
							250g Amber Jar (ALE210)	S
							60g VOC (ALE215)	S
			25288106	TP 04		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
							250g Amber Jar (ALE210)	S
							60g VOC (ALE215)	S
			25288113	TP 06		1.00 - 1.00	250g Amber Jar (ALE210)	S
			25288107	TP 07		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
							250g Amber Jar (ALE210)	S
							60g VOC (ALE215)	S
			25288108	TP 10		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
							250g Amber Jar (ALE210)	S
							60g VOC (ALE215)	S
			25288109	TP 12		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
							250g Amber Jar (ALE210)	S
							60g VOC (ALE215)	S
			25288110	TP 13		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
							250g Amber Jar (ALE210)	S
							60g VOC (ALE215)	S
PCBs by GCMS	All	NDPs: 0 Tests: 8						
				X				
							X	
				X				
Phenols by HPLC (W)	All	NDPs: 0 Tests: 8						
			X					
				X				
							X	
Sample description	All	NDPs: 0 Tests: 11						
				X				
							X	
						X		
				X				
							X	
Total Dissolved Solids on Leachates	All	NDPs: 0 Tests: 8						
			X					
				X				
							X	
Total Organic Carbon	All	NDPs: 0 Tests: 8						
				X				
							X	
				X				
TPH CWG GC (S)	All	NDPs: 0 Tests: 8						
				X				
							X	
				X				
VOC MS (S)	All	NDPs: 0 Tests: 8						
					X			
						X		
							X	
								X

25288112	TP 16		0.50 - 0.50	60g VOC (ALE215)	S																X
				250g Amber Jar (ALE210)	S		X				X				X				X		
				1kg TUB with Handle (ALE260)	S				X				X								
25288115	TP 15		1.00 - 1.00	250g Amber Jar (ALE210)	S						X										
25288114	TP 14		1.00 - 1.00	250g Amber Jar (ALE210)	S						X										
25288111	TP 14		0.50 - 0.50	60g VOC (ALE215)	S																X
				250g Amber Jar (ALE210)	S		X				X				X				X		
				1kg TUB with Handle (ALE260)	S				X				X								

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
25288105	TP 03	0.50 - 0.50	Dark Brown	Sandy Loam	Stones	Vegetation
25288106	TP 04	0.50 - 0.50	Dark Brown	Sandy Loam	Stones	Vegetation
25288113	TP 06	1.00 - 1.00	Light Brown	Sandy Loam	Stones	None
25288107	TP 07	0.50 - 0.50	Dark Brown	Sandy Loam	Stones	Vegetation
25288108	TP 10	0.50 - 0.50	Light Brown	Sandy Loam	None	None
25288109	TP 12	0.50 - 0.50	Light Brown	Sandy Loam	None	None
25288110	TP 13	0.50 - 0.50	Light Brown	Sandy Loam	None	None
25288111	TP 14	0.50 - 0.50	Light Brown	Sandy Loam	Stones	None
25288114	TP 14	1.00 - 1.00	Light Brown	Sandy Loam	Stones	None
25288115	TP 15	1.00 - 1.00	Light Brown	Sandy Loam	Stones	None
25288112	TP 16	0.50 - 0.50	Light Brown	Sandy Loam	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP 03	TP 04	TP 06	TP 07	TP 10	TP 12
			Depth (m)	0.50 - 0.50	0.50 - 0.50	1.00 - 1.00	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	-	-	-	-	-	-
			Sample Time	.	.	.	.	.	.
			Date Received	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
			SDG Ref	211106-42	211106-42	211106-42	211106-42	211106-42	211106-42
			Lab Sample No.(s)	25288105	25288106	25288113	25288107	25288108	25288109
			AGS Reference						
Moisture Content Ratio (% of as received sample)	%	PM024		7.7 §	8.2 §	9.1 §	16 §	21 §	19 §
Loss on ignition	<0.7 %	TM018		3.05 § M	2.79 § M	1.92 § M	4.07 § M	4.15 § M	4.71 § M
Organic Carbon, Total	<0.2 %	TM132		0.456 § M	0.593 § M		0.643 § M	0.545 § M	0.65 § M
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 § #	<0.6 § #		<0.6 § #	<0.6 § #	<0.6 § #
PCB congener 28	<3 µg/kg	TM168		<3 § M	<3 § M		<3 § M	<3 § M	<3 § M
PCB congener 52	<3 µg/kg	TM168		<3 § M	<3 § M		<3 § M	<3 § M	<3 § M
PCB congener 101	<3 µg/kg	TM168		<3 § M	<3 § M		<3 § M	<3 § M	<3 § M
PCB congener 118	<3 µg/kg	TM168		<3 § M	<3 § M		<3 § M	<3 § M	<3 § M
PCB congener 138	<3 µg/kg	TM168		<3 § M	<3 § M		<3 § M	<3 § M	<3 § M
PCB congener 153	<3 µg/kg	TM168		<3 § M	<3 § M		<3 § M	<3 § M	<3 § M
PCB congener 180	<3 µg/kg	TM168		<3 § M	<3 § M		<3 § M	<3 § M	<3 § M
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168		<21 §	<21 §		<21 §	<21 §	<21 §
Chromium, Trivalent	<0.9 mg/kg	TM181		15.6 §	11.8 §		18.1 §	16.3 §	18.9 §
Antimony	<0.6 mg/kg	TM181		1.62 § #	1.34 § #		2.11 § #	0.966 § #	<0.6 § #
Arsenic	<0.6 mg/kg	TM181		35.8 § M	13.6 § M		18.9 § M	13.4 § M	13.3 § M
Barium	<0.6 mg/kg	TM181		60 § #	61.7 § #		80.8 § #	88.5 § #	151 § #
Cadmium	<0.02 mg/kg	TM181		1.73 § M	1.88 § M		3.09 § M	1.95 § M	1.29 § M
Chromium	<0.9 mg/kg	TM181		15.6 § M	11.8 § M		18.1 § M	16.3 § M	18.9 § M
Copper	<1.4 mg/kg	TM181		38 § M	27.2 § M		43.6 § M	26.8 § M	20.8 § M
Lead	<0.7 mg/kg	TM181		20.4 § M	16.8 § M		25.7 § M	23.2 § M	23.9 § M
Mercury	<0.1 mg/kg	TM181		<0.1 § M	<0.1 § M		<0.1 § M	<0.1 § M	<0.1 § M
Molybdenum	<0.1 mg/kg	TM181		2.48 § #	3.08 § #		4.46 § #	2.78 § #	1.94 § #
Nickel	<0.2 mg/kg	TM181		40 § M	45.8 § M		77 § M	52.1 § M	56.2 § M
Selenium	<1 mg/kg	TM181		1.15 § #	<1 § #		<1 § #	1.02 § #	<1 § #
Zinc	<1.9 mg/kg	TM181		205 § M	92.7 § M		145 § M	120 § M	107 § M
Coronene	<200 µg/kg	TM410		<200 §	<200 §		<200 §	<200 §	<200 §
Mineral Oil >C10-C40 (EH_2D_AL)	<5 mg/kg	TM415		<5 §	<5 §		<5 §	<5 §	<5 §

CERTIFICATE OF ANALYSIS

SDG: 211106-42 **Report Number:** 622047 **Superseded Report:**
Client Ref.: 5898 **Location:** Kilshane

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP 13	TP 14	TP 14	TP 15	TP 16	
			Depth (m)	0.50 - 0.50	0.50 - 0.50	1.00 - 1.00	1.00 - 1.00	0.50 - 0.50	
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
			Date Sampled	-	-	-	-	-	
			Sample Time	.	.	.	.	.	
			Date Received	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	
			SDG Ref	211106-42	211106-42	211106-42	211106-42	211106-42	
			Lab Sample No.(s)	25288110	25288111	25288114	25288115	25288112	
			AGS Reference						
Moisture Content Ratio (% of as received sample)	%	PM024		18 §	20 §	11 §	15 §	15 §	
Loss on ignition	<0.7 %	TM018		4.38 § M	4.76 § M	2.64 § M	3.75 § M	3.16 § M	
Organic Carbon, Total	<0.2 %	TM132		0.58 § M	0.682 § M			0.478 § M	
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 § #	<0.6 § #			<0.6 § #	
PCB congener 28	<3 µg/kg	TM168		<3 § M	<3 § M			<3 § M	
PCB congener 52	<3 µg/kg	TM168		<3 § M	<3 § M			<3 § M	
PCB congener 101	<3 µg/kg	TM168		<3 § M	<3 § M			<3 § M	
PCB congener 118	<3 µg/kg	TM168		<3 § M	<3 § M			<3 § M	
PCB congener 138	<3 µg/kg	TM168		<3 § M	<3 § M			<3 § M	
PCB congener 153	<3 µg/kg	TM168		<3 § M	<3 § M			<3 § M	
PCB congener 180	<3 µg/kg	TM168		<3 § M	<3 § M			<3 § M	
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168		<21 §	<21 §			<21 §	
Chromium, Trivalent	<0.9 mg/kg	TM181		15.7 §	19.2 §			13.7 §	
Antimony	<0.6 mg/kg	TM181		1.21 § #	1.95 § #			1.66 § #	
Arsenic	<0.6 mg/kg	TM181		13.3 § M	17.2 § M			13.9 § M	
Barium	<0.6 mg/kg	TM181		63.6 § #	81 § #			58.2 § #	
Cadmium	<0.02 mg/kg	TM181		1.59 § M	3 § M			2.34 § M	
Chromium	<0.9 mg/kg	TM181		15.7 § M	19.2 § M			13.7 § M	
Copper	<1.4 mg/kg	TM181		30.4 § M	35.1 § M			29 § M	
Lead	<0.7 mg/kg	TM181		21.3 § M	24 § M			19.9 § M	
Mercury	<0.1 mg/kg	TM181		<0.1 § M	<0.1 § M			<0.1 § M	
Molybdenum	<0.1 mg/kg	TM181		2.47 § #	3.56 § #			3.62 § #	
Nickel	<0.2 mg/kg	TM181		59.3 § M	69.1 § M			50.8 § M	
Selenium	<1 mg/kg	TM181		1.04 § #	1.81 § #			1 § #	
Zinc	<1.9 mg/kg	TM181		108 § M	170 § M			122 § M	
Coronene	<200 µg/kg	TM410		<200 §	<200 §			<200 §	
Mineral Oil >C10-C40 (EH_2D_AL)	<5 mg/kg	TM415		<5 §	<5 §			<5 §	

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP 03	TP 04	TP 07	TP 10	TP 12	TP 13
			Depth (m)	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	-	-	-	-	-	-
			Sample Time	.	.	.	.	.	.
			Date Received	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
			SDG Ref	211106-42	211106-42	211106-42	211106-42	211106-42	211106-42
			Lab Sample No.(s)	25288105	25288106	25288107	25288108	25288109	25288110
			AGS Reference						
Naphthalene	<9 µg/kg	TM218		<9 § M	<9 § M	<9 § M	<9 § M	<9 § M	<9 § M
Acenaphthylene	<12 µg/kg	TM218		<12 § M	<12 § M	<12 § M	<12 § M	<12 § M	<12 § M
Acenaphthene	<8 µg/kg	TM218		<8 § M	<8 § M	<8 § M	<8 § M	<8 § M	<8 § M
Fluorene	<10 µg/kg	TM218		<10 § M	<10 § M	<10 § M	<10 § M	<10 § M	<10 § M
Phenanthrene	<15 µg/kg	TM218		<15 § M	<15 § M	<15 § M	<15 § M	<15 § M	<15 § M
Anthracene	<16 µg/kg	TM218		<16 § M	<16 § M	<16 § M	<16 § M	<16 § M	<16 § M
Fluoranthene	<17 µg/kg	TM218		<17 § M	<17 § M	<17 § M	<17 § M	<17 § M	<17 § M
Pyrene	<15 µg/kg	TM218		<15 § M	<15 § M	<15 § M	<15 § M	<15 § M	<15 § M
Benz(a)anthracene	<14 µg/kg	TM218		<14 § M	<14 § M	<14 § M	<14 § M	<14 § M	<14 § M
Chrysene	<10 µg/kg	TM218		<10 § M	<10 § M	<10 § M	<10 § M	<10 § M	<10 § M
Benzo(b)fluoranthene	<15 µg/kg	TM218		<15 § M	<15 § M	<15 § M	<15 § M	<15 § M	<15 § M
Benzo(k)fluoranthene	<14 µg/kg	TM218		<14 § M	<14 § M	<14 § M	<14 § M	<14 § M	<14 § M
Benzo(a)pyrene	<15 µg/kg	TM218		<15 § M	<15 § M	<15 § M	<15 § M	<15 § M	<15 § M
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218		<18 § M	<18 § M	<18 § M	<18 § M	<18 § M	<18 § M
Dibenzo(a,h)anthracene	<23 µg/kg	TM218		<23 § M	<23 § M	<23 § M	<23 § M	<23 § M	<23 § M
Benzo(g,h,i)perylene	<24 µg/kg	TM218		<24 § M	<24 § M	<24 § M	<24 § M	<24 § M	<24 § M
PAH, Total Detected USEPA 16	<118 µg/kg	TM218		<118 §	<118 §	<118 §	<118 §	<118 §	<118 §

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4♦§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP 14	TP 16				
			Depth (m)	0.50 - 0.50	0.50 - 0.50				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	-	-				
			Sample Time	.	.				
			Date Received	05/11/2021	05/11/2021				
			SDG Ref	211106-42	211106-42				
			Lab Sample No.(s)	25288111	25288112				
			AGS Reference						
Naphthalene	<9 µg/kg	TM218		<9 § M	<9 § M				
Acenaphthylene	<12 µg/kg	TM218		<12 § M	<12 § M				
Acenaphthene	<8 µg/kg	TM218		<8 § M	<8 § M				
Fluorene	<10 µg/kg	TM218		<10 § M	<10 § M				
Phenanthrene	<15 µg/kg	TM218		<15 § M	<15 § M				
Anthracene	<16 µg/kg	TM218		<16 § M	<16 § M				
Fluoranthene	<17 µg/kg	TM218		<17 § M	<17 § M				
Pyrene	<15 µg/kg	TM218		<15 § M	<15 § M				
Benz(a)anthracene	<14 µg/kg	TM218		<14 § M	<14 § M				
Chrysene	<10 µg/kg	TM218		<10 § M	<10 § M				
Benzo(b)fluoranthene	<15 µg/kg	TM218		<15 § M	<15 § M				
Benzo(k)fluoranthene	<14 µg/kg	TM218		<14 § M	<14 § M				
Benzo(a)pyrene	<15 µg/kg	TM218		<15 § M	<15 § M				
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218		<18 § M	<18 § M				
Dibenzo(a,h)anthracene	<23 µg/kg	TM218		<23 § M	<23 § M				
Benzo(g,h,i)perylene	<24 µg/kg	TM218		<24 § M	<24 § M				
PAH, Total Detected USEPA 16	<118 µg/kg	TM218		<118 §	<118 §				

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

TPH CWG (S)

Results Legend
- # ISO17025 accredited.
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- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP 03	TP 04	TP 07	TP 10	TP 12	TP 13
			Depth (m)	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	-	-	-	-	-	-
			Sample Time	.	.	.	.	.	.
			Date Received	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
			SDG Ref	211106-42	211106-42	211106-42	211106-42	211106-42	211106-42
			Lab Sample No.(s)	25288105	25288106	25288107	25288108	25288109	25288110
			AGS Reference						
GRO Surrogate % recovery**	%	TM089		123 §	123 §	97.4 §	107 §	101 §	127 §
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/kg	TM089		<10 §	<10 §	3620 §	<10 §	<10 §	<10 §
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/kg	TM089		<10 §	<10 §	<10 §	<10 §	<10 §	<10 §
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/kg	TM089		<10 §	<10 §	<10 §	11.3 §	<10 §	<10 §
Aliphatics >C10-C12 (EH_2D_AL_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #
Aliphatics >C12-C16 (EH_2D_AL_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #
Aliphatics >C16-C21 (EH_2D_AL_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #
Aliphatics >C21-C35 (EH_2D_AL_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #	<1000 § #	<1000 § #	1880 § #	<1000 § #
Aliphatics >C35-C44 (EH_2D_AL_#1)	<1000 µg/kg	TM414		<1000 §	<1000 §	<1000 §	<1000 §	<1000 §	<1000 §
Total Aliphatics >C10-C44 (EH_2D_AR_#1)	<5000 µg/kg	TM414		<5000 §	<5000 §	<5000 §	<5000 §	<5000 §	<5000 §
Total Aliphatics & Aromatics >C10-C44 (EH_2D_Total_#1)	<10000 µg/kg	TM414		<10000 §	<10000 §	<10000 §	<10000 §	<10000 §	<10000 §
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/kg	TM089		<10 §	<10 §	<10 §	<10 §	<10 §	<10 §
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/kg	TM089		<10 §	<10 §	<10 §	<10 §	<10 §	<10 §
Aromatics >EC8-EC10 (HS_1D_AR)	<10 µg/kg	TM089		<10 §	<10 §	<10 §	<10 §	<10 §	<10 §
Aromatics > EC10-EC12 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #
Aromatics > EC12-EC16 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #
Aromatics > EC16-EC21 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #	<1000 § #
Aromatics > EC21-EC35 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #	1330 § #	1390 § #	<1000 § #	<1000 § #
Aromatics >EC35-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 §	<1000 §	<1000 §	<1000 §	<1000 §	<1000 §
Aromatics > EC40-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 §	<1000 §	<1000 §	<1000 §	<1000 §	<1000 §
Total Aromatics > EC10-EC44 (EH_2D_AR_#1)	<5000 µg/kg	TM414		<5000 §	<5000 §	<5000 §	<5000 §	<5000 §	<5000 §
Total Aliphatics & Aromatics >C5-C44 (EH_2D_Total_#1+HS_1D_Total)	<10000 µg/kg	TM414		<10000 §	<10000 §	<10000 §	<10000 §	<10000 §	<10000 §
GRO >C5-C6 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §	<20 §	<20 §	<20 §	<20 §
GRO >C6-C7 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §	<20 §	<20 §	<20 §	<20 §
GRO >C7-C8 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §	<20 §	<20 §	<20 §	<20 §
GRO >C8-C10 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §	<20 §	<20 §	<20 §	<20 §
GRO >C10-C12 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §	<20 §	<20 §	<20 §	<20 §
Total Aliphatics >C5-C10 (HS_1D_AL_TOTAL)	<50 µg/kg	TM089		<50 §	<50 §	3620 §	<50 §	<50 §	<50 §
Total Aromatics >EC5-EC10 (HS_1D_AR_TOTAL)	<50 µg/kg	TM089		<50 §	<50 §	<50 §	<50 §	<50 §	<50 §
GRO >C5-C10 (HS_1D_TOTAL)	<20 µg/kg	TM089		<20 §	<20 §	3620 §	<20 §	<20 §	<20 §

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

TPH CWG (S)

Results Legend
- # ISO17025 accredited.
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- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP 14	TP 16				
			Depth (m)	0.50 - 0.50	0.50 - 0.50				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	-	-				
			Sample Time	.	.				
			Date Received	05/11/2021	05/11/2021				
			SDG Ref	211106-42	211106-42				
			Lab Sample No.(s)	25288111	25288112				
			AGS Reference						
GRO Surrogate % recovery**	%	TM089		113 §	101 §				
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/kg	TM089		<10 §	<10 §				
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/kg	TM089		<10 §	<10 §				
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/kg	TM089		<10 §	<10 §				
Aliphatics >C10-C12 (EH_2D_AL_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #				
Aliphatics >C12-C16 (EH_2D_AL_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #				
Aliphatics >C16-C21 (EH_2D_AL_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #				
Aliphatics >C21-C35 (EH_2D_AL_#1)	<1000 µg/kg	TM414		1170 § #	<1000 § #				
Aliphatics >C35-C44 (EH_2D_AL_#1)	<1000 µg/kg	TM414		<1000 §	<1000 §				
Total Aliphatics >C10-C44 (EH_2D_AR_#1)	<5000 µg/kg	TM414		<5000 §	<5000 §				
Total Aliphatics & Aromatics >C10-C44 (EH_2D_Total_#1)	<10000 µg/kg	TM414		<10000 §	<10000 §				
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/kg	TM089		<10 §	<10 §				
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/kg	TM089		<10 §	<10 §				
Aromatics >EC8-EC10 (HS_1D_AR)	<10 µg/kg	TM089		<10 §	<10 §				
Aromatics > EC10-EC12 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #				
Aromatics > EC12-EC16 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #				
Aromatics > EC16-EC21 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #				
Aromatics > EC21-EC35 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 § #	<1000 § #				
Aromatics >EC35-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 §	<1000 §				
Aromatics > EC40-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414		<1000 §	<1000 §				
Total Aromatics > EC10-EC44 (EH_2D_AR_#1)	<5000 µg/kg	TM414		<5000 §	<5000 §				
Total Aliphatics & Aromatics >C5-C44 (EH_2D_Total_#1+HS_1D_Total)	<10000 µg/kg	TM414		<10000 §	<10000 §				
GRO >C5-C6 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §				
GRO >C6-C7 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §				
GRO >C7-C8 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §				
GRO >C8-C10 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §				
GRO >C10-C12 (HS_1D)	<20 µg/kg	TM089		<20 §	<20 §				
Total Aliphatics >C5-C10 (HS_1D_AL_TOTAL)	<50 µg/kg	TM089		<50 §	<50 §				
Total Aromatics >EC5-EC10 (HS_1D_AR_TOTAL)	<50 µg/kg	TM089		<50 §	<50 §				
GRO >C5-C10 (HS_1D_TOTAL)	<20 µg/kg	TM089		<20 §	<20 §				

Validated

CERTIFICATE OF ANALYSIS

SDG: 211106-42 **Report Number:** 622047 **Superseded Report:**
Client Ref.: 5898 **Location:** Kilshane

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP 03	TP 04	TP 07	TP 10	TP 12	TP 13
			Depth (m)	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	-	-	-	-	-	-
			Sample Time	.	.	.	.	.	.
			Date Received	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
			SDG Ref	211106-42	211106-42	211106-42	211106-42	211106-42	211106-42
			Lab Sample No.(s)	25288105	25288106	25288107	25288108	25288109	25288110
			AGS Reference						
Dibromofluoromethane**	%	TM116		124 §	124 §	104 §	122 §	119 §	103 §
Toluene-d8**	%	TM116		100 §	97.9 §	98 §	97.2 §	98 §	98.4 §
4-Bromofluorobenzene**	%	TM116		94.6 §	87.8 §	88.4 §	78.9 §	84.2 §	87.5 §
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116		<10 § M	<10 § M	<10 § M	<10 § M	<10 § M	<10 § M
Benzene	<9 µg/kg	TM116		<9 § M	<9 § M	<9 § M	<9 § M	<9 § M	<9 § M
Toluene	<7 µg/kg	TM116		16.3 § M	23 § M	<7 § M	<7 § M	<7 § M	<7 § M
Ethylbenzene	<4 µg/kg	TM116		<4 § M	<4 § M	<4 § M	<4 § M	<4 § M	<4 § M
p/m-Xylene	<10 µg/kg	TM116		16.8 § #	23.1 § #	<10 § #	<10 § #	<10 § #	<10 § #
o-Xylene	<10 µg/kg	TM116		<10 § M	<10 § M	<10 § M	<10 § M	<10 § M	<10 § M

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP 14	TP 16
			Depth (m)	0.50 - 0.50	0.50 - 0.50
			Sample Type	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	-	-
			Sample Time	.	.
			Date Received	05/11/2021	05/11/2021
			SDG Ref	211106-42	211106-42
			Lab Sample No.(s)	25288111	25288112
			AGS Reference		
Dibromofluoromethane**	%	TM116		107 §	122 §
Toluene-d8**	%	TM116		101 §	95.7 §
4-Bromofluorobenzene**	%	TM116		84 §	77.6 §
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116		<10 § M	<10 § M
Benzene	<9 µg/kg	TM116		<9 § M	<9 § M
Toluene	<7 µg/kg	TM116		<7 § M	<7 § M
Ethylbenzene	<4 µg/kg	TM116		<4 § M	<4 § M
p/m-Xylene	<10 µg/kg	TM116		<10 § #	<10 § #
o-Xylene	<10 µg/kg	TM116		<10 § M	<10 § M

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Kilshane
Mass Sample taken (kg)	0.100	**Natural Moisture Content (%)**	10.8
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	90.3
Particle Size <4mm	>95%		

Case	
SDG	211106-42
Lab Sample Number(s)	25288105
Sampled Date	
Customer Sample Ref.	TP 03
Depth (m)	0.50 - 0.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.456	3	5	6
Loss on Ignition (%)	3.05	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	-	-	-	-
pH (pH Units)	-	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.00207	<0.0002	0.0207	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.000724	<0.0003	0.00724	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00131	<0.001	0.0131	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	0.677	<0.5	6.77	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	74.3	<10	743	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	3.25	<3	32.5	<30	500	800	1000

Leach Test Information

Date Prepared	08-Nov-2021
pH (pH Units)	7.99
Conductivity (µS/cm)	90.80
Temperature (°C)	21.10
Volume Leachant (Litres)	0.890

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

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CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Kilshane
Mass Sample taken (kg)	0.108	**Natural Moisture Content (%)**	20.2
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	83.2
Particle Size <4mm	>95%		

Case	
SDG	211106-42
Lab Sample Number(s)	25288106
Sampled Date	
Customer Sample Ref.	TP 04
Depth (m)	0.50 - 0.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.593	3	5	6
Loss on Ignition (%)	2.79	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	-	-	-	-
pH (pH Units)	-	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.00104	<0.0002	0.0104	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00139	<0.0003	0.0139	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00288	<0.001	0.0288	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	26.4	<10	264	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	4.81	<3	48.1	<30	500	800	1000

Leach Test Information

Date Prepared	08-Nov-2021
pH (pH Units)	8.48
Conductivity (µS/cm)	25.70
Temperature (°C)	20.80
Volume Leachant (Litres)	0.882

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CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Kilshane
Mass Sample taken (kg)	0.106	**Natural Moisture Content (%)**	17.2
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	85.3
Particle Size <4mm	>95%		

Case	
SDG	211106-42
Lab Sample Number(s)	25288107
Sampled Date	
Customer Sample Ref.	TP 07
Depth (m)	0.50 - 0.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.643	3	5	6
Loss on Ignition (%)	4.07	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	-	-	-	-
pH (pH Units)	-	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.000556	<0.0005	0.00556	<0.005	0.5	2	25
Barium	0.00117	<0.0002	0.0117	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00191	<0.0003	0.0191	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.0027	<0.001	0.027	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	24.8	<10	248	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	5.06	<3	50.6	<30	500	800	1000

Leach Test Information

Date Prepared	08-Nov-2021
pH (pH Units)	7.88
Conductivity (µS/cm)	24.40
Temperature (°C)	20.80
Volume Leachant (Litres)	0.884

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Kilshane
Mass Sample taken (kg)	0.114	**Natural Moisture Content (%)**	26.7
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	78.9
Particle Size <4mm	>95%		

Case	
SDG	211106-42
Lab Sample Number(s)	25288108
Sampled Date	
Customer Sample Ref.	TP 10
Depth (m)	0.50 - 0.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.545	3	5	6
Loss on Ignition (%)	4.15	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	-	-	-	-
pH (pH Units)	-	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.00169	<0.0002	0.0169	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.000816	<0.0003	0.00816	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.000576	<0.0004	0.00576	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00118	<0.001	0.0118	<0.01	4	50	200
Chloride	2	<2	20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	58.7	<10	587	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	3.07	<3	30.7	<30	500	800	1000

Leach Test Information

Date Prepared	08-Nov-2021
pH (pH Units)	7.94
Conductivity (µS/cm)	55.00
Temperature (°C)	20.00
Volume Leachant (Litres)	0.876

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CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Kilshane
Mass Sample taken (kg)	0.117	**Natural Moisture Content (%)**	29.2
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	77.4
Particle Size <4mm	>95%		

Case	
SDG	211106-42
Lab Sample Number(s)	25288109
Sampled Date	
Customer Sample Ref.	TP 12
Depth (m)	0.50 - 0.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.65	3	5	6
Loss on Ignition (%)	4.71	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	-	-	-	-
pH (pH Units)	-	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.000809	<0.0005	0.00809	<0.005	0.5	2	25
Barium	0.00162	<0.0002	0.0162	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.000526	<0.0003	0.00526	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	0.000661	<0.0002	0.00661	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.0208	<0.001	0.208	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	47.9	<10	479	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	4.47	<3	44.7	<30	500	800	1000

Leach Test Information

Date Prepared	08-Nov-2021
pH (pH Units)	6.78
Conductivity (µS/cm)	44.40
Temperature (°C)	21.20
Volume Leachant (Litres)	0.873

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Kilshane
Mass Sample taken (kg)	0.114	**Natural Moisture Content (%)**	26.6
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	79
Particle Size <4mm	>95%		

Case	
SDG	211106-42
Lab Sample Number(s)	25288110
Sampled Date	
Customer Sample Ref.	TP 13
Depth (m)	0.50 - 0.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.58	3	5	6
Loss on Ignition (%)	4.38	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	-	-	-	-
pH (pH Units)	-	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00078	<0.0005	0.0078	<0.005	0.5	2	25
Barium	0.0274	<0.0002	0.274	<0.002	20	100	300
Cadmium	0.000152	<0.00008	0.00152	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.0031	<0.0003	0.031	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.00099	<0.0004	0.0099	<0.004	0.4	10	40
Lead	0.00216	<0.0002	0.0216	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.3	<0.001	3	<0.01	4	50	200
Chloride	2.5	<2	25	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	104	<10	1040	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	8.94	<3	89.4	<30	500	800	1000

Leach Test Information

Date Prepared	08-Nov-2021
pH (pH Units)	10.56
Conductivity (µS/cm)	152.00
Temperature (°C)	20.40
Volume Leachant (Litres)	0.876

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

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Validated

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Kilshane
Mass Sample taken (kg)	0.114	**Natural Moisture Content (%)**	26
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	79.4
Particle Size <4mm	>95%		

Case	
SDG	211106-42
Lab Sample Number(s)	25288111
Sampled Date	
Customer Sample Ref.	TP 14
Depth (m)	0.50 - 0.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.682	3	5	6
Loss on Ignition (%)	4.76	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	-	-	-	-
pH (pH Units)	-	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.00554	<0.0002	0.0554	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00208	<0.0003	0.0208	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.0013	<0.0004	0.013	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	<0.001	<0.001	<0.01	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	0.689	<0.5	6.89	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	118	<10	1180	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	4.53	<3	45.3	<30	500	800	1000

Leach Test Information

Date Prepared	08-Nov-2021
pH (pH Units)	8.04
Conductivity (µS/cm)	147.00
Temperature (°C)	20.50
Volume Leachant (Litres)	0.876

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

21/11/2021 22:40:16

22:33:05 21/11/2021

Validated

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Kilshane
Mass Sample taken (kg)	0.112	**Natural Moisture Content (%)**	22.9
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	81.4
Particle Size <4mm	>95%		

Case	
SDG	211106-42
Lab Sample Number(s)	25288112
Sampled Date	
Customer Sample Ref.	TP 16
Depth (m)	0.50 - 0.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.478	3	5	6
Loss on Ignition (%)	3.16	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	-	-	-	-
pH (pH Units)	-	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.00768	<0.0002	0.0768	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00197	<0.0003	0.0197	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	0.00028	<0.0002	0.0028	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00564	<0.001	0.0564	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	43.2	<10	432	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	3.09	<3	30.9	<30	500	800	1000

Leach Test Information

Date Prepared	08-Nov-2021
pH (pH Units)	8.49
Conductivity (µS/cm)	44.00
Temperature (°C)	20.20
Volume Leachant (Litres)	0.879

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

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Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM132	In - house Method	ELTRA CS800 Operators Guide
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM410	Shaker extraction-In house coronene method	Determination of Coronene in soils by GCMS
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID
TM415	Analysis of Petroleum Hydrocarbons in Environmental Media.	Determination of Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

CERTIFICATE OF ANALYSIS

SDG: 211106-42 Report Number: 622047 Superseded Report:
Client Ref.: 5898 Location: Kilshane

Test Completion Dates

Lab Sample No(s)	25288105	25288106	25288113	25288107	25288108	25288109	25288110	25288111	25288114	25288115
Customer Sample Ref.	TP 03	TP 04	TP 06	TP 07	TP 10	TP 12	TP 13	TP 14	TP 14	TP 15
AGS Ref.										
Depth	0.50 - 0.50	0.50 - 0.50	1.00 - 1.00	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	1.00 - 1.00	1.00 - 1.00
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (w)	15-Nov-2021	15-Nov-2021		15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021		
CEN 10:1 Leachate (1 Stage)	10-Nov-2021	10-Nov-2021		10-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021	09-Nov-2021		
CEN Readings	13-Nov-2021	13-Nov-2021		13-Nov-2021	13-Nov-2021	13-Nov-2021	13-Nov-2021	13-Nov-2021		
Chromium III	12-Nov-2021	12-Nov-2021		12-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021		
Coronene	12-Nov-2021	12-Nov-2021		12-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021		
Dissolved Metals by ICP-MS	15-Nov-2021	15-Nov-2021		15-Nov-2021	12-Nov-2021	15-Nov-2021	15-Nov-2021	12-Nov-2021		
Dissolved Organic/Inorganic Carbon	17-Nov-2021	18-Nov-2021		18-Nov-2021	18-Nov-2021	18-Nov-2021	18-Nov-2021	18-Nov-2021		
EPH by GCxGC-FID	11-Nov-2021	11-Nov-2021		11-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021	11-Nov-2021		
EPH CWG GC (S)	11-Nov-2021	11-Nov-2021		11-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021	11-Nov-2021		
Fluoride	12-Nov-2021	12-Nov-2021		12-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021		
GRO by GC-FID (S)	15-Nov-2021	15-Nov-2021		15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021		
Hexavalent Chromium (s)	12-Nov-2021	12-Nov-2021		12-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021		
Loss on Ignition in soils	12-Nov-2021	12-Nov-2021	15-Nov-2021	12-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021
Mercury Dissolved	12-Nov-2021	15-Nov-2021		12-Nov-2021	15-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021		
Metals in solid samples by OES	12-Nov-2021	12-Nov-2021		12-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021		
Moisture at 105C	08-Nov-2021	08-Nov-2021		08-Nov-2021	08-Nov-2021	08-Nov-2021	08-Nov-2021	08-Nov-2021		
PAH by GCMS	11-Nov-2021	11-Nov-2021		11-Nov-2021	11-Nov-2021	11-Nov-2021	11-Nov-2021	11-Nov-2021		
PCBs by GCMS	12-Nov-2021	12-Nov-2021		12-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021	12-Nov-2021		
Phenols by HPLC (W)	12-Nov-2021	12-Nov-2021		12-Nov-2021	11-Nov-2021	12-Nov-2021	12-Nov-2021	11-Nov-2021		
Sample description	08-Nov-2021	08-Nov-2021	08-Nov-2021	08-Nov-2021	08-Nov-2021	08-Nov-2021	08-Nov-2021	08-Nov-2021	08-Nov-2021	08-Nov-2021
Total Dissolved Solids on Leachates	15-Nov-2021	12-Nov-2021		12-Nov-2021	15-Nov-2021	12-Nov-2021	12-Nov-2021	15-Nov-2021		
Total Organic Carbon	15-Nov-2021	15-Nov-2021		15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021		
TPH CWG GC (S)	15-Nov-2021	15-Nov-2021		15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021	15-Nov-2021		
VOC MS (S)	16-Nov-2021	16-Nov-2021		16-Nov-2021	12-Nov-2021	12-Nov-2021	16-Nov-2021	16-Nov-2021		

Lab Sample No(s)	25288112
Customer Sample Ref.	TP 16
AGS Ref.	
Depth	0.50 - 0.50
Type	Soil/Solid (S)
Anions by Kone (w)	15-Nov-2021
CEN 10:1 Leachate (1 Stage)	09-Nov-2021
CEN Readings	13-Nov-2021
Chromium III	15-Nov-2021
Coronene	12-Nov-2021
Dissolved Metals by ICP-MS	15-Nov-2021
Dissolved Organic/Inorganic Carbon	17-Nov-2021
EPH by GCxGC-FID	11-Nov-2021
EPH CWG GC (S)	11-Nov-2021
Fluoride	12-Nov-2021
GRO by GC-FID (S)	15-Nov-2021
Hexavalent Chromium (s)	12-Nov-2021
Loss on Ignition in soils	15-Nov-2021
Mercury Dissolved	12-Nov-2021
Metals in solid samples by OES	15-Nov-2021
Moisture at 105C	08-Nov-2021
PAH by GCMS	11-Nov-2021
PCBs by GCMS	12-Nov-2021
Phenols by HPLC (W)	12-Nov-2021
Sample description	08-Nov-2021
Total Dissolved Solids on Leachates	12-Nov-2021
Total Organic Carbon	15-Nov-2021
TPH CWG GC (S)	15-Nov-2021
VOC MS (S)	12-Nov-2021

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Matrix interference**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**
§	**Sampled on date not provided**

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix 8

Waste Classification Report

HazWasteOnline™

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

NTC8G-DLM6R-VWB6Z

Job name

5898

Description/Comments

Client: Go Power
Engineer: Waterman Moylan

Project

Kilshane

Site

Ballycoolin, Dublin 15

Classified by

Name:
Stephen Letch
Company:
Site Investigations Ltd
Date:
23 Nov 2021 14:31 GMT
Telephone:
00353 86817 9449

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: CERTIFIED

Course	Date
Hazardous Waste Classification	09 Oct 2019

Next 3 year Refresher due by Oct 2022

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	WAC Results		Page
					Inert	Non Haz	
1	TP03-0.50	0.50	Non Hazardous		Pass	Pass	3
2	TP04-0.50	0.50	Non Hazardous		Pass	Pass	7
3	TP07-0.50	0.50	Non Hazardous		Pass	Pass	11
4	TP10-0.50	0.50	Non Hazardous		Pass	Pass	14
5	TP12-0.50	0.50	Non Hazardous		Pass	Pass	17
6	TP13-0.50	0.50	Non Hazardous		Pass	Pass	20
7	TP14-0.50	0.50	Non Hazardous		Pass	Pass	23
8	TP16-0.50	0.50	Non Hazardous		Pass	Pass	26

Related documents

#	Name	Description
1	211106-42.hwol	.hwol file used to create the Job
2	Rilta Suite NEW	waste stream template used to create this Job

WAC results

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate the samples in this Job: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

Report

Created by: Stephen Letch
Created date: 23 Nov 2021 14:31 GMT

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Appendix A: Classifier defined and non CLP determinands	29
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Classification of sample: TP03-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP03-0.50
Sample Depth:
0.50 m
Moisture content:
7.7%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 7.7% Wet Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		**<LOD**
2	confirm TPH has NOT arisen from diesel or petrol					☑					
3	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1.62 mg/kg	1.197	1.79 mg/kg	0.000179 %	✓	
4	arsenic { arsenic pentoxide }	033-004-00-6	215-116-9	1303-28-2		35.8 mg/kg	1.534	50.684 mg/kg	0.00507 %	✓	
5	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		60 mg/kg	1.233	68.311 mg/kg	0.00683 %	✓	
6	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		1.73 mg/kg	1.855	2.961 mg/kg	0.000296 %	✓	
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		38 mg/kg	1.126	39.489 mg/kg	0.00395 %	✓	
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	20.4 mg/kg		18.829 mg/kg	0.00188 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		**<LOD**
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.48 mg/kg	1.5	3.434 mg/kg	0.000343 %	✓	
11	nickel { nickel sulfate }	028-009-00-5	232-104-9	7786-81-4		40 mg/kg	2.637	97.346 mg/kg	0.00973 %	✓	
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				1.15 mg/kg	1.405	1.491 mg/kg	0.000149 %	✓	
13	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		205 mg/kg	2.469	467.228 mg/kg	0.0467 %	✓	
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15.6 mg/kg	1.462	21.045 mg/kg	0.0021 %	✓	
15	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		**<LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
17	•	acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			205-917-1	208-96-8									
18	•	acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			201-469-6	83-32-9									
19	•	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
20	•	phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			201-581-5	85-01-8									
21	•	anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
			204-371-1	120-12-7									
22	•	fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
			205-912-4	206-44-0									
23	•	pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			204-927-3	129-00-0									
24		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
29	•	indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
31	•	benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
			205-883-8	191-24-2									
32	•	polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
35		toluene				0.0163	mg/kg		0.015	mg/kg	0.0000015 %	✓	
		601-021-00-3	203-625-9	108-88-3									
36	•	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
37	•	coronene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
			205-881-7	191-07-1									
38		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				0.0168	mg/kg		0.0155	mg/kg	0.00000155 %	✓	
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.0784 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because HP 3 can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 2; H225 "Highly flammable liquid and vapour."

Because of determinand:

toluene: (conc.: 1.5e-06%)

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]: (conc.: 1.55e-06%)

WAC results for sample: TP03-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis				Landfill Waste Acceptance Criteria Limits	
#	Determinand		User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	%	0.456	3	5
2	LOI (loss on ignition)	%	3.05	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	0.0331	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	<5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<0.118	100	-
7	pH	pH	7.99	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0207	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0072	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	<0.03	0.5	10
16	nickel	mg/kg	<0.004	0.4	10
17	lead	mg/kg	<0.002	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	0.0131	4	50
21	chloride	mg/kg	<20	800	15,000
22	fluoride	mg/kg	6.77	10	150
23	sulphate	mg/kg	<20	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	32.5	500	800
26	TDS (total dissolved solids)	mg/kg	743	4,000	60,000

Key

User supplied data

Classification of sample: TP04-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP04-0.50
Sample Depth:
0.50 m
Moisture content:
8.2%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 8.2% Wet Weight Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		**<LOD**
2		confirm TPH has NOT arisen from diesel or petrol					☑							
3		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1.34	mg/kg	1.197	1.473	mg/kg	0.000147 %	✓	
4		arsenic { arsenic pentoxide }	033-004-00-6	215-116-9	1303-28-2		13.6	mg/kg	1.534	19.15	mg/kg	0.00192 %	✓	
5		barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		61.7	mg/kg	1.233	69.866	mg/kg	0.00699 %	✓	
6		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		1.88	mg/kg	1.855	3.201	mg/kg	0.00032 %	✓	
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		27.2	mg/kg	1.126	28.113	mg/kg	0.00281 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	16.8	mg/kg		15.422	mg/kg	0.00154 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		**<LOD**
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.08	mg/kg	1.5	4.242	mg/kg	0.000424 %	✓	
11		nickel { nickel sulfate }	028-009-00-5	232-104-9	7786-81-4		45.8	mg/kg	2.637	110.858	mg/kg	0.0111 %	✓	
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		**<LOD**
13		zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		92.7	mg/kg	2.469	210.134	mg/kg	0.021 %	✓	
14		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		11.8	mg/kg	1.462	15.832	mg/kg	0.00158 %	✓	
15		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6	mg/kg	1.923	<1.154	mg/kg	<0.000115 %		**<LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
17	•	acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			205-917-1	208-96-8									
18	•	acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			201-469-6	83-32-9									
19	•	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
20	•	phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			201-581-5	85-01-8									
21	•	anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
			204-371-1	120-12-7									
22	•	fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
			205-912-4	206-44-0									
23	•	pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			204-927-3	129-00-0									
24		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
29	•	indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
31	•	benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
			205-883-8	191-24-2									
32	•	polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
35		toluene				0.023	mg/kg		0.0211	mg/kg	0.00000211 %	✓	
		601-021-00-3	203-625-9	108-88-3									
36	•	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
37	•	coronene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
			205-881-7	191-07-1									
38		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				0.0231	mg/kg		0.0212	mg/kg	0.00000212 %	✓	
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.0492 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because HP 3 can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 2; H225 "Highly flammable liquid and vapour."

Because of determinand:

toluene: (conc.: 2.11e-06%)

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]: (conc.: 2.12e-06%)

WAC results for sample: TP04-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis				Landfill Waste Acceptance Criteria Limits	
#	Determinand		User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	%	0.593	3	5
2	LOI (loss on ignition)	%	2.79	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	0.0461	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	<5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<0.118	100	-
7	pH	pH	8.48	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0104	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0139	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	<0.03	0.5	10
16	nickel	mg/kg	<0.004	0.4	10
17	lead	mg/kg	<0.002	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	0.0288	4	50
21	chloride	mg/kg	<20	800	15,000
22	fluoride	mg/kg	<5	10	150
23	sulphate	mg/kg	<20	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	48.1	500	800
26	TDS (total dissolved solids)	mg/kg	264	4,000	60,000

Key

User supplied data

Classification of sample: TP07-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP07-0.50
Sample Depth:
0.50 m
Moisture content:
16%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 16% Wet Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol					☑					
3	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		2.11 mg/kg	1.197	2.122 mg/kg	0.000212 %	✓	
4	arsenic { arsenic pentoxide }	033-004-00-6	215-116-9	1303-28-2		18.9 mg/kg	1.534	24.352 mg/kg	0.00244 %	✓	
5	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		80.8 mg/kg	1.233	83.72 mg/kg	0.00837 %	✓	
6	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		3.09 mg/kg	1.855	4.814 mg/kg	0.000481 %	✓	
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		43.6 mg/kg	1.126	41.235 mg/kg	0.00412 %	✓	
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	25.7 mg/kg		21.588 mg/kg	0.00216 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		4.46 mg/kg	1.5	5.62 mg/kg	0.000562 %	✓	
11	nickel { nickel sulfate }	028-009-00-5	232-104-9	7786-81-4		77 mg/kg	2.637	170.541 mg/kg	0.0171 %	✓	
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<LOD
13	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		145 mg/kg	2.469	300.76 mg/kg	0.0301 %	✓	
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18.1 mg/kg	1.462	22.221 mg/kg	0.00222 %	✓	
15	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
17	•	acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			205-917-1	208-96-8									
18	•	acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			201-469-6	83-32-9									
19	•	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
20	•	phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			201-581-5	85-01-8									
21	•	anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
			204-371-1	120-12-7									
22	•	fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
			205-912-4	206-44-0									
23	•	pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			204-927-3	129-00-0									
24		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
29	•	indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
31	•	benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
			205-883-8	191-24-2									
32	•	polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
35		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
36	•	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
37	•	coronene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
			205-881-7	191-07-1									
38		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.069 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP07-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis				Landfill Waste Acceptance Criteria Limits	
#	Determinand		User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	%	0.643	3	5
2	LOI (loss on ignition)	%	4.07	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	<5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<0.118	100	-
7	pH	pH	7.88	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	0.0055	0.5	2
10	barium	mg/kg	0.0117	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0191	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	<0.03	0.5	10
16	nickel	mg/kg	<0.004	0.4	10
17	lead	mg/kg	<0.002	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	0.027	4	50
21	chloride	mg/kg	<20	800	15,000
22	fluoride	mg/kg	<5	10	150
23	sulphate	mg/kg	<20	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	50.6	500	800
26	TDS (total dissolved solids)	mg/kg	248	4,000	60,000

Key

User supplied data

Classification of sample: TP10-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP10-0.50
Sample Depth:
0.50 m
Moisture content:
21%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 21% Wet Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol					☑					
3	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		0.966 mg/kg	1.197	0.914 mg/kg	0.0000914 %	✓	
4	arsenic { arsenic pentoxide }	033-004-00-6	215-116-9	1303-28-2		13.4 mg/kg	1.534	16.238 mg/kg	0.00162 %	✓	
5	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		88.5 mg/kg	1.233	86.24 mg/kg	0.00862 %	✓	
6	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		1.95 mg/kg	1.855	2.857 mg/kg	0.000286 %	✓	
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		26.8 mg/kg	1.126	23.837 mg/kg	0.00238 %	✓	
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	23.2 mg/kg		18.328 mg/kg	0.00183 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.78 mg/kg	1.5	3.295 mg/kg	0.000329 %	✓	
11	nickel { nickel sulfate }	028-009-00-5	232-104-9	7786-81-4		52.1 mg/kg	2.637	108.523 mg/kg	0.0109 %	✓	
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				1.02 mg/kg	1.405	1.132 mg/kg	0.000113 %	✓	
13	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		120 mg/kg	2.469	234.089 mg/kg	0.0234 %	✓	
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16.3 mg/kg	1.462	18.82 mg/kg	0.00188 %	✓	
15	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		**<LOD**
		601-052-00-2	202-049-5	91-20-3									
17	●	acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		**<LOD**
			205-917-1	208-96-8									
18	●	acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		**<LOD**
			201-469-6	83-32-9									
19	●	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
			201-695-5	86-73-7									
20	●	phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
			201-581-5	85-01-8									
21	●	anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		**<LOD**
			204-371-1	120-12-7									
22	●	fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		**<LOD**
			205-912-4	206-44-0									
23	●	pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
			204-927-3	129-00-0									
24		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		**<LOD**
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		**<LOD**
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
		601-032-00-3	200-028-5	50-32-8									
29	●	indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		**<LOD**
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
31	●	benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		**<LOD**
			205-883-8	191-24-2									
32	●	polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		**<LOD**
		602-039-00-4	215-648-1	1336-36-3									
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		**<LOD**
		601-020-00-8	200-753-7	71-43-2									
35		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		**<LOD**
		601-021-00-3	203-625-9	108-88-3									
36	●	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		**<LOD**
		601-023-00-4	202-849-4	100-41-4									
37	●	coronene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		**<LOD**
			205-881-7	191-07-1									
38		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.0526 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP10-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis				Landfill Waste Acceptance Criteria Limits	
#	Determinand		User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	%	0.545	3	5
2	LOI (loss on ignition)	%	4.15	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	<5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<0.118	100	-
7	pH	pH	7.94	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0169	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0081	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	<0.03	0.5	10
16	nickel	mg/kg	0.0057	0.4	10
17	lead	mg/kg	<0.002	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	0.0118	4	50
21	chloride	mg/kg	20	800	15,000
22	fluoride	mg/kg	<5	10	150
23	sulphate	mg/kg	<20	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	30.7	500	800
26	TDS (total dissolved solids)	mg/kg	587	4,000	60,000

Key

User supplied data

Classification of sample: TP12-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP12-0.50
Sample Depth:
0.50 m
Moisture content:
19%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 19% Wet Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol					☑					
3	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<0.6 mg/kg	1.197	<0.718 mg/kg	<0.0000718 %		<LOD
4	arsenic { arsenic pentoxide }	033-004-00-6	215-116-9	1303-28-2		13.3 mg/kg	1.534	16.524 mg/kg	0.00165 %	✓	
5	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		151 mg/kg	1.233	150.869 mg/kg	0.0151 %	✓	
6	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		1.29 mg/kg	1.855	1.938 mg/kg	0.000194 %	✓	
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		20.8 mg/kg	1.126	18.969 mg/kg	0.0019 %	✓	
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	23.9 mg/kg		19.359 mg/kg	0.00194 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		1.94 mg/kg	1.5	2.357 mg/kg	0.000236 %	✓	
11	nickel { nickel sulfate }	028-009-00-5	232-104-9	7786-81-4		56.2 mg/kg	2.637	120.027 mg/kg	0.012 %	✓	
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<LOD
13	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		107 mg/kg	2.469	214.014 mg/kg	0.0214 %	✓	
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18.9 mg/kg	1.462	22.375 mg/kg	0.00224 %	✓	
15	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
17	•	acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			205-917-1	208-96-8									
18	•	acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			201-469-6	83-32-9									
19	•	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
20	•	phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			201-581-5	85-01-8									
21	•	anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
			204-371-1	120-12-7									
22	•	fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
			205-912-4	206-44-0									
23	•	pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			204-927-3	129-00-0									
24		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
29	•	indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
31	•	benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
			205-883-8	191-24-2									
32	•	polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
35		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
36	•	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
37	•	coronene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
			205-881-7	191-07-1									
38		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.058 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP12-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis				Landfill Waste Acceptance Criteria Limits	
#	Determinand		User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	%	0.65	3	5
2	LOI (loss on ignition)	%	4.71	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	<5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<0.118	100	-
7	pH	pH	6.78	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	0.008	0.5	2
10	barium	mg/kg	0.0162	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0052	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	<0.03	0.5	10
16	nickel	mg/kg	<0.004	0.4	10
17	lead	mg/kg	0.0066	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	0.208	4	50
21	chloride	mg/kg	<20	800	15,000
22	fluoride	mg/kg	<5	10	150
23	sulphate	mg/kg	<20	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	44.7	500	800
26	TDS (total dissolved solids)	mg/kg	479	4,000	60,000

Key

User supplied data

Classification of sample: TP13-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP13-0.50
Sample Depth:
0.50 m
Moisture content:
18%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 18% Wet Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol					☑					
3	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1.21 mg/kg	1.197	1.188 mg/kg	0.000119 %	✓	
4	arsenic { arsenic pentoxide }	033-004-00-6	215-116-9	1303-28-2		13.3 mg/kg	1.534	16.728 mg/kg	0.00167 %	✓	
5	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		63.6 mg/kg	1.233	64.329 mg/kg	0.00643 %	✓	
6	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		1.59 mg/kg	1.855	2.418 mg/kg	0.000242 %	✓	
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		30.4 mg/kg	1.126	28.066 mg/kg	0.00281 %	✓	
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	21.3 mg/kg		17.466 mg/kg	0.00175 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.47 mg/kg	1.5	3.038 mg/kg	0.000304 %	✓	
11	nickel { nickel sulfate }	028-009-00-5	232-104-9	7786-81-4		59.3 mg/kg	2.637	128.211 mg/kg	0.0128 %	✓	
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				1.04 mg/kg	1.405	1.198 mg/kg	0.00012 %	✓	
13	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		108 mg/kg	2.469	218.681 mg/kg	0.0219 %	✓	
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15.7 mg/kg	1.462	18.816 mg/kg	0.00188 %	✓	
15	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		**<LOD**
		601-052-00-2	202-049-5	91-20-3									
17	●	acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		**<LOD**
			205-917-1	208-96-8									
18	●	acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		**<LOD**
			201-469-6	83-32-9									
19	●	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
			201-695-5	86-73-7									
20	●	phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
			201-581-5	85-01-8									
21	●	anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		**<LOD**
			204-371-1	120-12-7									
22	●	fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		**<LOD**
			205-912-4	206-44-0									
23	●	pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
			204-927-3	129-00-0									
24		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		**<LOD**
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		**<LOD**
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
		601-032-00-3	200-028-5	50-32-8									
29	●	indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		**<LOD**
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
31	●	benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		**<LOD**
			205-883-8	191-24-2									
32	●	polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		**<LOD**
		602-039-00-4	215-648-1	1336-36-3									
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		**<LOD**
		601-020-00-8	200-753-7	71-43-2									
35		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		**<LOD**
		601-021-00-3	203-625-9	108-88-3									
36	●	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		**<LOD**
		601-023-00-4	202-849-4	100-41-4									
37	●	coronene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		**<LOD**
			205-881-7	191-07-1									
38		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.0512 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP13-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis				Landfill Waste Acceptance Criteria Limits	
#	Determinand		User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	%	0.58	3	5
2	LOI (loss on ignition)	%	4.38	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	<5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<0.118	100	-
7	pH	pH	10.56	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	0.0078	0.5	2
10	barium	mg/kg	0.274	20	100
11	cadmium	mg/kg	0.0015	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.031	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	<0.03	0.5	10
16	nickel	mg/kg	0.0099	0.4	10
17	lead	mg/kg	0.0216	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	3	4	50
21	chloride	mg/kg	25	800	15,000
22	fluoride	mg/kg	<5	10	150
23	sulphate	mg/kg	<20	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	89.4	500	800
26	TDS (total dissolved solids)	mg/kg	1040	4,000	60,000

Key

User supplied data

Classification of sample: TP14-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP14-0.50
Sample Depth:
0.50 m
Moisture content:
20%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 20% Wet Weight Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol					☑					
3	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1.95 mg/kg	1.197	1.867 mg/kg	0.000187 %	✓	
4	arsenic { arsenic pentoxide }	033-004-00-6	215-116-9	1303-28-2		17.2 mg/kg	1.534	21.106 mg/kg	0.00211 %	✓	
5	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		81 mg/kg	1.233	79.93 mg/kg	0.00799 %	✓	
6	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		3 mg/kg	1.855	4.451 mg/kg	0.000445 %	✓	
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		35.1 mg/kg	1.126	31.615 mg/kg	0.00316 %	✓	
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	24 mg/kg		19.2 mg/kg	0.00192 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.56 mg/kg	1.5	4.273 mg/kg	0.000427 %	✓	
11	nickel { nickel sulfate }	028-009-00-5	232-104-9	7786-81-4		69.1 mg/kg	2.637	145.756 mg/kg	0.0146 %	✓	
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				1.81 mg/kg	1.405	2.034 mg/kg	0.000203 %	✓	
13	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		170 mg/kg	2.469	335.824 mg/kg	0.0336 %	✓	
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		19.2 mg/kg	1.462	22.449 mg/kg	0.00224 %	✓	
15	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
17	•	acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			205-917-1	208-96-8									
18	•	acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			201-469-6	83-32-9									
19	•	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
20	•	phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			201-581-5	85-01-8									
21	•	anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
			204-371-1	120-12-7									
22	•	fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
			205-912-4	206-44-0									
23	•	pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			204-927-3	129-00-0									
24		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
29	•	indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
31	•	benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
			205-883-8	191-24-2									
32	•	polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
35		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
36	•	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
37	•	coronene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
			205-881-7	191-07-1									
38		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.068 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP14-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis				Landfill Waste Acceptance Criteria Limits	
#	Determinand		User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	%	0.682	3	5
2	LOI (loss on ignition)	%	4.76	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	<5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<0.118	100	-
7	pH	pH	8.04	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0554	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0208	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	<0.03	0.5	10
16	nickel	mg/kg	0.013	0.4	10
17	lead	mg/kg	<0.002	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	<0.01	4	50
21	chloride	mg/kg	<20	800	15,000
22	fluoride	mg/kg	6.89	10	150
23	sulphate	mg/kg	<20	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	45.3	500	800
26	TDS (total dissolved solids)	mg/kg	1180	4,000	60,000

Key

User supplied data

Classification of sample: TP16-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP16-0.50
Sample Depth:
0.50 m
Moisture content:
15%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15% Wet Weight Moisture Correction applied (MC)

#	Determinand	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number / EC Number / CAS Number							
1	TPH (C6 to C40) petroleum group TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol		☑					
3	antimony { antimony trioxide } 051-005-00-X / 215-175-0 / 1309-64-4		1.66 mg/kg	1.197	1.689 mg/kg	0.000169 %	✓	
4	arsenic { arsenic pentoxide } 033-004-00-6 / 215-116-9 / 1303-28-2		13.9 mg/kg	1.534	18.123 mg/kg	0.00181 %	✓	
5	barium { barium sulphide } 016-002-00-X / 244-214-4 / 21109-95-5		58.2 mg/kg	1.233	61.021 mg/kg	0.0061 %	✓	
6	cadmium { cadmium sulfate } 048-009-00-9 / 233-331-6 / 10124-36-4		2.34 mg/kg	1.855	3.689 mg/kg	0.000369 %	✓	
7	copper { dicopper oxide; copper (I) oxide } 029-002-00-X / 215-270-7 / 1317-39-1		29 mg/kg	1.126	27.753 mg/kg	0.00278 %	✓	
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) } 082-001-00-6	1	19.9 mg/kg		16.915 mg/kg	0.00169 %	✓	
9	mercury { mercury dichloride } 080-010-00-X / 231-299-8 / 7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
10	molybdenum { molybdenum(VI) oxide } 042-001-00-9 / 215-204-7 / 1313-27-5		3.62 mg/kg	1.5	4.616 mg/kg	0.000462 %	✓	
11	nickel { nickel sulfate } 028-009-00-5 / 232-104-9 / 7786-81-4		50.8 mg/kg	2.637	113.852 mg/kg	0.0114 %	✓	
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } 034-002-00-8		1 mg/kg	1.405	1.194 mg/kg	0.000119 %	✓	
13	zinc { zinc sulphate } 030-006-00-9 / 231-793-3 [1] 231-793-3 [2] / 7446-19-7 [1] 7733-02-0 [2]		122 mg/kg	2.469	256.066 mg/kg	0.0256 %	✓	
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) } 215-160-9 / 1308-38-9		13.7 mg/kg	1.462	17.02 mg/kg	0.0017 %	✓	
15	chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0 / 215-607-8 / 1333-82-0		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
16		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		**<LOD**
		601-052-00-2	202-049-5	91-20-3									
17	●	acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		**<LOD**
			205-917-1	208-96-8									
18	●	acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		**<LOD**
			201-469-6	83-32-9									
19	●	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
			201-695-5	86-73-7									
20	●	phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
			201-581-5	85-01-8									
21	●	anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		**<LOD**
			204-371-1	120-12-7									
22	●	fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		**<LOD**
			205-912-4	206-44-0									
23	●	pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
			204-927-3	129-00-0									
24		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		**<LOD**
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		**<LOD**
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		**<LOD**
		601-032-00-3	200-028-5	50-32-8									
29	●	indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		**<LOD**
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
31	●	benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		**<LOD**
			205-883-8	191-24-2									
32	●	polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		**<LOD**
		602-039-00-4	215-648-1	1336-36-3									
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		**<LOD**
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		**<LOD**
		601-020-00-8	200-753-7	71-43-2									
35		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		**<LOD**
		601-021-00-3	203-625-9	108-88-3									
36	●	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		**<LOD**
		601-023-00-4	202-849-4	100-41-4									
37	●	coronene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		**<LOD**
			205-881-7	191-07-1									
38		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		**<LOD**
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.0534 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP16-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis				Landfill Waste Acceptance Criteria Limits	
#	Determinand		User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	%	0.478	3	5
2	LOI (loss on ignition)	%	3.16	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	<5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<0.118	100	-
7	pH	pH	8.49	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0768	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0197	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	<0.03	0.5	10
16	nickel	mg/kg	<0.004	0.4	10
17	lead	mg/kg	0.0028	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	0.0564	4	50
21	chloride	mg/kg	<20	800	15,000
22	fluoride	mg/kg	<5	10	150
23	sulphate	mg/kg	<20	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	30.9	500	800
26	TDS (total dissolved solids)	mg/kg	432	4,000	60,000

Key

User supplied data

Appendix A: Classifier defined and non CLP determinands

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

confirm TPH has NOT arisen from diesel or petrol

Description/Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

barium sulphide (EC Number: 244-214-4, CAS Number: 21109-95-5)

CLP index number: 016-002-00-X
Description/Comments:
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): EUH031 >= 0.8 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH031 >= 0.8 % hazard statement sourced from: WM3, Table C12.2

lead compounds with the exception of those specified elsewhere in this Annex (worst case)

CLP index number: 082-001-00-6
Description/Comments: Worst Case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following CLP protocols, considers lead compounds from smelting industries, flue dust and similar to be Carcinogenic category 1A
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html (worst case lead compounds). Review date 29/09/2015

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

anthracene (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

fluoranthene (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

pyrene (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

indeno[123-cd]pyrene (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

benzo[ghi]perylene (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

polychlorobiphenyls; PCB (EC Number: 215-648-1, CAS Number: 1336-36-3)

CLP index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s):
29 Sep 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

coronene (EC Number: 205-881-7, CAS Number: 191-07-1)

Description/Comments: Data from C&L Inventory Database; no entries in Registered Substances or Pesticides Properties databases; SDS: Sigma Aldrich, 1907/2006 compliant, dated 2012 - no entries; IARC – Group 3, not carcinogenic.
Data source: http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=17010&HarmOnly=no?fc=true&lang=en
Data source date: 16 Jun 2014
Hazard Statements: STOT SE 2 H371

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case scenario.

arsenic {arsenic pentoxide}

Arsenic pentoxide used as most hazardous species.

barium {barium sulphide}

Chromium VII at limits of detection. Barium sulphide used as the next most hazardous species. No chromate present.

cadmium {cadmium sulfate}

Cadmium sulphate used as the most hazardous species.

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead compounds with the exception of those specified elsewhere in this Annex (worst case)}

Chromium VII at limits of detection. Lead compounds used as the next most hazardous species. No chromate present.

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight.

nickel {nickel sulfate}

Chromium VII at limits of detection. Nickel sulphate used as the next most hazardous species. No chromate present.

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

zinc {zinc sulphate}

Chromium VII at limits of detection. Zinc sulphate used as the next most hazardous species. No chromate present.

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments.

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2021.293.4891.9295 (20 Oct 2021)
HazWasteOnline Database: 2021.293.4891.9295 (20 Oct 2021)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2019 - UK: 2019 No. 720 of 27th March 2019
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019

Appendix 9

Survey Data

Survey Data

Location	Irish Transverse Mercator		Elevation	Irish National Grid	
	Easting	Northing		Easting	Northing
Boreholes					
BH01	710778.385	742304.266	79.66	310851.605	242279.728
BH02	710828.053	742278.441	78.61	310901.284	242253.898
BH03	710874.843	742327.339	78.56	310948.083	242302.807
BH04	710810.778	742357.380	80.23	310884.004	242332.854
Trial Pits					
TP01	710543.292	742183.245	80.62	310616.463	242158.680
TP02	710642.756	742332.109	80.84	310715.947	242307.576
TP03	710596.166	742470.886	82.85	310669.345	242446.383
TP04	710684.732	742619.034	83.06	310757.929	242594.564
TP05	710828.477	742750.035	80.65	310901.703	242725.594
TP06	710796.998	742609.299	81.39	310870.219	242584.827
TP07	710786.841	742471.531	80.53	310860.061	242447.030
TP08	710953.440	742658.661	78.59	311026.694	242634.201
TP09	710939.386	742368.549	78.30	311012.640	242344.026
TP10	710934.451	742451.994	78.72	311007.703	242427.489
TP11	710973.862	742525.011	78.26	311047.122	242500.522
TP12	710986.675	742598.125	77.96	311059.937	242573.652
TP13	710901.565	742581.879	78.74	310974.809	242557.402
TP14	710822.578	742313.118	79.48	310895.807	242288.582
TP15	710759.726	742351.280	80.58	310832.941	242326.752
TP16	710872.062	742360.647	79.01	310945.301	242336.122
Soakaway Test					
SK02	710649.458	742327.363	80.80	310722.650	242302.829
SK07	710785.216	742456.914	80.49	310858.436	242432.409
SK09	710926.652	742372.980	78.32	310999.903	242348.458
SK10	710921.871	742455.429	78.70	310995.120	242430.925
SK11	710958.633	742531.028	78.21	311031.889	242506.541
SK12	710973.438	742598.989	77.98	311046.697	242574.516
SK13	710886.122	742580.580	78.72	310959.362	242556.103
SK16	710861.554	742350.106	79.05	310934.791	242325.579
Percolation Tests					
PT01	710955.032	742705.885	78.54	311028.286	242681.435
PT02	710939.327	742703.744	78.67	311012.577	242679.294
PT03	710929.400	742442.143	78.63	311002.651	242417.636
PT04	710901.341	742445.085	79.36	310974.586	242420.579

	Contract No:	5898	Client:	Go Power
	Contract:	Kilshane	Engineer:	Waterman Moylan
	Location:	Kilshane, Ballycoolin, Dublin 15	Scale:	1:3000
	Title:	Site Plan	Drawn By:	SL

Legend Key

- Locations By Type - CP
- Locations By Type - IP
- Locations By Type - OP

UK and Ireland Office Locations