Engineering Assessment Report

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

May 2026

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This document has been prepared and checked in accordance with
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Issue	Date	Prepared by	Checked by	Approved by
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Comments

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1. Introduction

1.1 Background of Report

This preliminary engineering assessment report has been prepared by Waterman Moylan as part of the planning documentation for Phase 2 of a proposed gas turbine power generation station in lands at Kilshane, Dublin 11.

This report assesses wastewater and surface water drainage, water supply infrastructure and the road and transportation network in the vicinity of the site, and details the criteria used to design the proposed wastewater and surface water drainage, water supply and road networks.

Phase 1 which is located immediately north of this subject site has received planning permission under Reg. Ref. FW25A/0523E.

1.2 Site Location and Description

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.

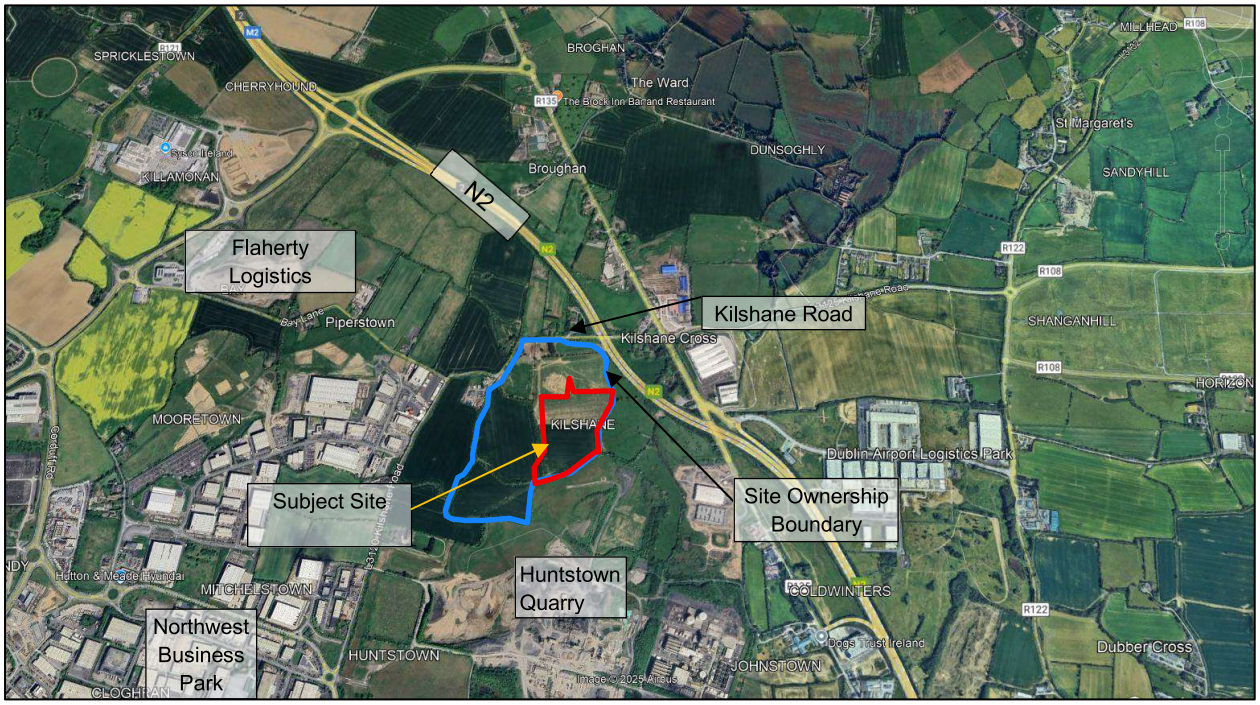


Figure 1 | *Site Location (Source: Google Earth)*

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 80.50m OD Malin on the western boundary, and a low point 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.

The Fingal Development Plan 2023-2029 shows in its Map No. 12 (Blanchardstown North), that the site is located entirely within the blue area which denotes lands zoned: HI, for Heavy Industry, refer to ***Figure 2***, below.

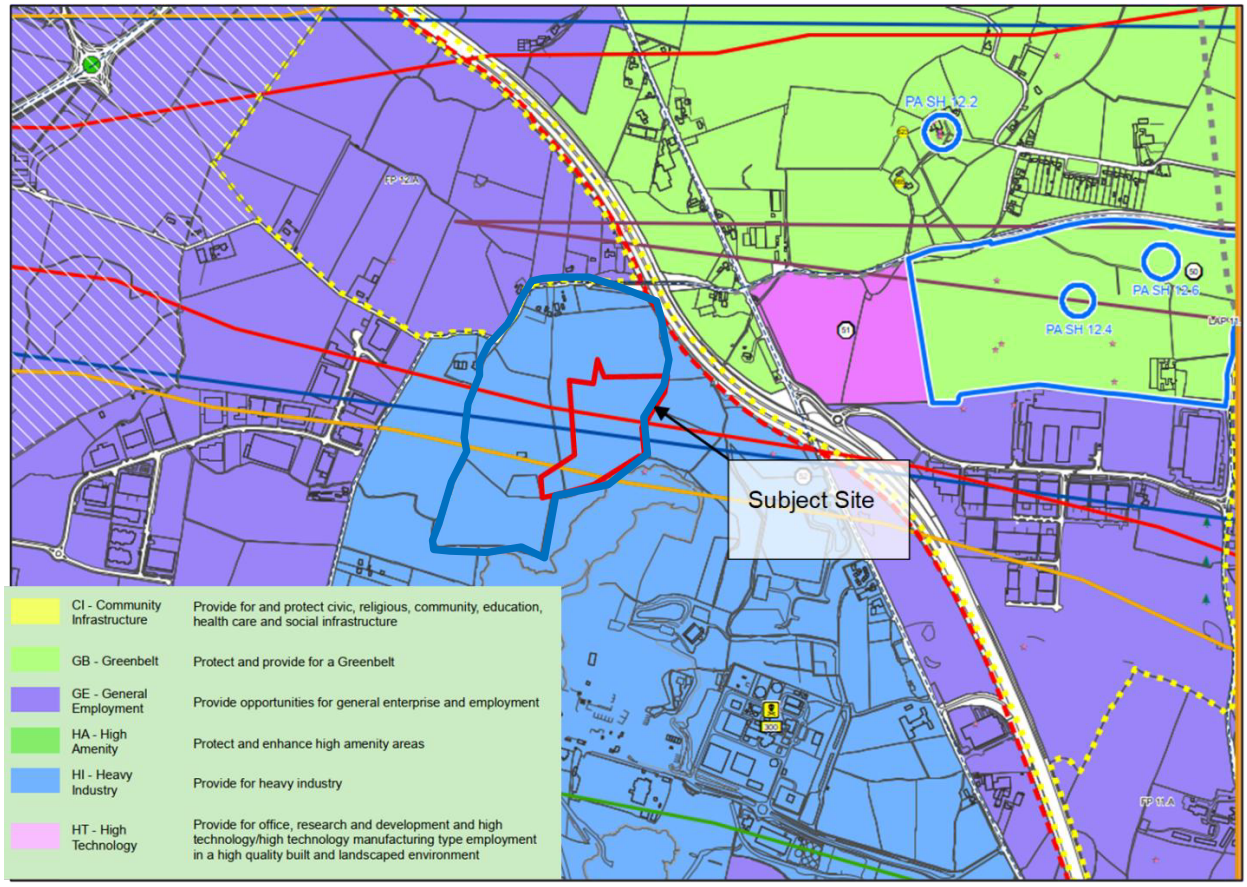


Figure 2 | *Extract from Map No. 12 (Blanchardstown North), Fingal County Council Development Plan 2023-2029*

1.3 Proposed 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

2. Foul Water Network

2.1 Existing Foul Water Network

Uisce Eireann records for the site were obtained. ***Figure 3*** below, is extracted from these records. This extract shows that the site, Kilshane Road, or anywhere in the immediate vicinity of the site, is not served by an Uisce Eireann Foul network.

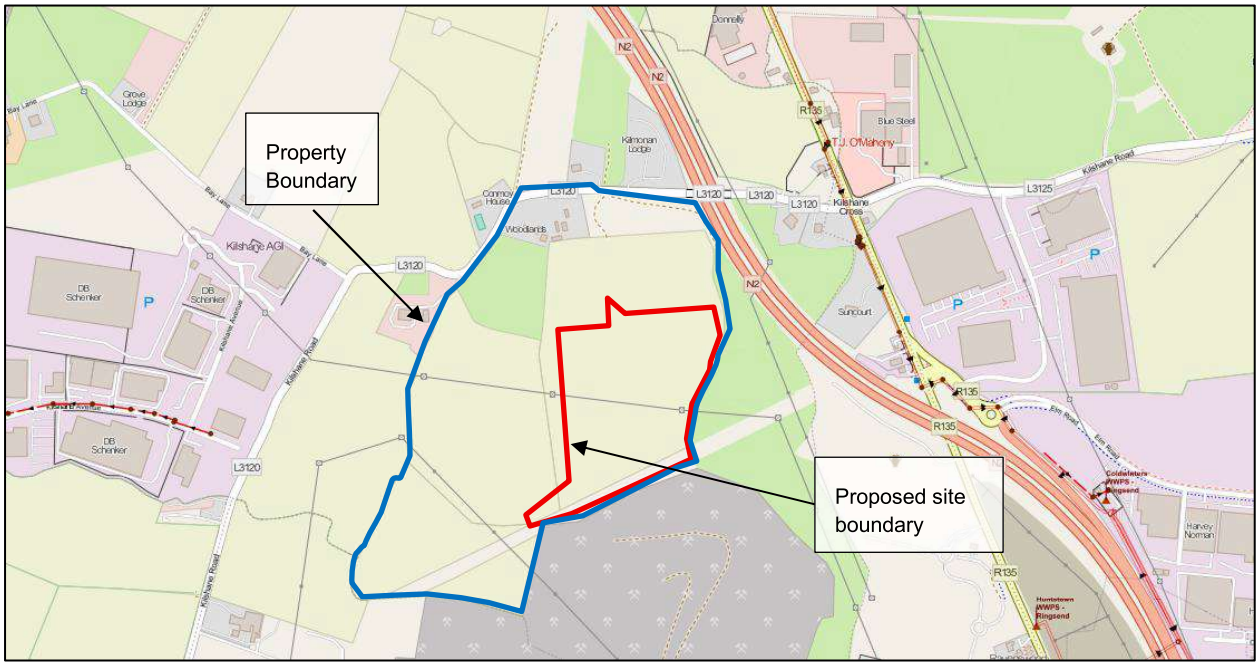


Figure 3 | *Extract from Uisce Eireann Record Maps*

The permitted Phase 1 under Reg. Ref. FW25A/0523E consists of a gravity network which is then pumped south in an 80mm rising main for 1,823m along Kilshane Road to connect to the foul gravity network on Mitchelstown Road.

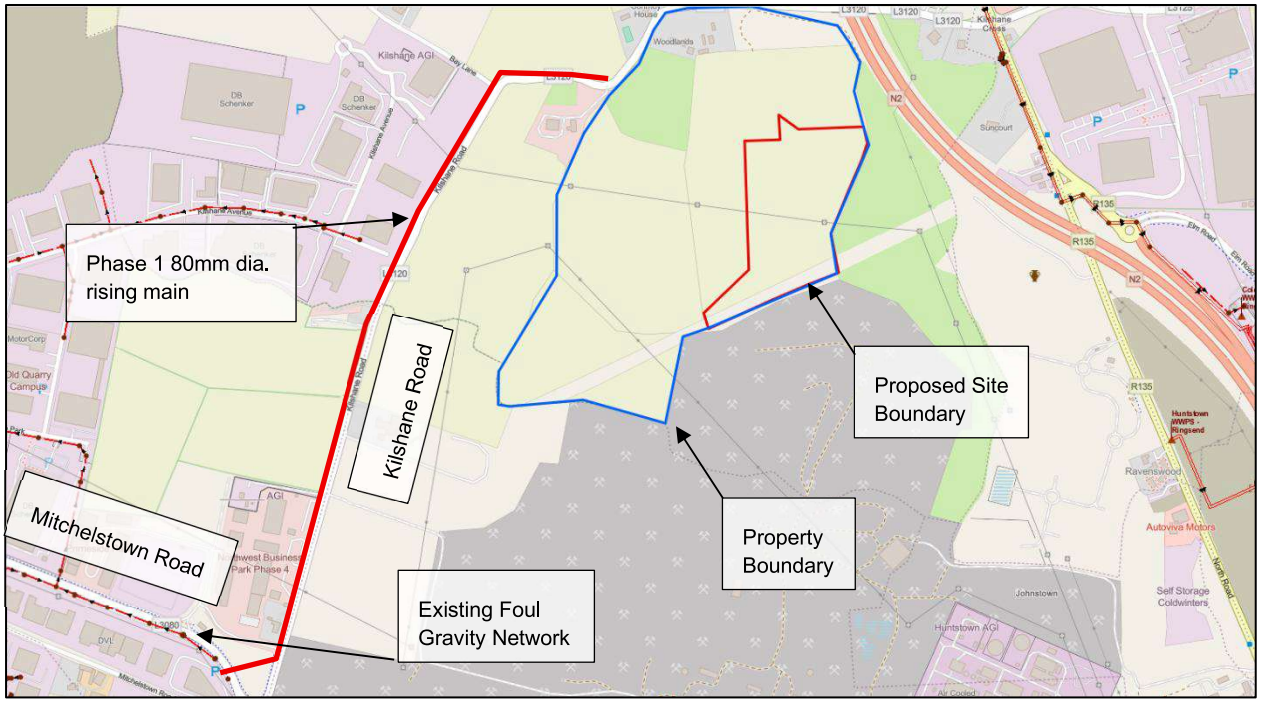


Figure 4 | *Layout of Permitted Phase 1 Foul Water rising main*

2.2 Proposed Foul Water Network

The subject Phase 2 development is reliant on the permitted Phase 1 foul water network and pumping station under Reg. Ref. FW25A/0523E and whose Confirmation of Feasibility was issued under CDS22004080. There is an increase of 10no. operational staff in the subject development whose foul water peak flow calculations have been undertaken in section 2.3. An upgrade of the Phase 1 development welfare facilities is not required to accommodate this staff increase. As such, there are no proposed foul water requirements within the subject Phase 2 red-boundary line.

A Pre-connection Enquiry was submitted to Uisce Éireann, reference number CDS25004544. The Confirmation of Feasibility (CoF) dated 28 August 2025, is included in Appendix A, and advises that wastewater connection is feasible without infrastructure upgrade by Uisce Eireann. Additionally, the CoF notes that the on-site pumping station from the adjacent Phase 1 must be constructed, completed and connected to the UE network before the subject proposed Phase 2 connection (Phase 2) can proceed. Refer to Appendix A for the Confirmation of Feasibility (CoF).

2.3 Foul Water Drainage Calculations

The calculated foul water flows at the subject development are set out in the ***Table 1*** overleaf. The proposed development's wastewater loads have been calculated based on a maximum of 30no. staff on site per day, an increase of 10no. operational staff from the permitted Phase 1 development. It should be noted that the typical number of staff to manage plant production is 1 person, but this may rise to 30 during power outages. Outages occur with an irregular frequency of once every couple of years, and so it is deemed appropriate to design for the maximum number of staff under normal operational circumstances. For an additional complement of 10no. staff with a daily per capita wastewater flow of 100 litres for an industrial factory with canteen facility, as per Appendix C of the Uisce Eireann Code of Practice for Wastewater infrastructure is

used. This figure requires a 10% unit consumption allowance, in line with Section 3.6 of the same document. A peak flow multiplier of 4.5 has been used, as per Section 2.2.7.

Description	Total Population	Load per Capita	Daily Load	Total DWF	Peak Flow
	No. People	*l/day*	*l/day*	*l/s*	*l/s*
Operational Staff	10	100	1,100	0.013	0.059
Total	**10**	**100**	**1,100**	**0.013**	**0.059**

***Table 1** | Calculation of Total Foul Water Flow from the subject development.*

The total dry weather flow from the development is 0.013 l/s, with a peak flow of 0.059 l/s. Consequently, the peak flow in the permitted Phase 1 development was 0.150 l/s.

2.4 Foul Water Drainage – General

Foul water sewers will be constructed strictly in accordance with Uisce Eireann requirements. No private drainage will be located within public areas.

Drains will be laid to comply with the requirements of the latest Building Regulations, and in accordance with the recommendations contained in the Technical Guidance Document H.

3. Surface Water Network

3.1 Existing Surface Water Network

The site is comprised of a greenfield surrounded by hedgerows to the east and west, and bordered to the north by the permitted Phase 1 development which has a surface water network which attenuates to an underground storage system on the subject site before discharging at a controlled rate to the existing drainage ditch.

The site generally slopes from west to east. Surface water and rainfall, is generally percolated through the site via grass and soil. The topographic survey has confirmed that the boundary hedgerows contain ditches which convey flow to an unnamed ditch system to the east of the site, during heavier rainfall events. These ditches only serve the subject site and the agricultural fields immediately to the west, located between the subject site and the Kilshane Road. This ditch 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 location of this unnamed ditch and its route close to the proposed site are illustrated in ***Figure 4*** below. 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.

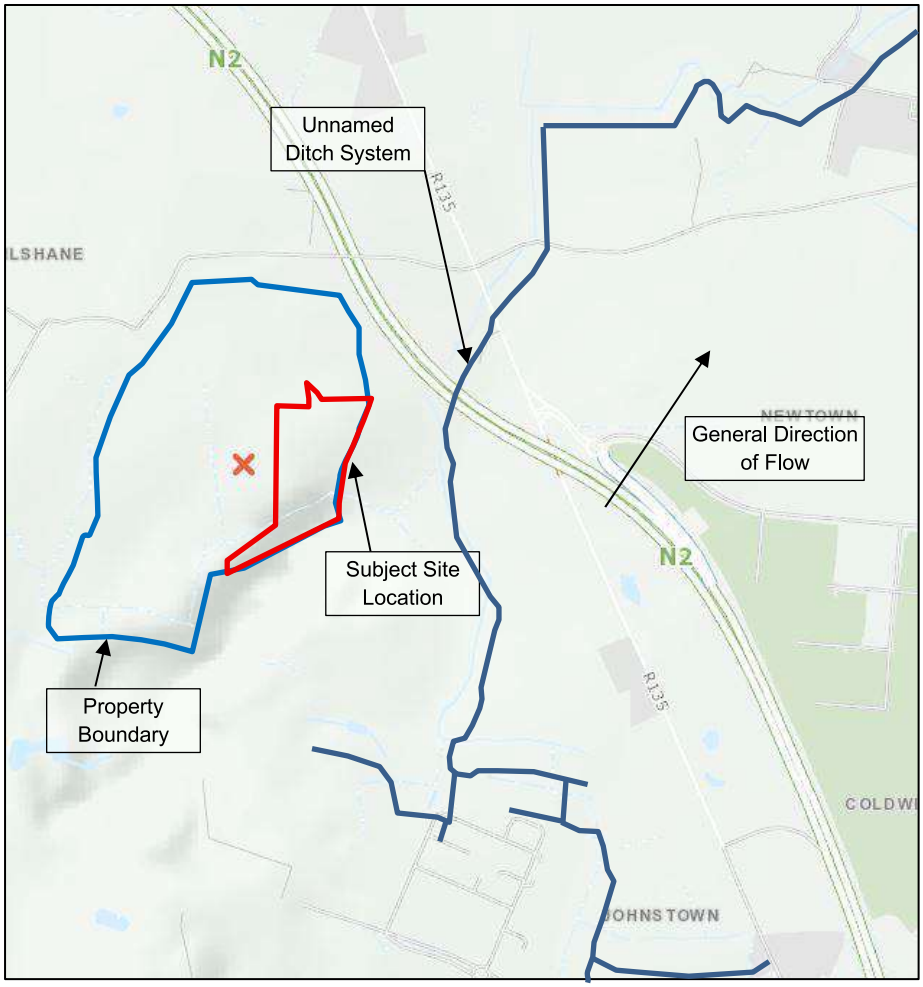


Figure 4 | *Local Ditch System and Flow Path*

3.2 Proposed Surface Water Network & SuDS Strategy

It is proposed to incorporate a Storm Water Management Plan through the use of various SuDS techniques to treat and minimise surface water runoff from the site. The methodology involved in developing a Storm Water Management Plan for the subject site is based on recommendations set out in the Greater Dublin Strategic Drainage Study (GDSDS) and in the SuDS Manual. Based on three key elements – Water Quantity, Water Quality and Amenity – the targets of the SuDS train concept have been implemented in the design, providing SuDS devices for each of the following:

- Source Control
- Site Control
- Regional Control

For storm water management purposes the site will be considered as 1 catchment area, see ***Figure 5*** below. Attenuation will be provided by upsizing the underground attenuation system in the permitted Phase 1 development. The catchment and its hardstanding areas have been measured, and these details have been tabulated to ***Table 1*** overleaf. These measurements form the basis of the calculations included in Appendix C.

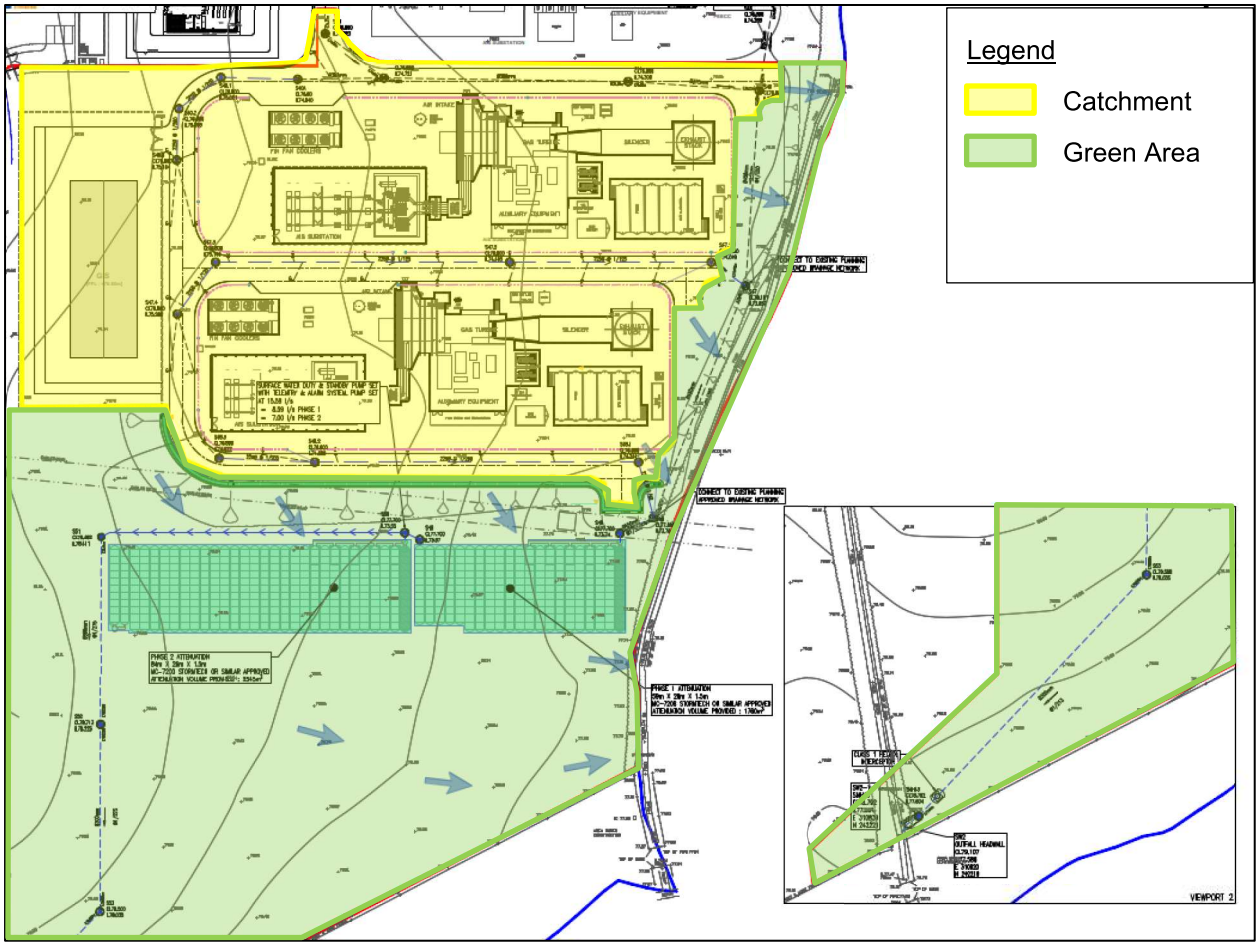


***Figure 5** | Catchment area*

Catchment	Total Area	Hardstanding Area	Percentage hardstanding
	m^2	m^2	%
Catchment	21,395.5	20,310.5	94.93
Total	**21,395.5**	**20,310.5**	**94.93**

***Table 1** | Site Catchment Area*

C. 12,682m^2 of stone area will be incorporated in the power station equipment compounds which will allow for some infiltration into the underlying ground. However, for purposes of attenuation calculations and to have a robust/conservative design, the stone area has been included as 100% hardstanding area.

Similarly to the permitted Phase 1, storm water from the proposed Phase 2 site will drain to a series of Storm Water pipes before connecting to the Phase 1 Storm Water network which will then ultimately discharge at a controlled rate, limited to the greenfield equivalent runoff, to the existing ditches at the south-western corner of the site boundary. Rainfall in excess of this will be attenuated in a new underground attenuation system which will be located beside the Phase 1 attenuation system. Additionally, the Phase 1

flow control pump set will be upsized to accommodate the additional Phase 2 surface water runoff. The proposed development will be designed to incorporate best drainage practice. Section 3.3 below sets out the methodology used in determining the existing greenfield runoff rates and calculating attenuation storage requirements for the site. The relevant calculations are included in full in Appendix C.

All SuDS features will remain under private management and maintenance.

3.2.1 Site Control

Roadside Trees:

It is proposed to provide roadside trees throughout the development, in conjunction with the swales. Trees can help control storm water runoff because their leaves, stems, and roots slow rain from reaching the ground and capture and store rainfall to be released later. Trees help to attenuate flows, trap silts and pollutants, promote infiltration and prevent erosion. Incorporating tree planting offers multiple benefits, including attractive planting features, improved air quality and increased biodiversity whilst helping to ensure adaptation to climate change.

Swales:

Swales are grassed channels proposed to run parallel and adjacent to selected roads throughout the site. The road gullies in these areas will be linked to the swales, and rainfall from road surfaces may then be percolated to the soil with further absorption by the trees as aforementioned. Grassed swales also enhance surface water runoff quality as the blades of grass slow down water flow, allowing suspended particles to filter and settle out of suspension. The swales will be connected to the surface water network so that any excess flows can be directed to the mains rather than overspilling to open spaces on the site.

3.2.2 Regional Control

Ponds and Forebay systems **(not proposed to be used)**

It would be the preferred option to utilise a pond and forebay system to attenuate and treat surface water volumes. Unfortunately, due to the proximity of the site to the end of the runway of Dublin Airport, an attenuation pond at this location would present a hazard to pilots and planes along the flightpath. There is the potential of glare blinding the pilots, caused by the reflection of sunlight from the pond's surface. Furthermore, a pond would attract waterfowl and similar birds, which would present a bird-strike hazard (when flying birds are hit by planes or sucked into jet engines). As such, an underground attenuation system is proposed to be used, to mitigate these risks, as agreed for Phase 1.

Underground attenuation system

An underground attenuation system is proposed to be utilised for the proposed development by upsizing the underground system in the permitted Phase 1 development under Reg. Ref. ABP-317480-23 for the reasons given above. These underground systems are modular systems, which will provide sufficient attenuation volume for each catchment. These systems allow suspended particles to settle out of suspension by reducing the velocity of the surface water as it flows through the system. The system also allows for the percolation of water back to the water table.

Attenuation Discharge Pump set:

Discharge from the underground attenuation system is pumped at the greenfield equivalent runoff rate for c.116.3m before outfalling by gravity to the existing ditch at the south-western corner of the subject

development via a headwall. The Phase 1 flow control pump set will be increased from 8.59l/s to 16.04l/s to accommodate the proposed Phase 2 catchment.

Petrol Interceptor:

A Class 1 Petrol interceptor is proposed to be installed before surface water outfalls to the existing ditch system. The Interceptor will remove hydrocarbons from surface flows before they outfall to natural watercourses.

3.3 Interception or Treatment Storage and Attenuation Storage

As noted above, the methodology involved in developing the Storm Water Management Plan for the subject site is based on recommendations set out in the Greater Dublin Strategic Drainage Study (GDSDS) and in the SuDS Manual. Appendix E of the Greater Dublin Strategic Drainage Study (GDSDS) sets out criteria for determining the provision of interception or treatment storage, attenuation storage and long-term storage at a development site. These calculations are included in full in Appendix A and are summarised below:

3.3.1 Criterion 1: River Water Quality Protection

Criterion 1.1: Interception

The Greater Dublin Strategic Drainage Study (GDSDS) states that approximately 30% to 40% of rainfall events are sufficiently small that there is no measurable runoff from greenfield areas into the receiving waters. These events are generally considered as the first 5mm of rainfall. Assuming 80% runoff from paved surfaces and 0% from pervious surfaces for the first 5mm of rainfall yields the following:

Paved surfaces connected to drainage system	*21,395.5m² x 0.9493 x 1 =* 20,310.75m²	*21,396m² site area* *95% of the site is paved* *100% of the paved area*
Volume of Interception Storage	*20,310.75m² x 5mm x 0.8 =* **81.24m³**	*Paved area directly drained* *5mm rainfall depth* *80% paved runoff factor*

***Table 2** | Interception Calculation*

The required interception volume is 81.24m³ for the catchment. It is not proposed to provide the entire required interception volume. Criterion 1.2 will therefore be assessed to provide the required River Water Quality Protection in accordance with Criterion 1.

Criterion 1.2: Treatment Volume

For events larger than 5mm, and in situations where interception storage cannot be provided, surface water runoff treatment is provided using the detention basin or wetland in accordance with the CIRIA design manual C521.

Assuming 80% runoff from paved surfaces and 0% from pervious surfaces for the first 15mm of rainfall:

Paved surfaces connected to drainage system	*21,395.5m² x 0.9493 x 1 =* 20,310.75m²	*21,396m² site area* *95% of the site is paved*

		100% of the paved area
Volume of Interception Storage	*20,310.75m² x 15mm x 0.8 =* **243.73m³**	*Paved area directly drained* *15mm rainfall depth* *80% paved runoff factor*

Table 3 | *Treatment Volume Calculation*

The required treatment volume is 243.73m³ for the catchment.

The required interception and treatment volumes are provided through the use of various SuDS features as described in Section 3.2, above. C. 280 linear metres of grassed swales are proposed providing approximately 50.7m³ of volume. There is additional treatment storage within the significant amount of voids within stone build up of the 2 proposed compounds. Consequently, the underground tank for the catchment allows further settlement of suspended particles, which will easily satisfy the remainder of the requirement of the treatment volume.

3.3.2 Criterion 2: River Regime Protection

Attenuation storage is provided to limit the discharge rate from the site into receiving waters. As per the GDSDS, the required attenuation volume is calculated assuming 100% runoff from paved areas, and has been calculated for the 1-year, 30-year and 100-year return periods, identifying the critical storm for each – refer to the calculations included in Appendix A. Based on the calculations included in Appendix A, the required attenuation storage volume for the catchment is set out in ***Table 4*** below:

Catchment	**Area**	**Allowable Discharge Rate**	**Required Attenuation Volume**
	m²	*l/s*	*m³*
Phase 1 Catchment	28,342	8.59	1,245.2
Phase 2 Catchment	21,395.5	7.45	1,852.2
Total	**49,737.5**	**16.04**	**3,097.4**

Table 4 | *Attenuation Volume for the Catchment*

The catchment will be attenuated by upsizing the permitted phase 1 underground attenuation tank system, located in the open space on the southern part of the subject site. The tank will normally remain dry and will only attenuate water in extreme weather events. The Phase 1 catchment has an attenuation volume of 1,245.2m³ and a greenfield equivalent runoff rate of 8.59l/s, while the proposed Phase 2 catchment has an attenuation volume of 1,852.2m³ and a greenfield equivalent runoff rate of 7.45l/s, giving a total minimum required attenuation volume of 3,097.4m³ and a discharge rate of 16.04l/s as outlined in ***Table 4*** above. This will accommodate the 1-in-100 year storm volume from the catchments in both Phases 1 and 2, accounting for a 20% increase due to climate change. Water will discharge from the tank to the existing ditch network at the south-western corner of the subject site via a pump set limited to the greenfield equivalent runoff rate of 16.04 l/s for c.116.3m before outfalling by gravity to the existing ditch via a headwall. Refer to drainage drawing no. 25-046-P200.

3.3.3 Criterion 3: Levels of Service

There are four criteria for levels of service. These are:

Criterion 3.1: No external flooding except where specifically planned (30-year high intensity rainfall event).

Criterion 3.2: No internal flooding (100-year high intensity rainfall event).

Criterion 3.3: No internal flooding (100-year river event and critical duration for site storage).

Criterion 3.4: No flood routing off site except where specifically planned (100-year high intensity rainfall event).

Both internal and external flooding have been assessed in the Flood Risk Assessment report which accompanies this Engineering Assessment report. The Flood Risk Assessment has been carried out in accordance with the *DEHLG/OPW Guidelines on the Planning Process and Flood Risk Management* published in November 2009.

The assessment identifies the risk of both internal and external flooding at the site from various sources and sets out mitigation measures against the potential risks of flooding. The sources of possible flooding assessed in the report include coastal, fluvial, pluvial (direct heavy rain), groundwater and human/mechanical errors.

As a result of the flood risk management and mitigation measures proposed, the residual risk of internal or external flooding for the 30-year and 100-year flood events is low, and accordingly all four of the above criteria have been met. Please refer to the accompanying Flood Risk Assessment report for the full analysis of the flood risk at the subject site.

3.3.4 Criterion 4: River Flood Protection

The long-term storage volume is a comparison of pre- and post-development runoff volumes. The objective is to limit the runoff discharged after development to the same as that which occurred prior to development.

Of the three methods described in the GDSDS for establishing River Flood Protection by comparison of the pre- and post-development runoff volumes, (Criteria 4.1, 4.2 and 4.3 respectively), Criteria 4.3 is selected for use as the most practical criteria at this stage in the design.

The Criteria 4.3 approach is for all runoff to be limited to either Q_{BAR} or to 2 l/s/Ha, whichever is the greater. The proposed drainage system includes flow control devices at the outfall for each catchment to ensure that the discharge rate is limited to the greenfield equivalent and ample attenuation is provided for the 1-in-100 year storm, accounting for a 20% increase due to climate change.

The extra runoff volume of the development runoff over greenfield runoff, Vol_{xs}, is calculated in Appendix A for the catchment. Note that as stated in the GDSDS, this volume is not additional to the attenuation storage volume but is effectively an element of it.

3.4 Surface Water – General

Surface water sewers will generally consist of PVC (to IS 123) or concrete socket and spigot pipes (to IS 6). The surface drainage network and the SuDS devices will remain under private management.

Drains will be laid in accordance with the requirements of the Building Regulations, Technical Guidance Document H.

3.5 Flood Risk Assessment

A site-specific Flood Risk Assessment has been carried out for the proposed development and accompanies this submission under a separate cover.

4. Water Supply

4.1 Existing Water Supply

Uisce Eireann records, extracted below to ***Figure 6*** below, show the watermain networks in and adjacent to the site.

A 50.8 uPVC watermain, is located to the north of the site on the Kilshane Road.

The south of the site is traversed by a 914.4mm (36") concrete watermain. This distribution main is fenced-off as a protective measure.

There are no proposed works, structures or crossing points proposed within this wayleave, refer to drawing no. 25-046-P300.

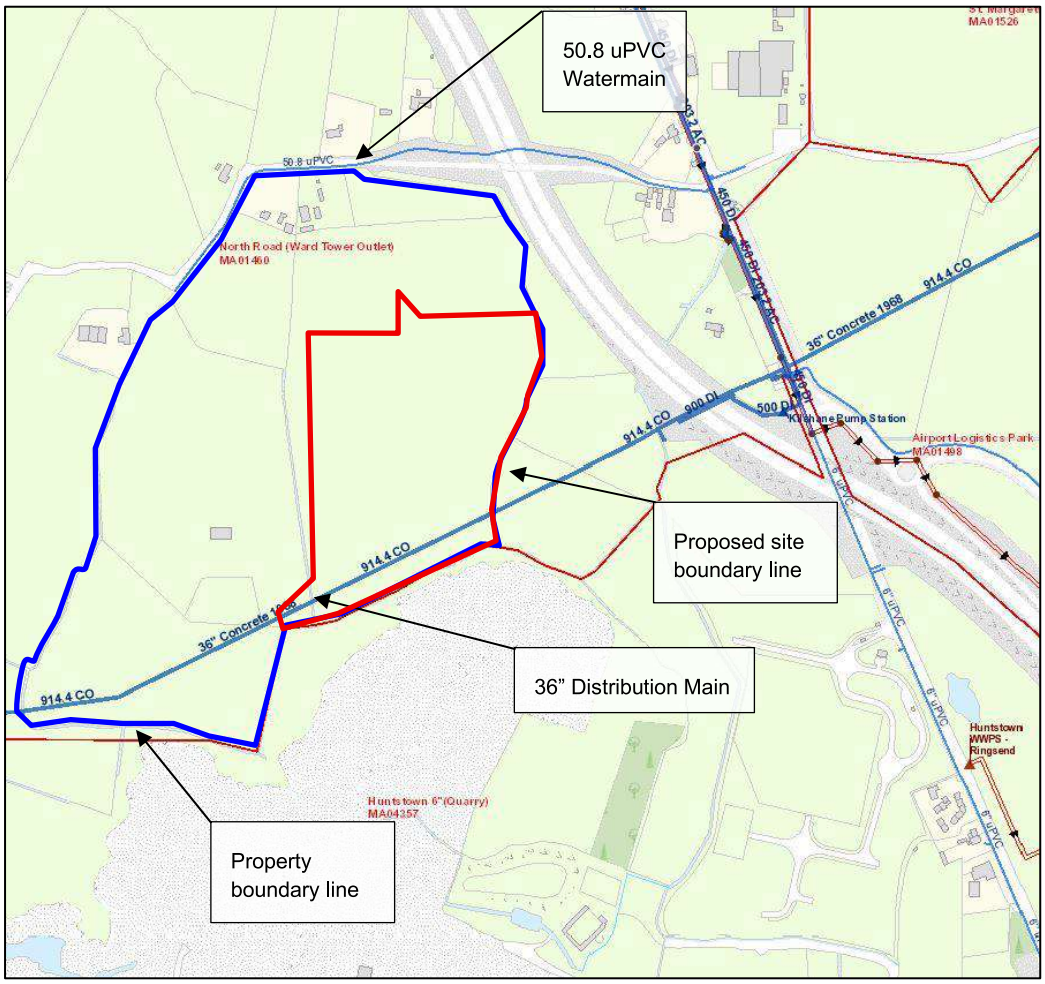


Figure 6 | *Uisce Eireann Record Map Extract*

Additional Uisce Eireann records, extracted to ***Figure 7*** overleaf show an existing 110mm Ø MOPVC to the southwest of the site. The permitted phase 1 watermain network connects the 110mm Ø MOPVC watermain located to the southwest of the site on Kilshane Road to the 50.8 uPVC watermain adjacent to the site via a new 150mm Ø watermain.

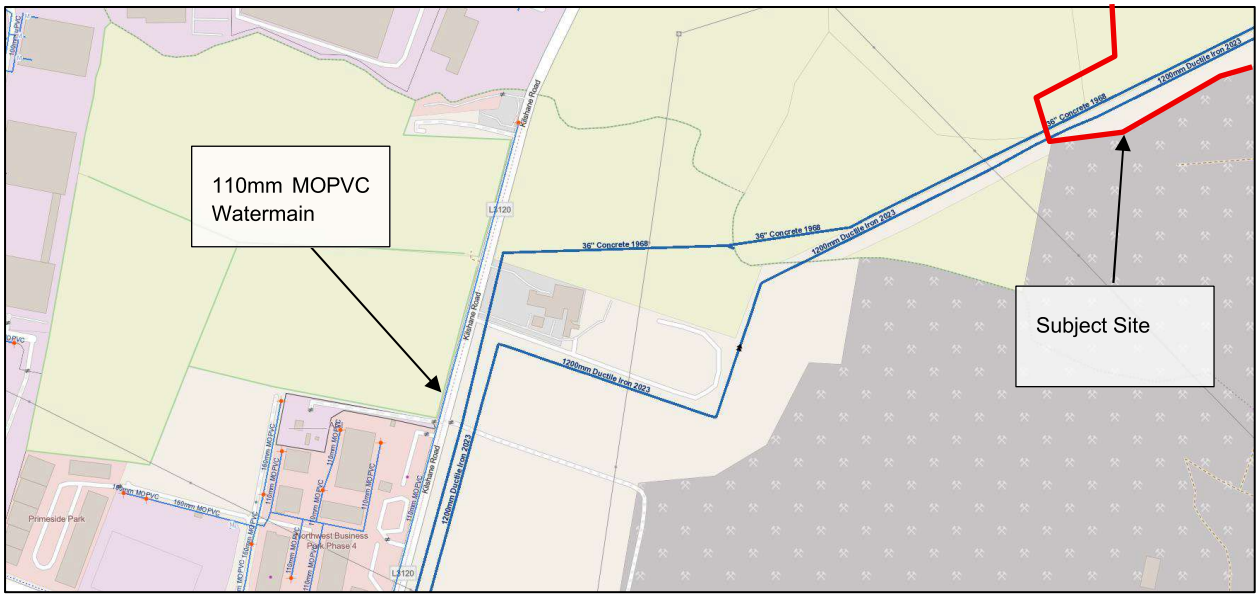


Figure 7 | *Uisce Eireann Watermain Records to Southwest of Site*

4.2 Proposed Water Supply

It is proposed to connect to the permitted phase 1 watermain network under Reg. Ref. ABP-317480-23 via a 200mm Ø watermain which will loop around the subject site. The water supply requirements under the permitted Phase 1 development took into account the water demand for the entire masterplan lands, which includes the subject phase 2 development. As such, there are no additional water supply requirements for the subject phase 2 development besides the increase in operational staff from phase 1 (10no. staff) which will be accommodated within the Phase 1 welfare facilities. Refer to watermain drawing 25-046-P300 for the proposed watermain layout.

A Pre-Connection Enquiry was submitted to Uisce Éireann, reference number CDS25004544. The Confirmation of Feasibility (CoF) dated 28 August 2025, is included in Appendix A, and advises that the proposed water supply connection is feasible without infrastructure upgrades to the water supply network. The CoF also notes that all required Uisce Éireann network upgrades from Phase 1 must be constructed and completed before this proposed connection can proceed. Refer to Appendix A for the Confirmation of Feasibility (CoF).

4.3 Water Supply Calculations

The calculated water demand at the subject development is set out in the ***Table 5*** below. The demand has been established based on the figures used for the calculation of foul water flows, included in section 2.3 of this report, with a daily per capita consumption of 100 litres and with a 10% allowance factor. The average day/peak week demand has been taken as 1.25 times the average daily demand, while the peak demand has been taken as 5 times the average day/peak week demand, as per Section 3.7.2 of the Irish Water Code of Practice for Water Infrastructure.

Similar to the foul calculations, it is appropriate to design the network for the typical maximum number of staff, which will be 30no. staff, an increase of 10no. staff from the permitted phase 1. The maximum number

of persons working on site during power outages is expected to be 30no. staff, but this may occur only once every couple of years.

Description	Total Population	Water Demand	Average Demand	Average Peak Demand	Peak Demand
	No. People	*l/day*	*l/s*	*l/s*	*l/s*
Operational Staff	10	1,100	0.0127	0.0159	0.0795
Total	**10**	**1,100**	**0.0127**	**0.0159**	**0.0795**

***Table 5** | Calculation of Water Demand for the Development*

The average demand for the development is 0.0127l/s, with a peak demand of 0.0795l/s.

4.4 Water Supply – General

All watermains will be laid strictly in accordance with Uisce Eireann requirements for taking in charge.

Valves, hydrants, scour and sluice valves, and bulk water meters will be provided in accordance with the requirements of Irish Water.

5. Roads and Transport Network

This section summarizes the design considerations that have been taken into account for the Subject Site. Complete assessment, including a traffic assessment, is detailed in Waterman Moylan Consulting Engineers report *No. 25-046r.002 Traffic and Transport Assessment*, which is included in the documentation package.

5.1 Existing Road Network

The subject site is currently accessed from the **Kilshane Road (L3120).** The Kilshane Road at this location is a 2-lane carriageway with a posted speed limit of 80 km/hr. There are currently no dedicated pedestrian and cycle facilities at this location. Local network improvements are planned along Kilshane Road (L3120), as part of a broader development initiative associated with the approved Phase 1 of the project (Reg. Ref. ABP-317480-23). The proposed upgrades include road improvement works to 493.34m Kilshane Road (L3120), including the realignment of a portion of the road (293.86m) within the subject lands boundary and the provision of new footpaths, off-road cycle ways, together with the construction of a new roundabout linking the permitted realignment of Kilshane Road back to the existing road network to the northeast of the subject lands and to the proposed internal road network to serve the proposed development.

The **R135** at Kilshane is a regional single carriageway road with a pavement width of approximately 9 metres. It follows a north-south alignment, extending northward towards Ashbourne and connecting southward to the N2. The N2 in turn provides access to the M2 motorway via junctions 2 and 3. The road is subject to a speed limit of 80 km/h. There are no dedicated pedestrian or cycling facilities along this section of the R135.

The **N2** at Kilshane is a national primary road that forms part of the strategic route connecting Dublin to the northwest of Ireland. It features a dual carriageway configuration in this area and links directly to the M2 motorway at junctions 2 and 3. There are no dedicated pedestrian or cycling facilities along this section of the R135.

The **N3** road is a national primary road running between Dublin, Cavan and the border with County Fermanagh. The former section from its junction with the M50 to Dublin city centre, as well as the bypassed section from Clonee to the border with County Cavan, have been reclassified as the R147 road.

The **M50** at Kilshane is a major orbital motorway serving the Dublin region, providing a critical link between national primary routes including the N2 and M1. The M50 is a tolled motorway, and there are no dedicated pedestrian or cycling facilities along this section.

The key roads within this network are shown in ***Figure 8*** below:

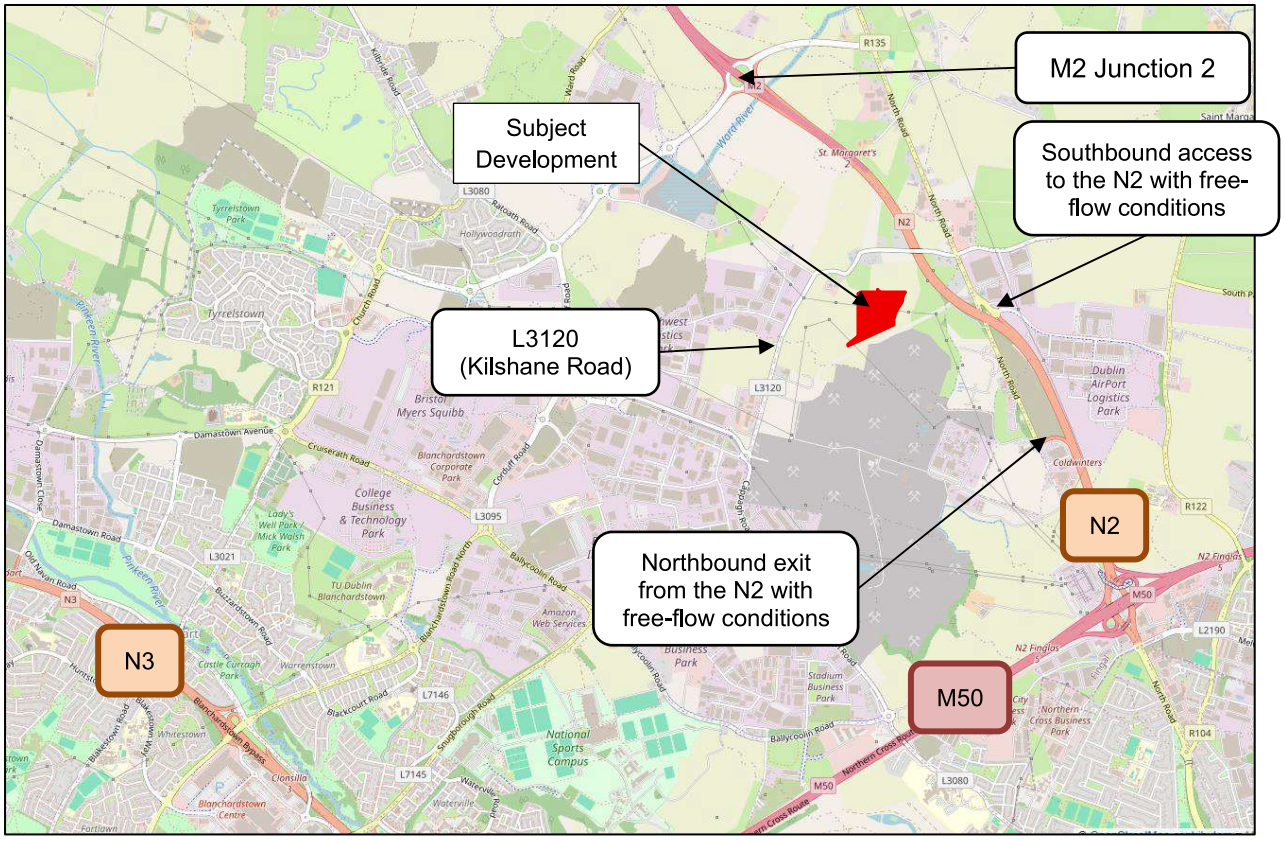


***Figure 8** | Existing Road Network*

5.2 Proposed Development

5.2.1 Development Description

The site is located at Kilshane, Dublin 11, just west of the N2 Primary Road, approximately 300m west of the R135 and is located approx. 2 km north-west of the M50.

The site is bound to the north by the Phase 1 which has received a notification to grant permission under Reg. Ref. ABP-317480-23. The remaining lands surrounding the site are largely comprised of agricultural fields, with the businesses and commercial/industrial sheds appearing in the wider vicinity east and west of the site.

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

5.2.2 Development Access Point

Vehicular access to the subject development will be provided via a new roundabout, connecting to the internal road to be provided in Phase 1 which is located immediately north of the subject site. This phase has received a notification to grant permission under Reg. Ref. ABP-317480-23. The proposed roundabout will also serve as the primary access point for pedestrians and cyclists.

As part of the Phase 1 project, a section of Kilshane Road along the north-western boundary of the site is proposed to be realigned and upgraded. The upgraded road layout will include dedicated 2-metre-wide footpaths and 2-metre-wide cycle lanes on both sides of the carriageway.

The development access point is shown in ***Figure 9*** below:

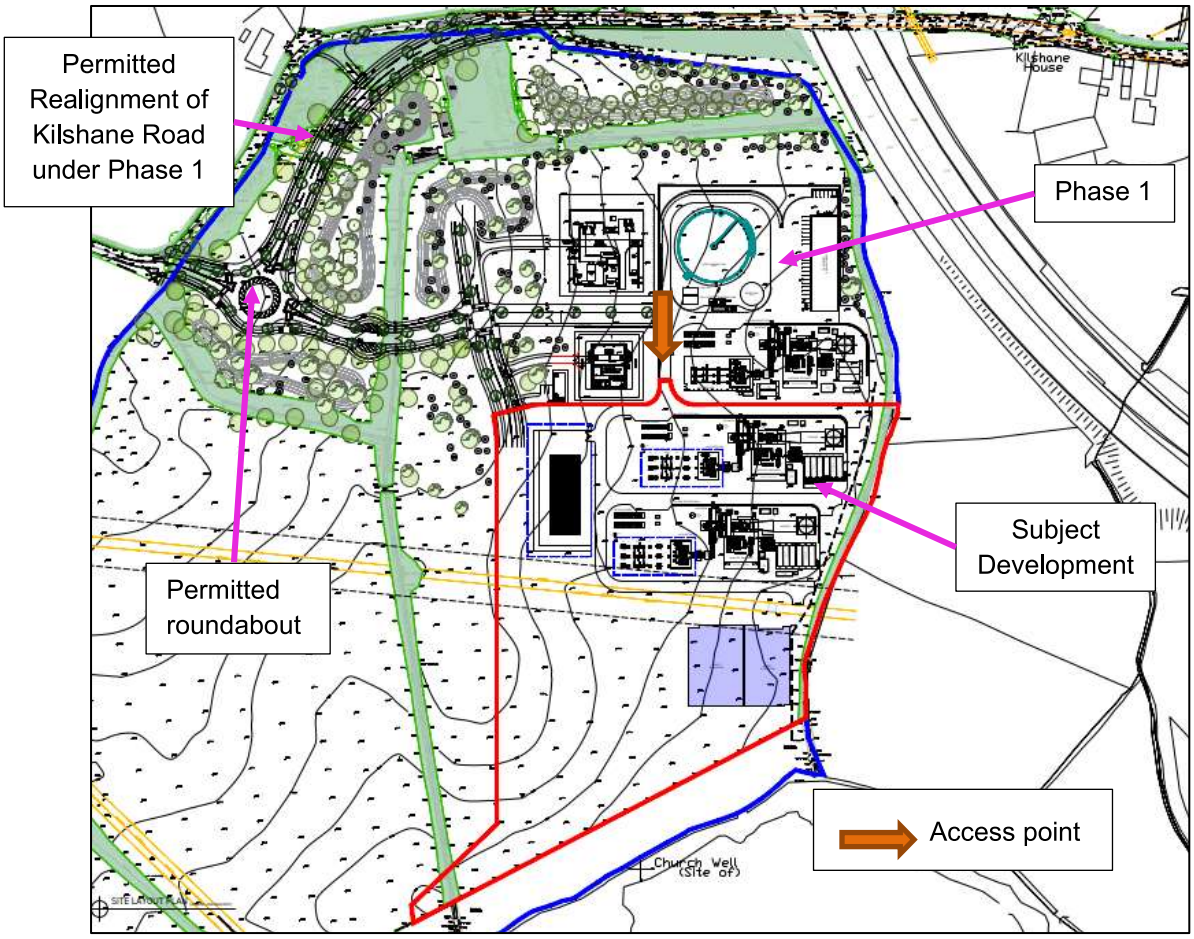


Figure 9 | *Proposed Development – Site Access Point*

5.3 Multi-modal access to the site

5.3.1 Bus Network

There are no public transport services operating directly on Kilshane Road. The nearest bus stops are located on the R135. Additionally, there are bus stops located on the Mitchelstown Road at the Northwest Business Park, situated to the east and southwest of the site. Details on current bus services and walking routes to/from the site are provided below:

- "Suncourt" bus stop (Stop 101121) on the R135. This is 950m (approx. 13 min walk) away from the existing site entrance. This stop is served by bus routes 103 & 105X in a southbound direction only.
- "Kilshane Cross" bus stops numbers 105621 and 134321 on the R135. This is 2.0km (approx. 27 min walk) away from the existing site entrance. This stop is served by bus routes 103 & 105X in a northbound direction only.
- Northwest bus stops numbers 7680 and 7676 on the Mitchelstown Road at Northwest Business Park, serve route 40E in both directions and are 1.6km (approx. 22 min walk) away from the existing site entrance.

5.3.2 Pedestrian Infrastructure and Walking Accessibility

There are no dedicated pedestrian walkways along Kilshane Road in the vicinity of the subject development. However, there is a pedestrian footpath, on the northern side of the road closer to the N2 east over the N2 flyover for approximately 380m.

As illustrated in the Traffic and Transport Assessment submitted with this application under *Waterman Moylan Report No. 25-046r.002*, within a 24-minute walking catchment, the subject development has access to bus stops and various bus routes as outlined in **Section 5.3.1** above. It also has access to amenities such as cafés, grocery stores and business parks.

5.3.3 Cycle Infrastructure and Cycling Accessibility

There is no dedicated cycle infrastructure along Kilshane Road.

As illustrated in the Traffic and Transport Assessment submitted with this application under *Waterman Moylan Report No. 25-046r.002*, within a 24-minute cycling catchment, the subject development has access to amenities such as cafés, grocery stores, medical centres and schools.

5.4 Traffic Assessment

Details of the specific Traffic Assessment are set out in the Waterman Moylan Report No. *25-046r.002 Traffic and Transport Assessment*, which is included in the documentation package.

To provide a robust and cumulative assessment of local road network, trips generated to/from the Subject Development and trips generated to/from the committed and potential future developments in the surrounding area were analysed. These developments include:

- Huntstown Battery Energy Storage System (FW24A/0400E): Comprising the construction of a Battery Energy Storage System facility to include up to 85no. containerised battery storage

modules on concrete bases, 20 no. transformer and power conditioning units, cable racks and associated lighting.

- Shipping Container Depot at Kilshane (FW24A/0339E): Comprising the construction of a Shipping Container Depot
- High Technology Manufacturing Unit (FW22A/0066): Comprising the construction of a high technology manufacturing unit for electrical components.
- Huntstown Data Hall (FW21A/0151): Comprising the construction of 2no. data hall buildings.

Trip generation potential for the proposed development has been estimated based on the staff number and HGV deliveries advised by the developer based on the size and use of the proposal and has been estimated for the Construction Phase and the Operational Phase.

It has been estimated that during the Construction Phase, the subject development will generate a total of 27 vehicular movements in the AM peak hour (22 inbound and 5 outbound) and a total of 57 vehicular movements in the PM peak hour (5 inbound and 52 outbound).

During the Operation Phase, the subject development will generate a total of 30 vehicular movements in the AM peak hour (30 inbound and 0 outbound) and a total of 30 vehicular movements in the PM peak hour (0 inbound and 30 outbound).

The following junctions were assessed as part of the TTA:

- **Junction 1**: A three-armed proposed roundabout at the intersection of (L3120) Kilshane Road, and proposed site access to Phase 1 and Phase 2 developments.
- **Junction 2**: A signalised cross-roads located at the intersection of (L3120 Kilshane Road), R135 and Kilshane Road (L3125).

In accordance with TII guidelines, an assessment was conducted to determine impact of the proposed development on each of the key junctions in the local road network. The TII document indicates that the impact of new developments is considered to be significant if the level of traffic generated by them exceeds the thresholds of 10% for normal operating networks and 5% for congested networks.

The assessment was carried out with the base year two-way traffic flows and traffic flows generated by the subject development during the Construction and Operation Phase:

- During the Construction Phase, it is anticipated that Junction 1 will experience a two-way traffic increase greater than 5% in the PM peak hour. Junction 2 is expected to receive a traffic increase less than 5% during both peak hours. Therefore, in the construction phase, Junction 1 was assessed. The modelling results indicate that Junction 1 would operate within its capacity for the Construction Phase during both peak periods.
- During the Operation Phase, Junction 1 and Junction 2 are expected to receive a two-way traffic increase below 5% in both the AM and PM peak hour. Therefore, in the operation phase, no further traffic assessment was carried out.

5.5 Car Parking

Car parking standards for general industrial development are provided in Table 14.19 of Fingal Development Plan (2023-2029). However, these standards are not applicable due the nature of the subject development.

As outlined in **Section 6.1.2** of the TTA, the maximum number of staff required for the Phase 1 development and the subject development is 30, which comprises of 25 no. staff for Phase 1 and an additional 5 no. staff for the subject development.

According to the approved Travel Plan prepared as part of the planning application for Phase 1, it will only require 1-2 staff on average each day and up to 25 staff required on the busiest days. The proposed subject development is expected to follow a similar pattern, with an average daily requirement of 1–2 staff and a maximum of 5 staff on the busiest days. Therefore 26 no. car parking spaces (including 1 no. disabled parking space and 2 no. EV charging points) proposed in the approved Phase 1 development are adequate.

Figure 10 shows the location of the car parking spaces.

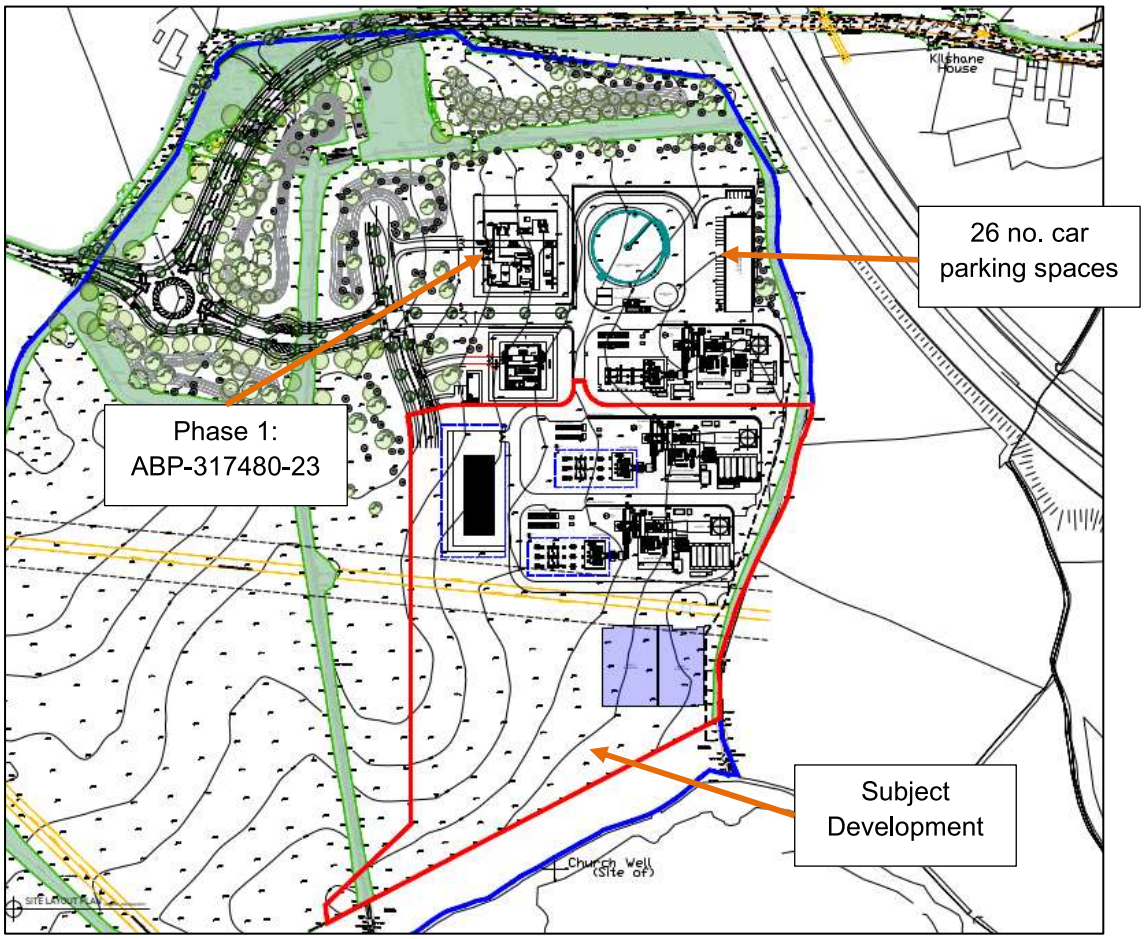


Figure 10 | *Location of car parking spaces*

5.6 Cycle Parking

Cycle parking standards for general industrial development are provided in Table 14.17 of Fingal Development Plan (2023-2029). However, these standards are not applicable due the nature of the subject development.

The proposed development will utilise the 20 no. sheltered bicycle parking spaces included as part of the Phase 1 planning application (Reg Ref. ABP-317480-23).

Given the low number of staff expected on-site—1–2 on a typical day and up to 5 on the busiest days—this provision is considered sufficient. Furthermore, the absence of dedicated cycling infrastructure along Kilshane Road limits the likelihood of significant demand for cycling as a primary mode of commuting.

APPENDICES

A. Uisce Eireann Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

Kevin Muhia
Waterman Moylan
Block S, Eastpoint Business Park
Alfie Byrne Road
Dublin 3
D03H3F4

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

28 August 2025

Our Ref: CDS25004544 Pre-Connection Enquiry Site at, Kilshane, Dublin

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 4 unit(s) at Site at, Kilshane, Dublin, (the **Development)**.

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection**
  - Feasible without infrastructure upgrade by Uisce Éireann

- Proposed connection to Uisce Éireann infrastructure is via a private infrastructure. Please be advised that at connection application stage you must provide written confirmation from the owner of the infrastructure that you have received a legal permission to connect to and that the infrastructure has capacity and integrity to cater for the additional demand from the Development.
- All required Uisce Éireann network upgrades from Phase 1 must be constructed and completed before this proposed connection can proceed.

- **Wastewater Connection**
  - Feasible without infrastructure upgrade by Uisce Éireann

Stiúrthóirí / Directors: Niall Gleeson (POF / CEO), Jerry Grant (Cathaoirleach / Chairperson), Gerard Britchfield, Liz Joyce, Michael Nolan, Patricia King, Eileen Maher, Cathy Mannion, Paul Reid, Michael Walsh.
Oifig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin, Ireland D01NP86
Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Uisce Éireann is a designated activity company, limited by shares.
Cláraithe in Éirinn Uimh.: 530363 / Registered in Ireland No.: 530363.

- Proposed connection to Uisce Éireann infrastructure is via a private infrastructure. Please be advised that at connection application stage you must provide written confirmation from the owner of the infrastructure that you have received a legal permission to connect to and that the infrastructure has capacity and integrity to cater for the additional demand from the Development.
- The On-site Pumping Station from Phase 1 must be constructed, completed and connected to UE network before this proposed connection can proceed.
- This development will require a Trade Effluent Licence under Section 16.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Uisce Éireann's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Uisce Éireann's network(s). This is not a connection offer and capacity in Uisce Éireann's network(s) may only be secured by entering into a connection agreement with Uisce Éireann.

For any further information, visit **www.water.ie/connections**, **email newconnections@water.ie** or contact 1800 278 278**.**

Yours sincerely,

Dermot Phelan
Connections Delivery Manager

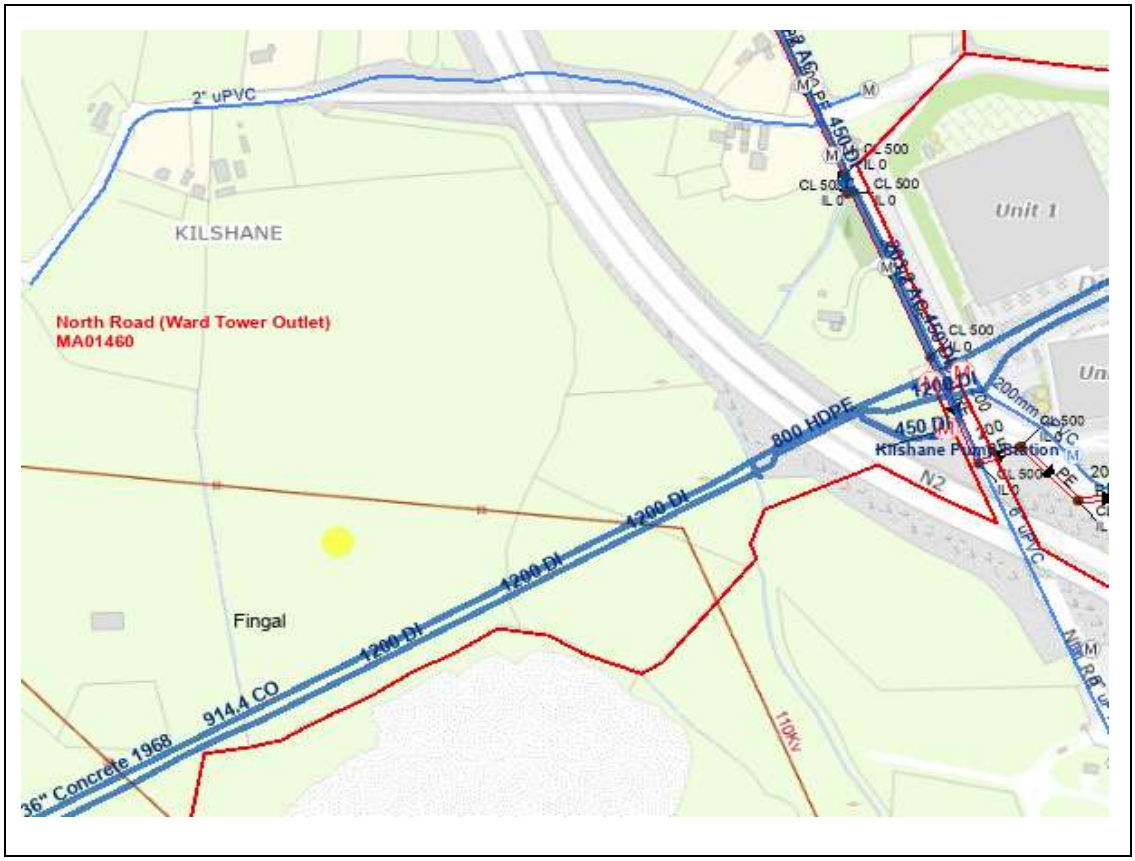
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Uisce Éireann's network(s). • Before the Development can connect to Uisce Éireann's network(s), you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Uisce Éireann connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Uisce Éireann's network(s), including works in the public space, must be carried out by Uisce Éireann*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Uisce Éireann's network(s)?	• Requests for maps showing Uisce Éireann's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with ***the Uisce Éireann Connections and Developer Services Standard Details and Codes of Practice,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Uisce Éireann's Network(s)

The map included below outlines the current Uisce Éireann infrastructure adjacent the Development: To access Uisce Éireann Maps email datarequests@water.ie



Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Note: The information provided on the included maps as to the position of Uisce Éireann's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Uisce Éireann.

Whilst every care has been taken in respect of the information on Uisce Éireann's network(s), Uisce Éireann assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Uisce Éireann's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Uisce Éireann's underground network(s) is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

B. 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

Contents:

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2.	Site Location	1
3.	Fieldwork	1
4.	Laboratory Testing	4
5.	Ground Conditions	4
6.	Recommendations and Conclusions	6

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

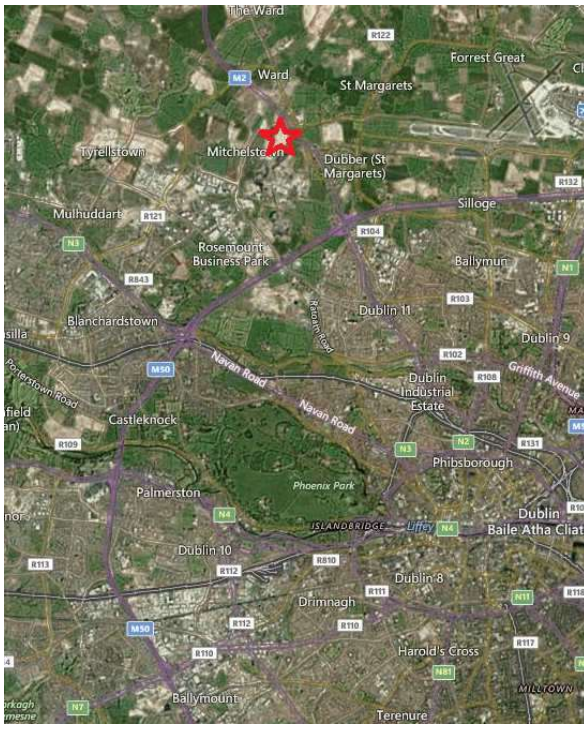
1. Introduction

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.

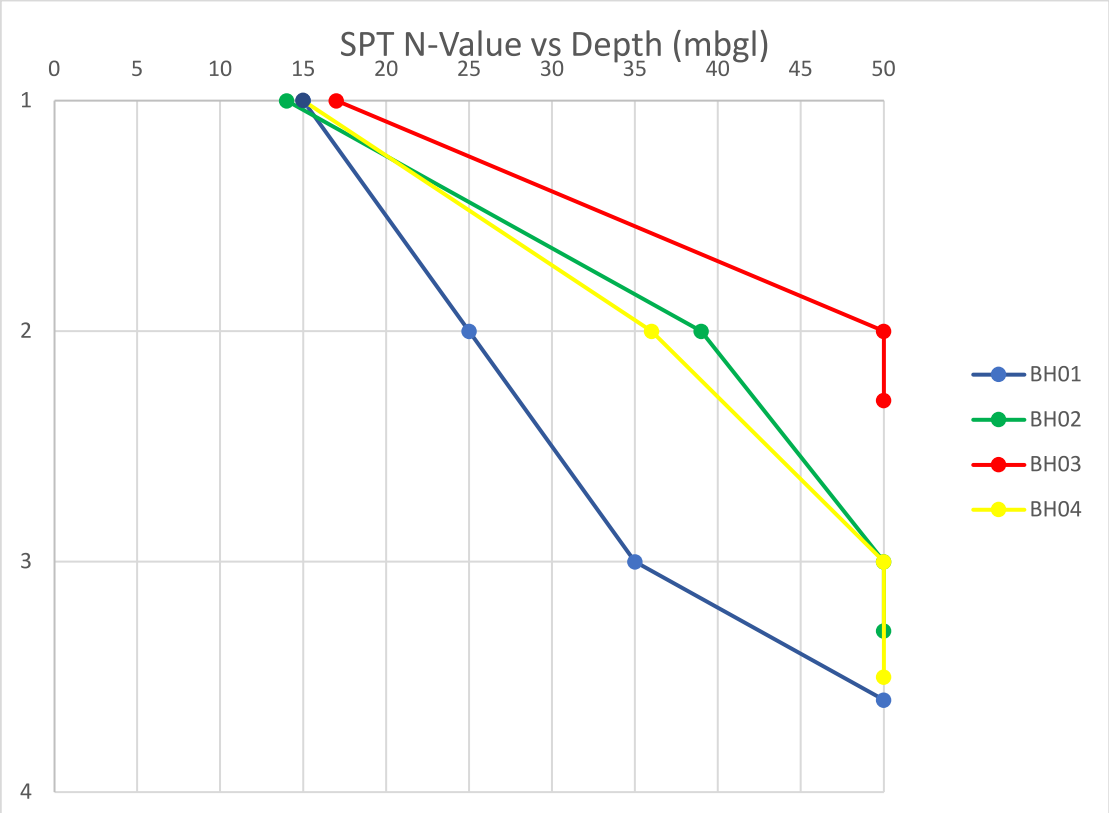
5. Ground Conditions

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
	0.20	TOPSOIL.		79.5	79.46						
0.5		Brown slightly sandy slightly gravelly silty CLAY with low cobble content.		79.0							
1.0	1.10				78.56	N=15 (2,3/4,4,3,4) B / 1.00					
1.5		Firm grey brown slightly sandy slightly gravelly silty CLAY with high cobble content.		78.5							
2.0				78.0		N=25 (3,6/5,6,7,7) B / 2.00					
	2.30			77.5	77.36						
2.5		Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble content.		77.0							
3.0				76.5		N=35 (4,7/9,9,8,9) B / 3.00					
3.5											
	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.*		75.5		3.60 - 4.60	96	30	0	Ni	
4.5		*Discontinuities - smooth, planar, tight to open, 40-50° dip, occasionally sub-horizontal, clean surfaces.*		75.0							
5.0				74.5		4.60 - 5.60	100	100	13	26	
5.5		*Discontinuities - non-intact.*		74.0							
6.0				73.5		5.60 - 6.60	96	60	0	Ni	
6.5		*Discontinuities - smooth, planar, tight to open, 40-50° dip, clean surfaces.*								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:	Legend: B: Bulk D: Disturbed U: Undisturbed ES: Environmental W: Water
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.	

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	Firm becoming very stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content.		77.81							
1.0				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	Weak dark grey calcareous MUDSTONE interbedded with moderately strong grey argillaceous LIMESTONE with frequent fossils. Fresh to slightly weathered.		75.31		~~50 (25 for 5mm/50 for 5mm)~~				Ni	
3.5		*Discontinuities - non-intact.*		75.0						25	
		Discontinuities - smooth, planar, tight to open, 40-50° and 70-80° dip, clean surfaces.				3.30 - 4.30	100	85	60		
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:
3.20	3.30	01:00

Water Strikes:

Strike:	Rose:	Sealed:

Water Details:

Date:	Hole Depth:	Water Depth:
02/11	3.30	Dry

Installations:

From:	To:	Pipe:

Backfill:

From:	To:	Type:
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
0	0.20	TOPSOIL.		78.5	78.36						
		Brown slightly sandy slightly gravelly silty CLAY with low cobble content.		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					
2.0	2.30	Obstruction - boulder. Open hole drilling: driller reports returns of sandy gravelly CLAY with cobbles.		77.0	76.26	50 (5,9/50 for 40mm) B / 2.00 50 (25 for 5mm/50 for 5mm)					
3.0	3.70	Moderately strong dark grey calcareous MUDSTONE interbedded with very strong grey argillaceous LIMESTONE with frequent fossils. Fresh to slightly weathered.		76.5	74.86	3.70 - 4.70	96	75	14	Ni	
		Discontinuities - non-intact. *Discontinuities - smooth, planar, tight to open, 40-50° dip, occasionally sub-vertical, clean with occasional brown and grey staining.*		76.0		4.70 - 5.70	94	85	27	14	
5.0				75.5		5.70 - 6.70	79	79	14		
6.0				75.0							
				74.5							
				74.0							
				73.5							
				73.0							
				72.5							
				72.0							
6.5	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:
2.20	2.30	01:00				03/11	2.30	Dry				0.00	6.70	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: **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
		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, 7, 7, 6, 6, 13, 11, 10, 8, 7, 7, 6, 7, 7, 8, 14, 16, 13, 19, 28, 26, 8, 10, 9, 13, 14, 21, 20, 23, 35	
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					
1.0				79.5		1.00	B		
1.5				79.0					
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).		78.5	78.62				
2.5	2.60	**Pit terminated at 2.60m**		78.0	78.02	2.50	B		
3.0				77.5					
3.5				77.0					
4.0				76.5					
4.5				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
0	0.30	TOPSOIL.		82.5	82.55			1 2 2 2 3	
0.5		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.				0.50	ES	5 6 5	
1.0				82.0		1.00	B	5 7 5 7 6	
1.5				81.5				7 6 6 6 7	
2.0	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).		81.0	80.75	2.20	B	7 9 13 22	
2.5	2.50	**Pit terminated at 2.50m**		80.5	80.35			18 17 18 20 19	
3.0				80.0				18 20 28 27 35	
3.5				79.5					
4.0				79.0					
4.5				78.5					
				78.0					

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: **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				82.76			1	
		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.		82.5		0.50	ES	2	
0.5								2	
								3	
	0.90				82.16			2	
		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).		82.0		1.00	B	4	
1.0								5	
								6	
								6	
								7	
								9	
1.5				81.5				9	
								8	
								8	
								9	
	1.90				81.16			11	
		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.		81.0				13	
2.0								10	
								11	
								16	
								35	
2.5				80.5		2.50	B		
	2.80	**Pit terminated at 2.80m**			80.26				
3.0				80.0					
3.5				79.5					
4.0				79.0					
4.5				78.5					

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

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				80.5				0	
								0	
	0.30	TOPSOIL.			80.35			1	
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				4 5 6 8 15 9 8	
1.0						1.00	B	6 5 3 2 1	
1.5				79.5				2 2 3 5	
	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			8 9 9 13 10 10	▼
2.0						2.00	B		
2.5				78.5				35	
	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
		TOPSOIL.						1	
	0.30				81.09			1	
		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				1	
0.5	0.60				80.79			1	
		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).		80.5				2	
								3	
								10	
1.0						1.00	B	12	
								8	
								9	
								10	
	1.40			80.0	79.99			9	
		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).						10	
1.5								9	
								16	
				79.5				20	
								22	
2.0						2.00	B	35	
	2.30				79.09				
	2.40	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	78.99				
2.5		Obstruction - possible bedrock or boulders.							
		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.				0.50	ES	2 2 2 2 2 2 2	
0.5				80.0					
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			12	
	2.30				78.23	2.20	B	14 14 14	
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 1 1 2 1 1 4 4 8 9 9 35	
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					
2.0	2.00	Obstruction - possible bedrock or boulders. **Pit terminated at 2.00m**		77.0	76.59	2.00	B		
2.5				76.5					
3.0				76.0					
3.5				75.5					
4.0				75.0					
4.5				74.5					
				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	0.30	TOPSOIL.		78.5	78.42			1	
0.5		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	
1.5				77.0					
2.0				76.5					
2.5						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. Cobbles are angular to subangular of limestone.		76.0	75.92				
	3.10	**Pit terminated at 3.10m**			75.62				
3.5				75.5					
4.0				75.0					
4.5				74.5					
				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). Obstruction - boulders. **Pit terminated at 1.50m**		77.0	76.76			3 3 4 5 4 6 9 8 8 29 8 7 16 35	
2.0				76.5					
2.5				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
		TOPSOIL.			77.76			1 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.		77.5		0.50	ES	2 3 3 3	
0.5								7 7	
	0.80	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.			77.16			6 7	
1.0				77.0		1.00	B	5 5	
								3 3	
1.5				76.5				5 4	
	1.70	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.			76.26			6 6	
2.0				76.0		2.00	B	8 9 7	
	2.20	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 .			75.76			8 8 8	
2.5				75.5		2.50	B	7 9 9	
	3.00	**Pit terminated at 3.00m**		75.0	74.96			21 17 21 22 35	
3.0									
3.5				74.5					
4.0				74.0					
4.5				73.5					
				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
0.5	0.20	TOPSOIL.		79.0	79.28	0.50	ES	1 2 1 2 2 3 6 4 5 6	
1.0		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.		78.5		1.00	B	9 8 7 8 8 10 10	
1.5	1.80	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).		78.0	77.68			14 14 13	
2.0	2.30	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 .		77.5	77.18	2.00	B	12 12 14 13	
2.5	2.50	**Pit terminated at 2.50m**		77.0	76.98			15 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
		TOPSOIL.		80.5				1	
	0.20				80.38			3	
		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.						2	
0.5						0.50	ES	1	
				80.0				2	
								2	
								2	
								4	
								4	
1.0						1.00	B	5	
				79.5				4	
								6	
								8	
	1.40				79.18			5	
		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).						7	
1.5				79.0				7	
								6	
								10	
								9	
2.0								13	
	2.10			78.5	78.48			12	
		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 .						17	
								17	
								20	
2.5						2.50	B	19	
				78.0				17	
								18	
								19	
								19	
3.0	3.00				77.58			25	
		Pit terminated at 3.00m		77.5				24	
								28	
								28	
								29	
3.5								28	
				77.0				27	
								25	
								23	
								27	
4.0								25	
				76.5				26	
								35	
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
0		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

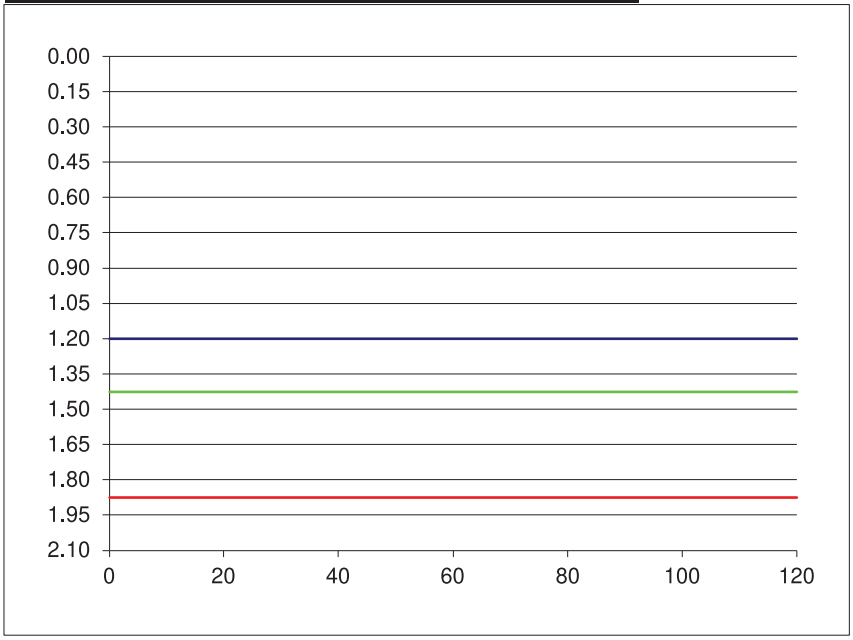
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK02
Date:	03/11/2021

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

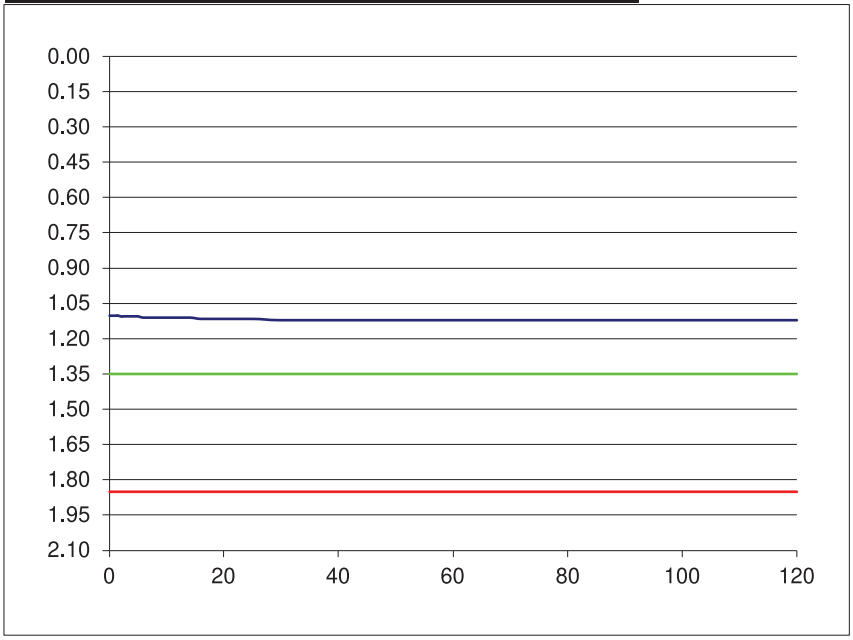
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK07
Date:	03/11/2021

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

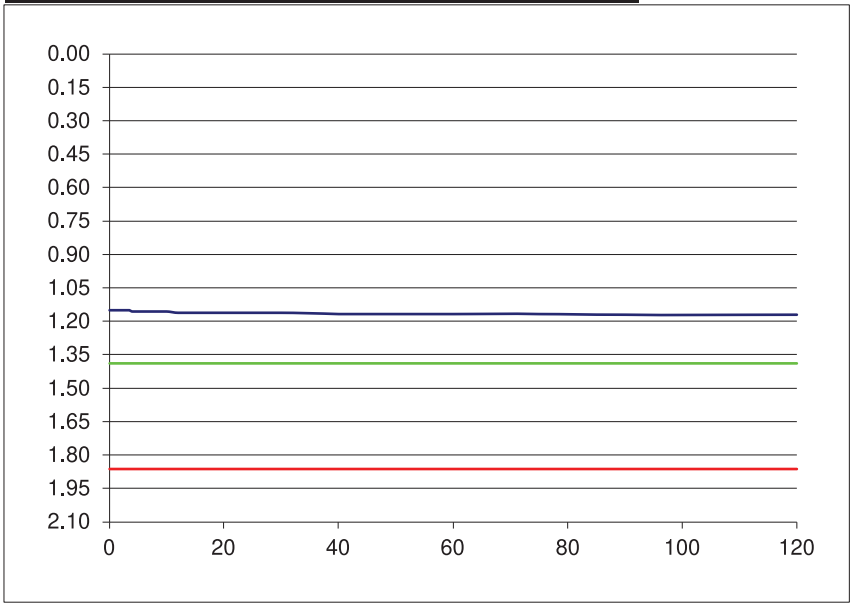
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK09
Date:	03/11/2021

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

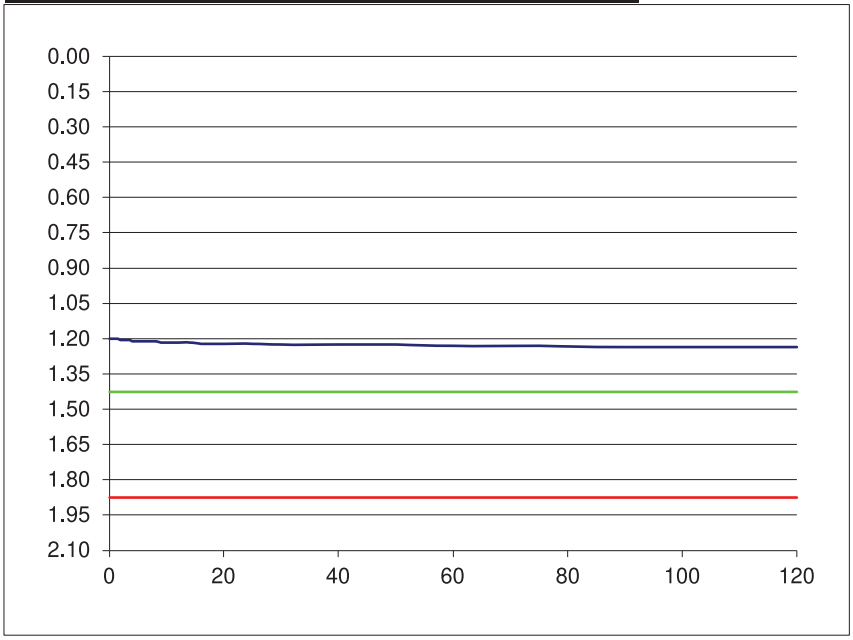
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK10
Date:	03/11/2021

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

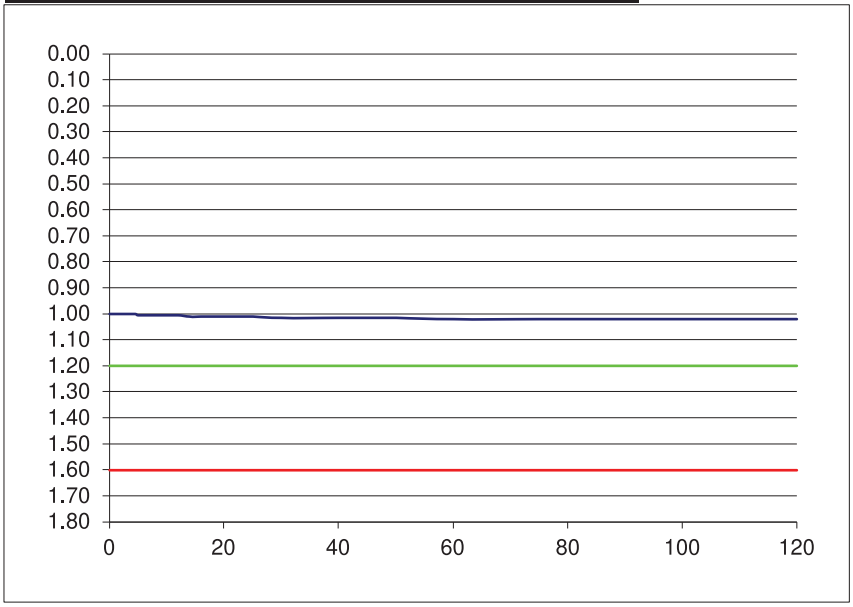
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK11
Date:	03/11/2021

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

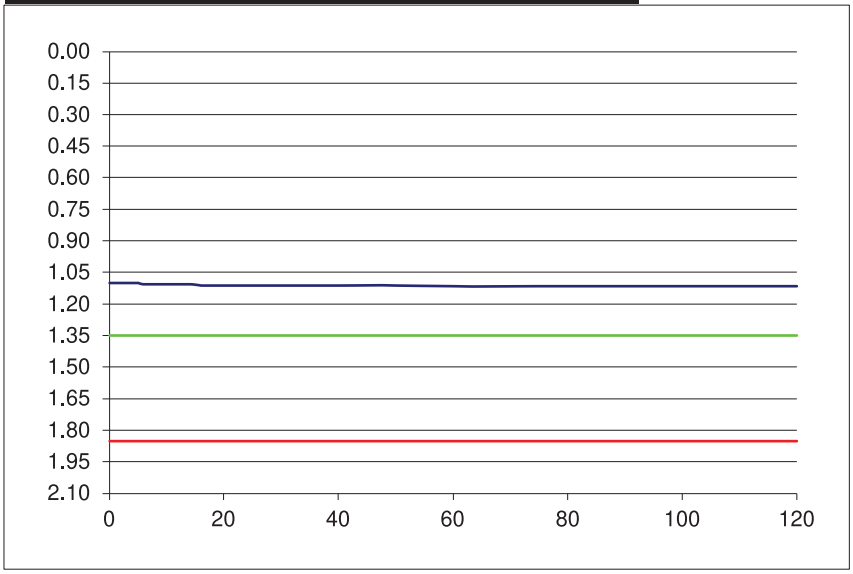
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK12
Date:	03/11/2021

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

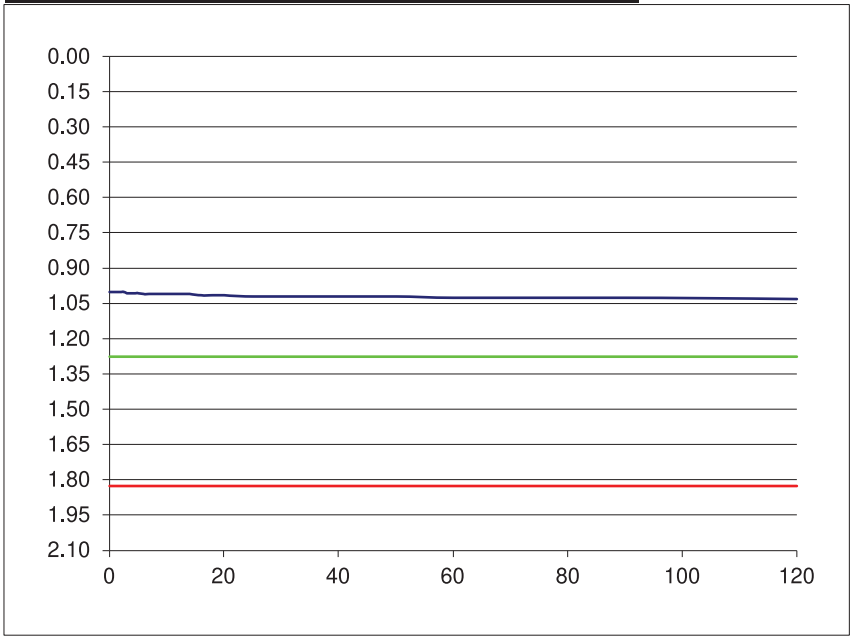
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK13
Date:	03/11/2021

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

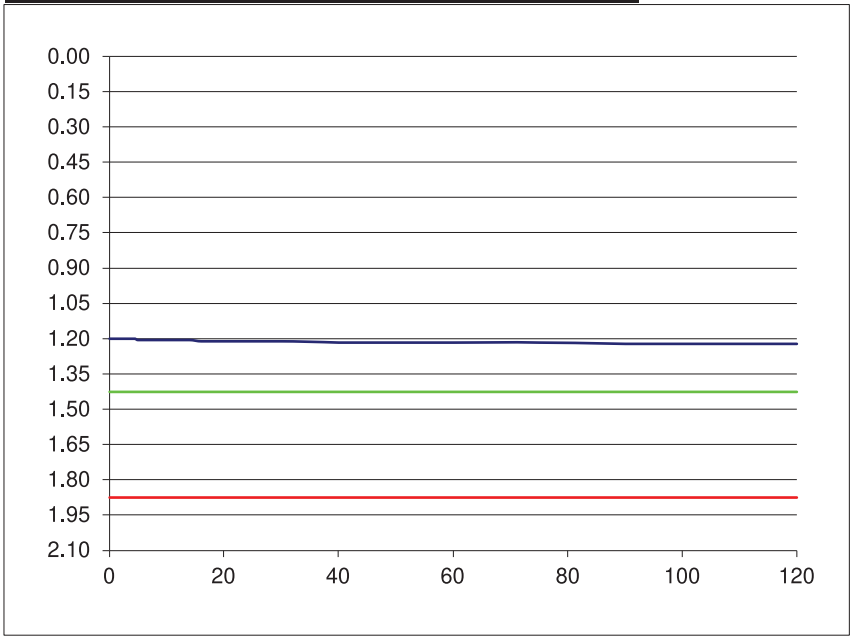
Project Reference:	5898
Contract name:	Kilshane
Location:	Ballycoolin, Dublin 15
Test No:	SK16
Date:	03/11/2021

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	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 0.50m)		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	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	11:02	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

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	11:05	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

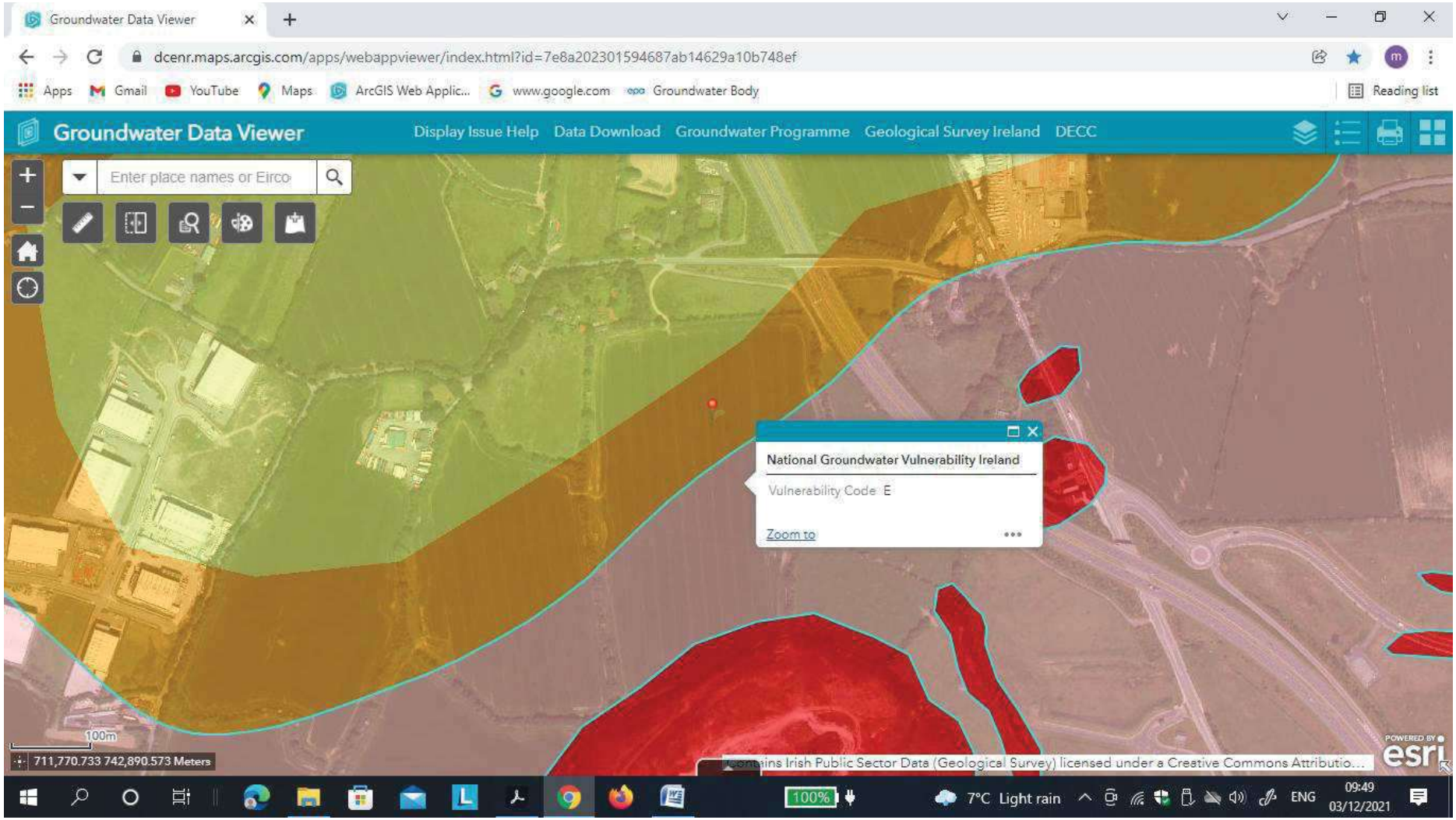
Figure 6. P – Test 2

KILSHANE ENERGY LTD. SITE – Photos of Test 3

Figure 7. P – Test 3

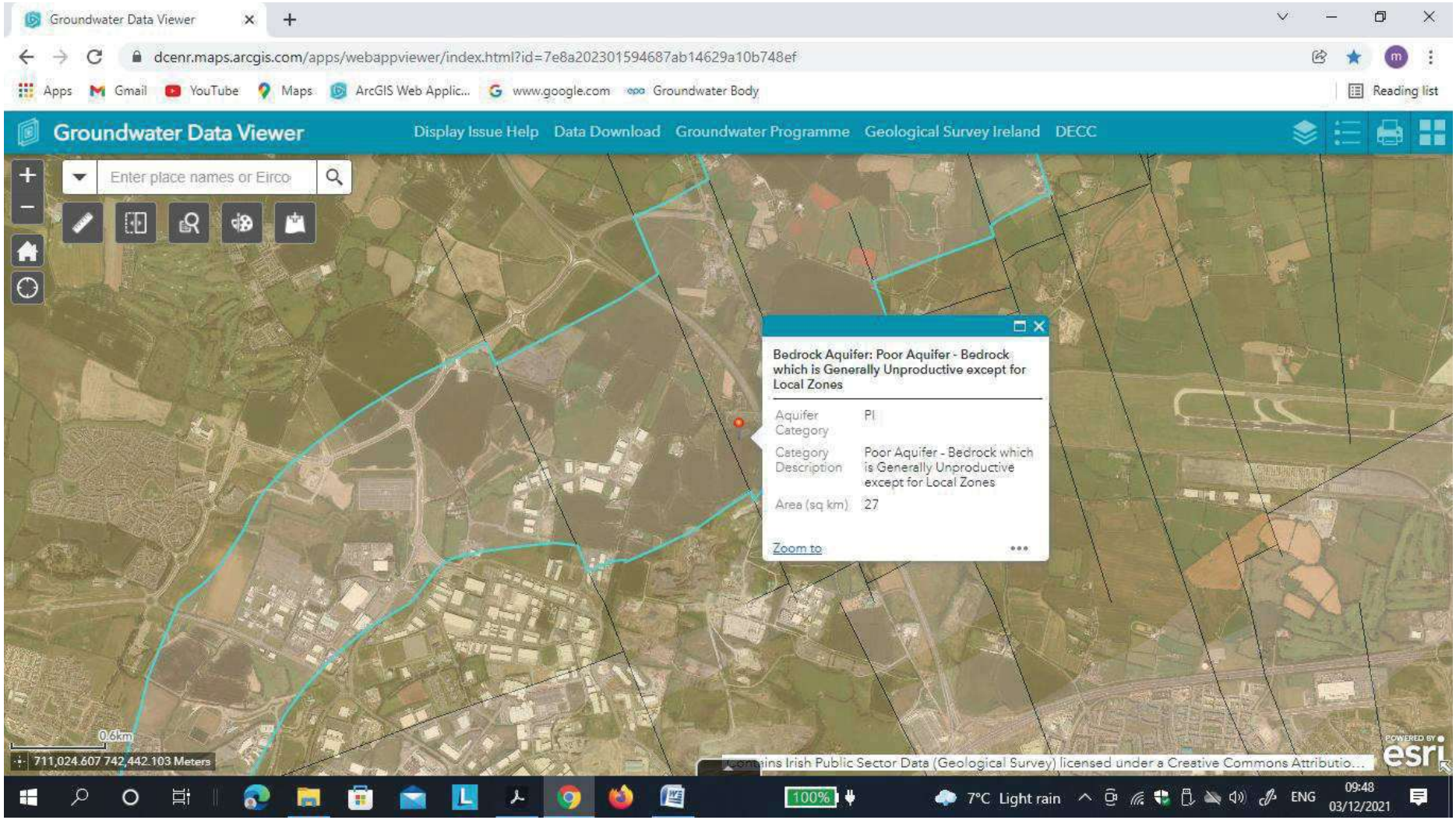
Figure 8. View of site

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4

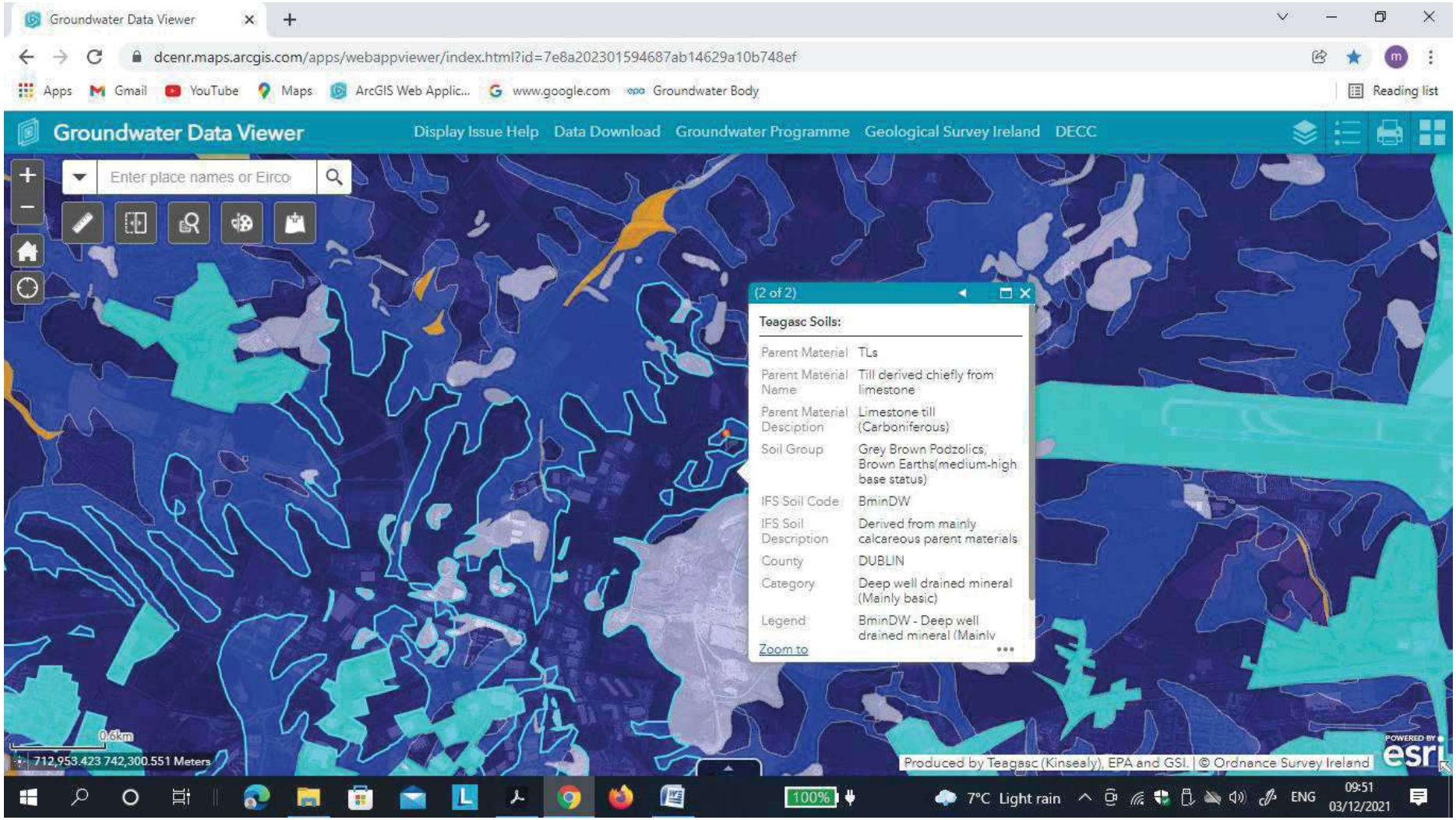


VULNERABILITY MAP

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4

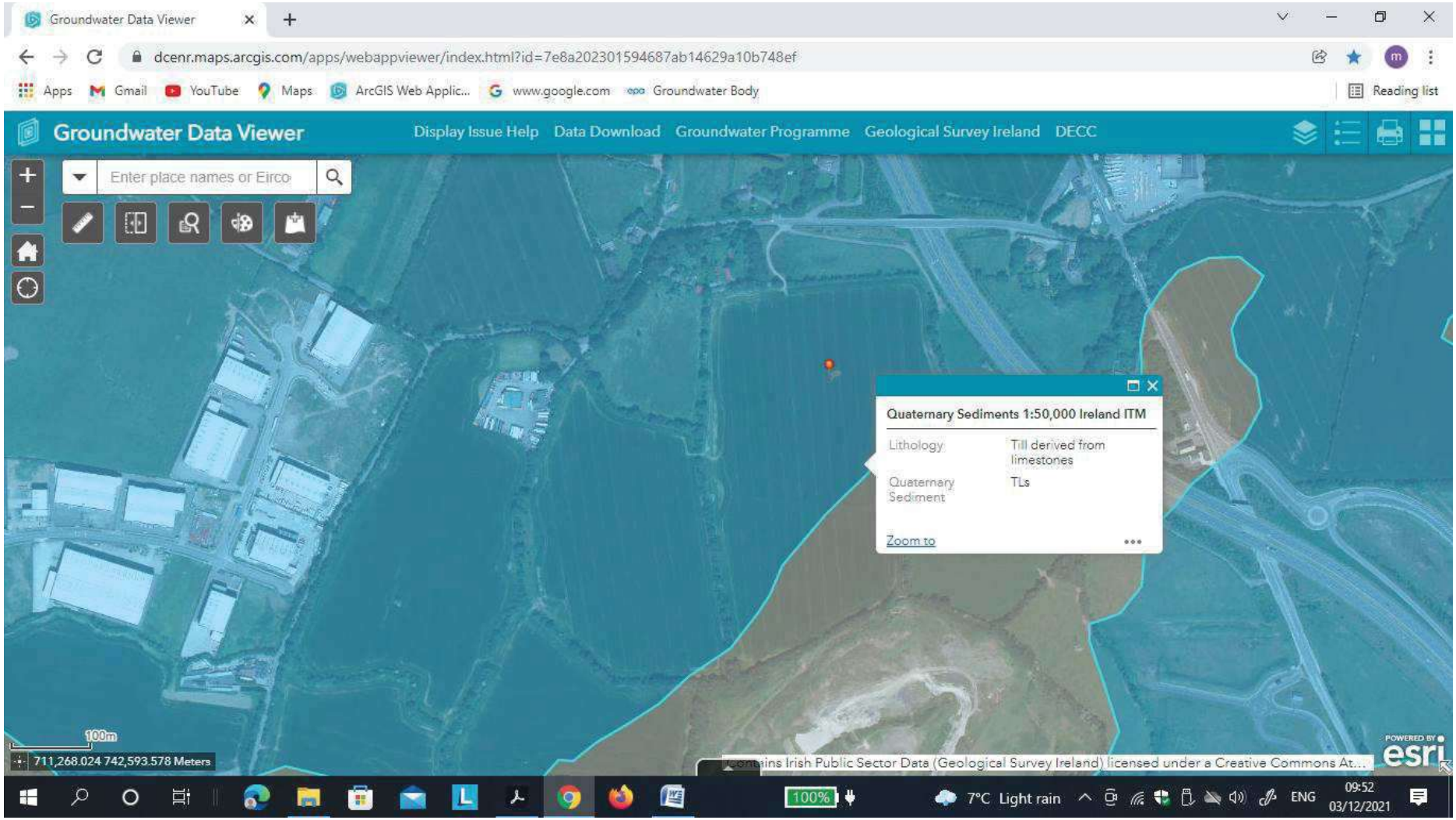


AQUIFER MAP


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

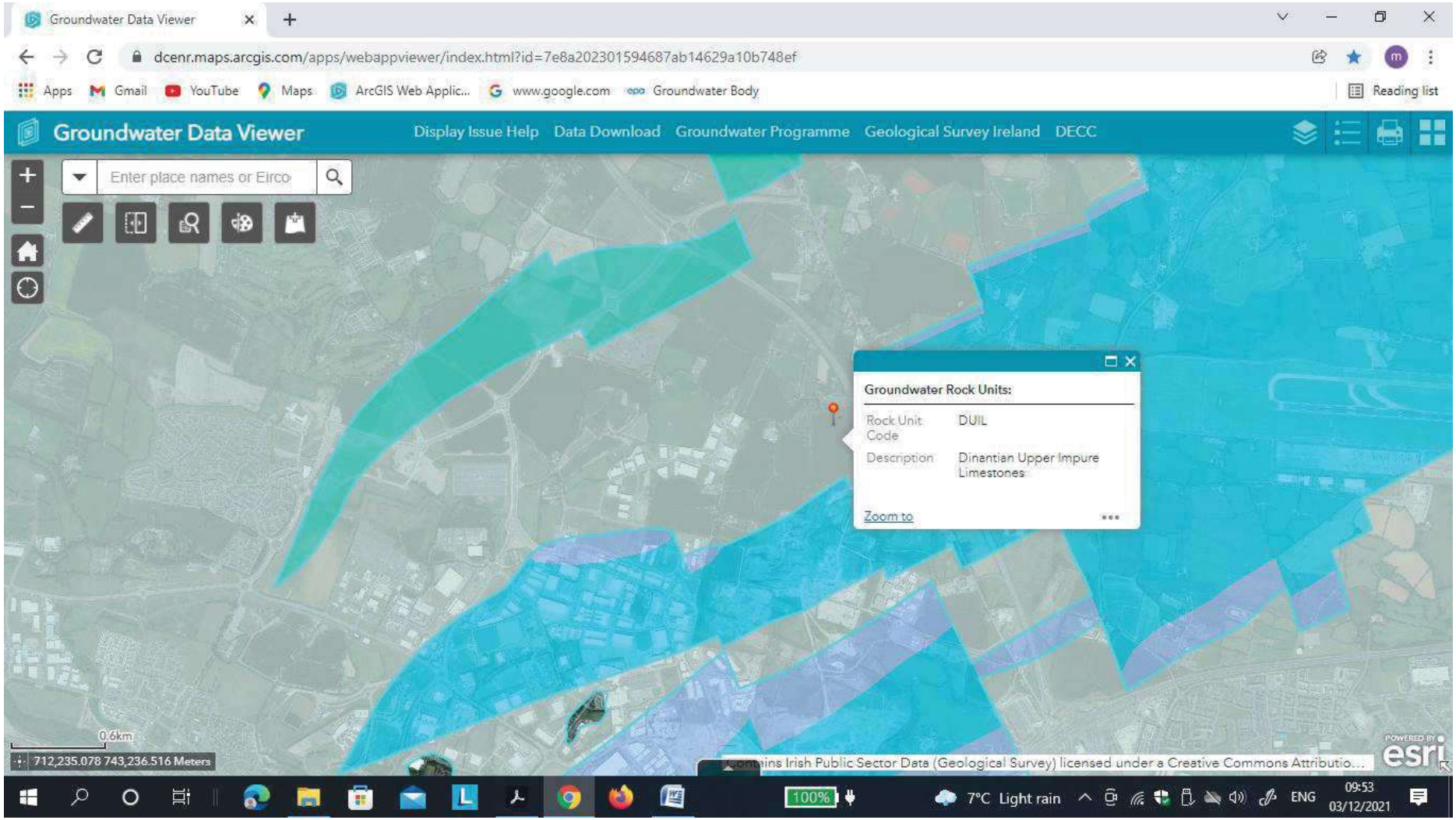
SOILS MAP

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4



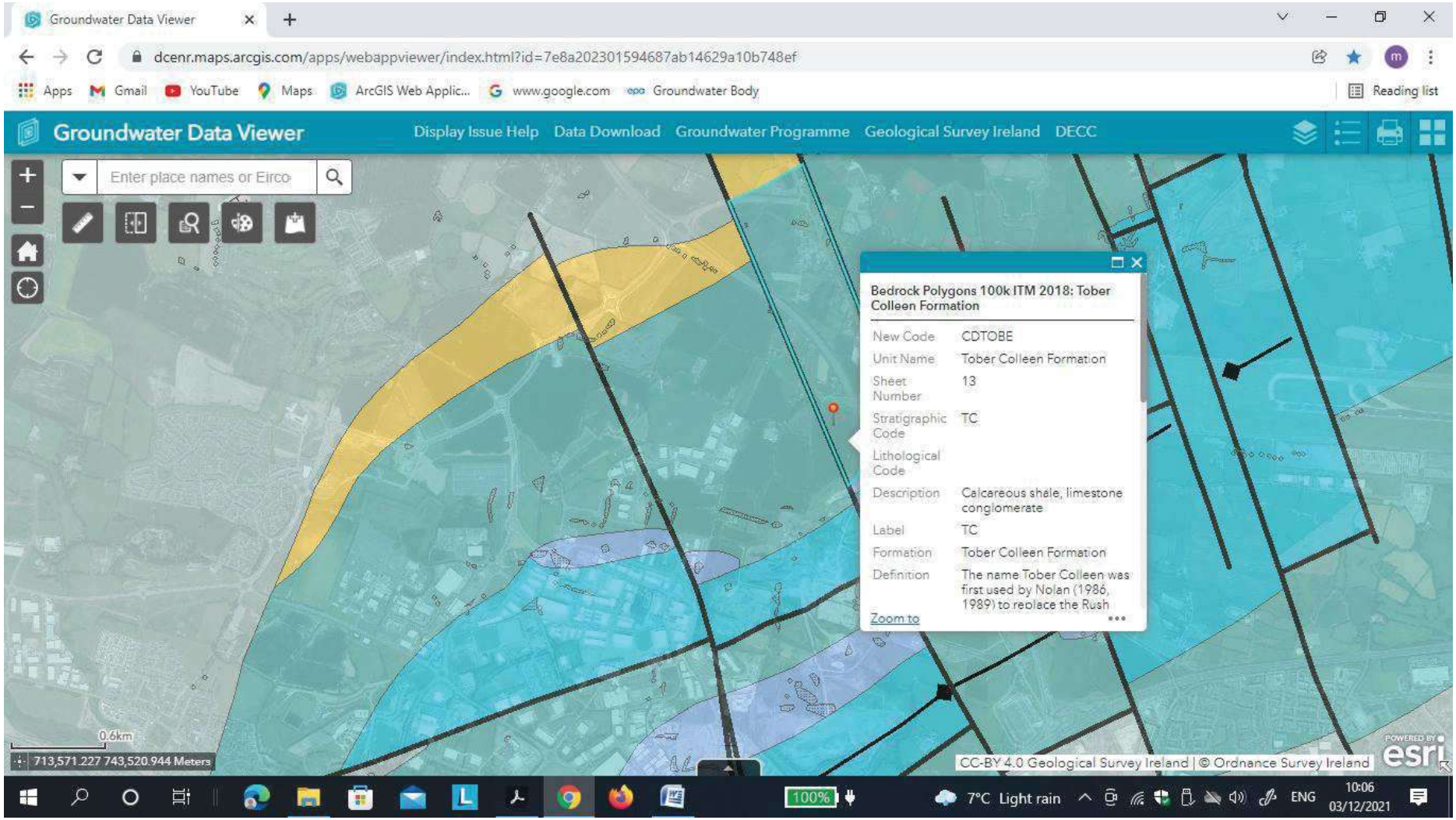
QUATERNARY SEDIMENTS MAP

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4



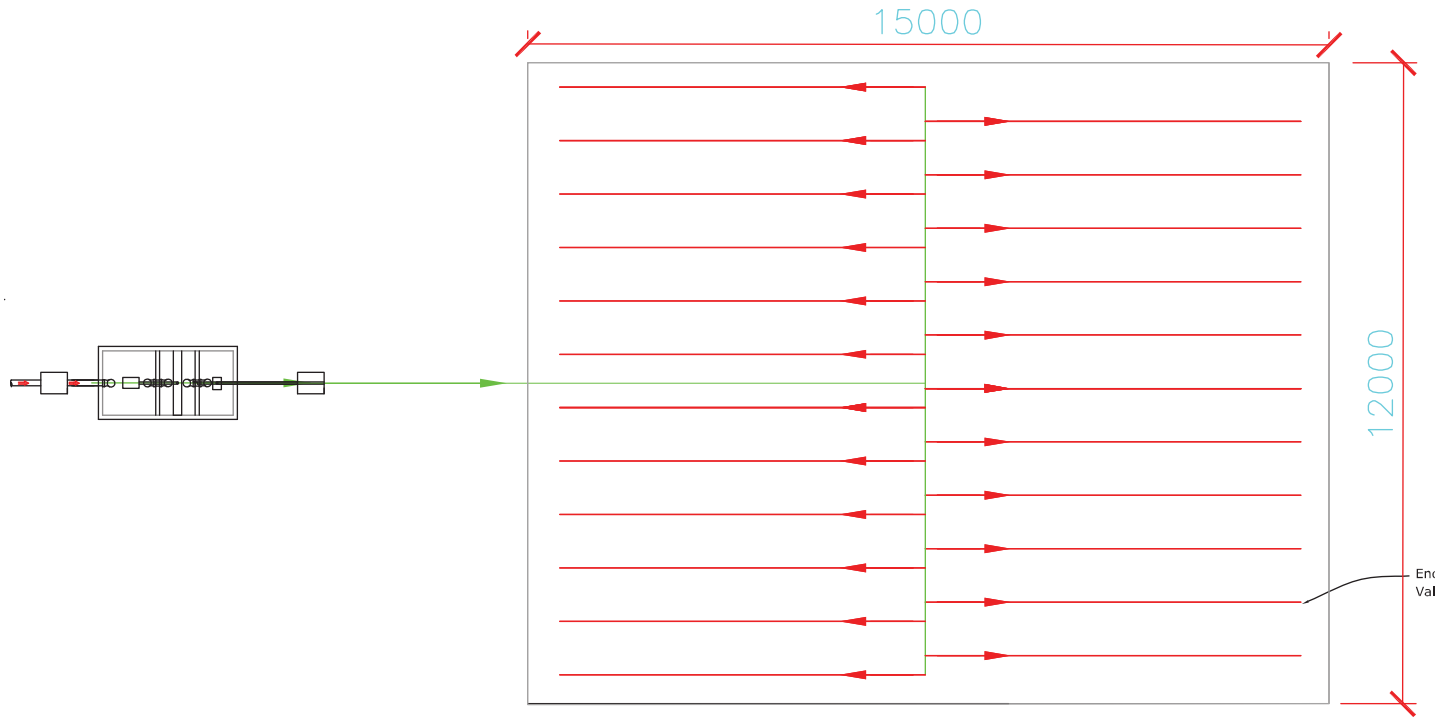
GROUNDWATER ROCK MAP

KILSHANE ENERGY LTD. SITE – TESTS 3 AND 4



BEDROCK MAP

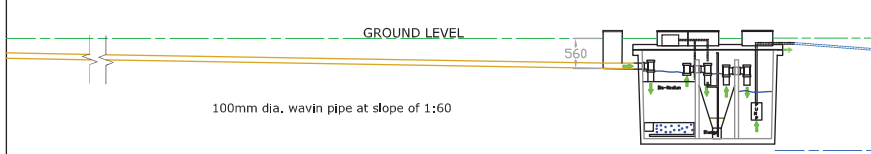
ALL WORKS TO BE SUPERVISED AND CERTIFIED BY A SUITABLY QUALIFIED ENGINEER



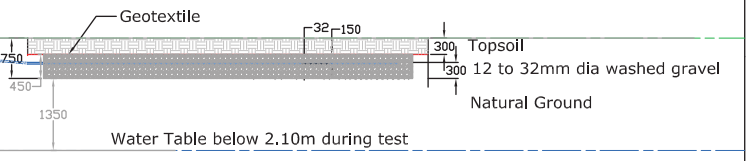
PUMP SYSTEM AND PIPE NETWORK TO BE DESIGNED SPECIFICALLY FOR THE PROPOSED SYSTEM

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

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	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

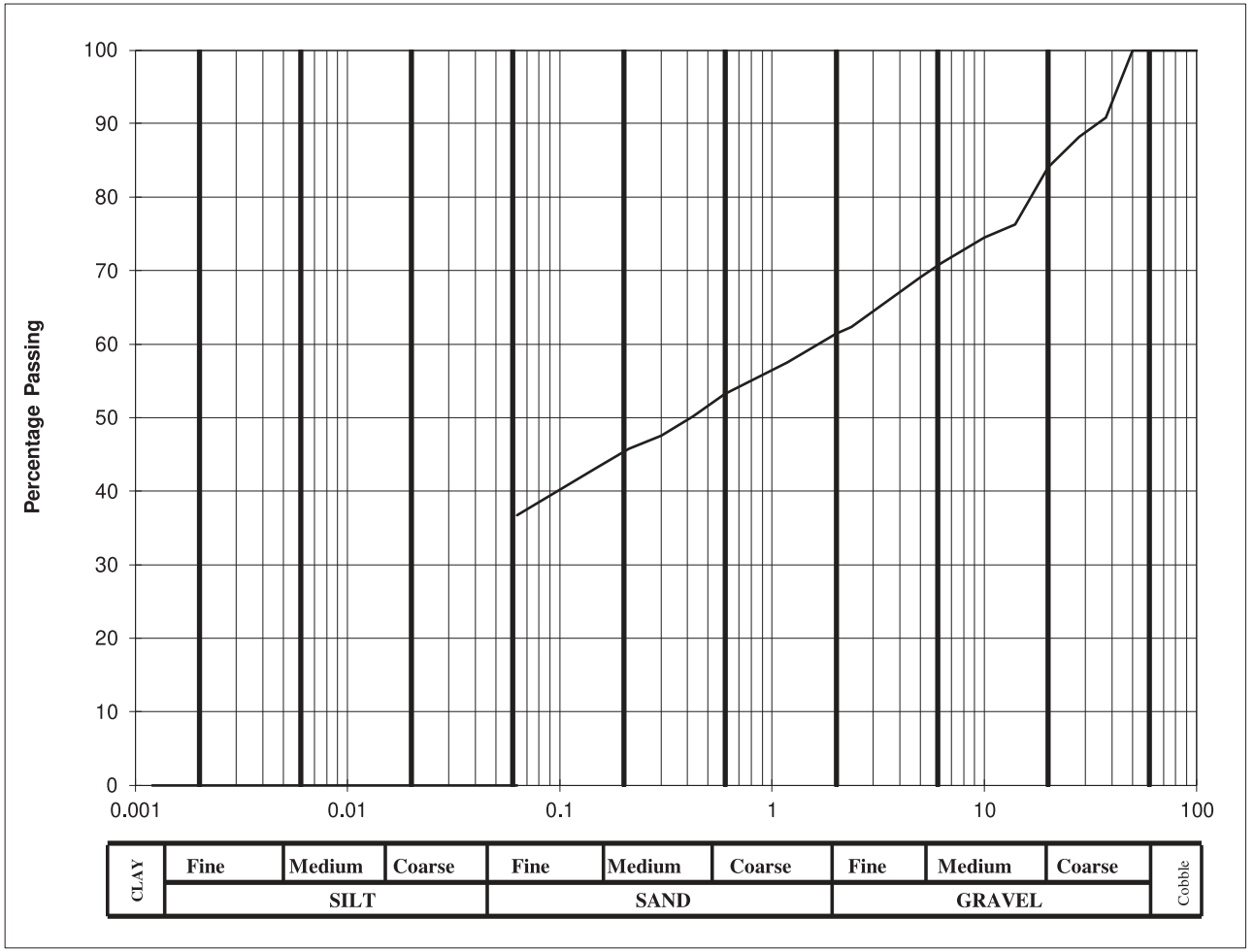
Paddy McGonagle
Site Investigations Ltd

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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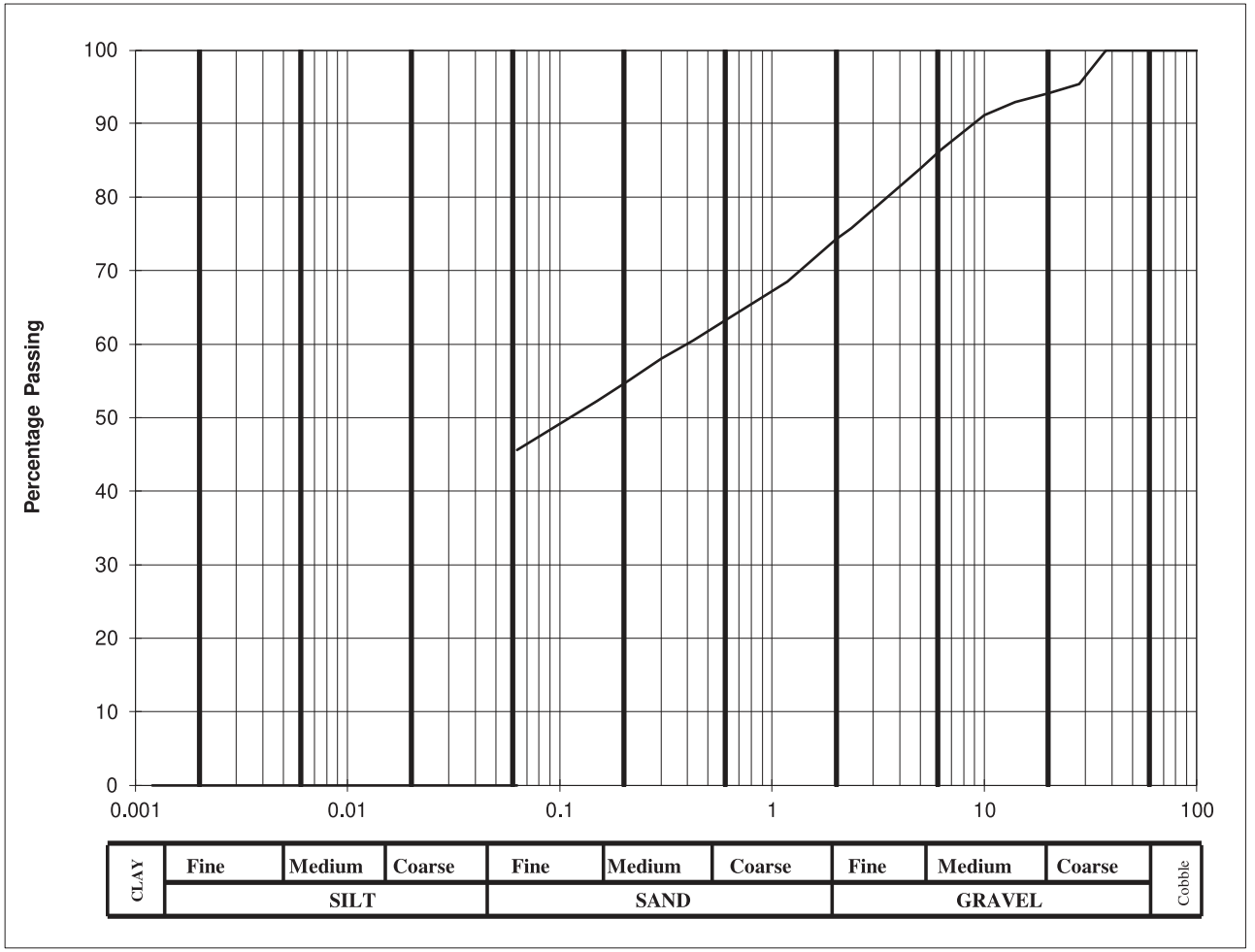
Site Investigations Ltd

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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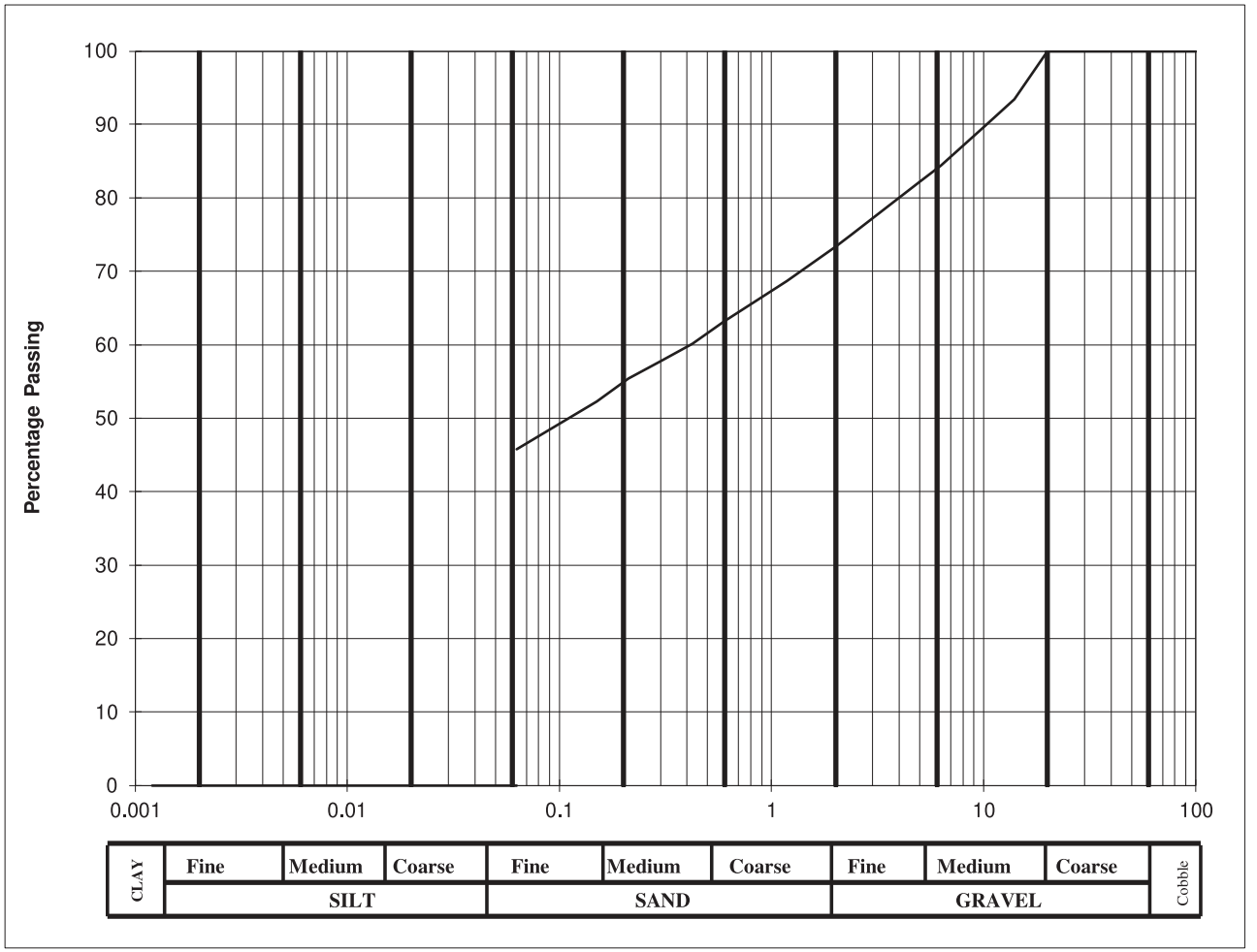
Site Investigations Ltd

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

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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	

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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	

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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

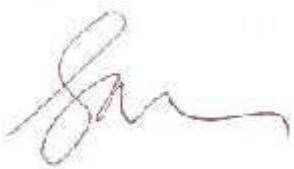
We received 11 samples on Friday November 05, 2021 and 11 of these samples were scheduled for analysis which was completed on Thursday November 18, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of 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
PCBs by GCMS	All	NDPs: 0 Tests: 8	25288105	TP 03		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288106	TP 04		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288113	TP 06		1.00 - 1.00	250g Amber Jar (ALE210)	S
			25288107	TP 07		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288108	TP 10		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288109	TP 12		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288110	TP 13		0.50 - 0.50	250g Amber Jar (ALE210)	S
Phenols by HPLC (W)	All	NDPs: 0 Tests: 8	25288105	TP 03		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288106	TP 04		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288113	TP 06		1.00 - 1.00	1kg TUB with Handle (ALE260)	S
			25288107	TP 07		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288108	TP 10		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288109	TP 12		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288110	TP 13		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
Sample description	All	NDPs: 0 Tests: 11	25288105	TP 03		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288106	TP 04		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288113	TP 06		1.00 - 1.00	250g Amber Jar (ALE210)	S
			25288107	TP 07		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288108	TP 10		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288109	TP 12		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288110	TP 13		0.50 - 0.50	250g Amber Jar (ALE210)	S
Total Dissolved Solids on Leachates	All	NDPs: 0 Tests: 8	25288105	TP 03		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288106	TP 04		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288113	TP 06		1.00 - 1.00	1kg TUB with Handle (ALE260)	S
			25288107	TP 07		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288108	TP 10		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288109	TP 12		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
			25288110	TP 13		0.50 - 0.50	1kg TUB with Handle (ALE260)	S
Total Organic Carbon	All	NDPs: 0 Tests: 8	25288105	TP 03		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288106	TP 04		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288113	TP 06		1.00 - 1.00	250g Amber Jar (ALE210)	S
			25288107	TP 07		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288108	TP 10		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288109	TP 12		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288110	TP 13		0.50 - 0.50	250g Amber Jar (ALE210)	S
TPH CWG GC (S)	All	NDPs: 0 Tests: 8	25288105	TP 03		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288106	TP 04		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288113	TP 06		1.00 - 1.00	250g Amber Jar (ALE210)	S
			25288107	TP 07		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288108	TP 10		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288109	TP 12		0.50 - 0.50	250g Amber Jar (ALE210)	S
			25288110	TP 13		0.50 - 0.50	250g Amber Jar (ALE210)	S
VOC MS (S)	All	NDPs: 0 Tests: 8	25288105	TP 03		0.50 - 0.50	60g VOC (ALE215)	S
			25288106	TP 04		0.50 - 0.50	60g VOC (ALE215)	S
			25288113	TP 06		1.00 - 1.00	60g VOC (ALE215)	S
			25288107	TP 07		0.50 - 0.50	60g VOC (ALE215)	S
			25288108	TP 10		0.50 - 0.50	60g VOC (ALE215)	S
			25288109	TP 12		0.50 - 0.50	60g VOC (ALE215)	S
			25288110	TP 13		0.50 - 0.50	60g VOC (ALE215)	S

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								

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)

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		

Component	LOD/Units	Method		
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.
- 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						
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.
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- * 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

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)	0.100	**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

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)	0.106	**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
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)	0.114	**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

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)	0.117	**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
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 (%)**	26.6
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
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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
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
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22:33:05 21/11/2021

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
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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

Appendices	Page
Appendix A: Classifier defined and non CLP determinands	29
Appendix B: Rationale for selection of metal species	30

Appendices	Page
Appendix C: Version	31

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	Legend Key
Contract:	Kilshane	Engineer:	Waterman Moylan	Locations By Type - CP
Location:	Kilshane, Ballycoolin, Dublin 15	Scale:	1:3000	Locations By Type - IP
Title:	Site Plan	Drawn By:	SL	Locations By Type - OP

C. Greenfield Run-off Rate & GDSDS Attenuation Calculations

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Calculation By:	KM
Approved by:	MD

Input Data

Project Name	Kilshane- Flow Rate
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Total Site Area: 21,396m² … *Entire redline area*

Paved Area

Total: 95% … *Total paved area as a percentage of site area*

Drained: 100% … *Proportion of paved area drained*

Soil Area

Drained: 0% … *Proportion of soil area drained*

Runoff Growth Factors:

1-Year 0.85 … *Typical value for Dublin is 0.85*

30-Year 2.10 … *Typical value for Dublin is 2.10*

100-Year 2.60 … *Typical value for Dublin is 2.60*

Soil Type: Type 3 … *From 1 to 5, preferably from Site Investigation report, or else estimate from the adjacent map*

SAAR: 825mm … *Values from the Word Document*

Climate Change Factor: 20% … *20% is typically used in Ireland*

Rain Data From: Met Éireann Archive

Rainfall return period data: contact enquiries@met.ie (provide Irish Grid coordinates).
Note: https://www.met.ie/climate/services/rainfall-return-periods is superseded.
New version here: https://www.met.ie/climate/services

Met Éireann Archive Rainfall Data

Duration (Hours)	Return Period (Years) 1	5	10	20	30	50	100
0.5	8.1	13.5	16.7	20.3	22.7	26.0	31.3
1	10.6	17.2	21.1	25.5	28.4	32.4	38.7
2	13.8	22.0	26.8	32.1	35.5	40.4	47.9
4	18.0	28.1	33.9	40.4	44.5	50.3	59.2
6	21.0	32.5	39.0	46.1	50.8	57.2	67.0
12	27.4	41.5	49.4	58.0	63.6	71.2	82.8
24	35.7	53.0	62.6	73.0	79.6	88.7	102.4
48	43.1	62.1	72.5	83.5	90.4	99.9	114.1

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Calculation By:	KM
Approved by:	MD

Project Data

Project Name	Kilshane- Flow Rate
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Description		%	Area
Total Site Area		-	21,396m²
Paved Area	Total	95%	20,311m²
	Drained	100%	20,311m²
Soil Area	Total	5%	1,085m²
	Drained	0%	0m²

Soil Type:	Type 3
SPR Index (from FSR):	0.37
SAAR:	825mm
Rain Data:	Met Éireann
Climate Change Factor:	20%

Greenfield Runoff:

$Q_{BARrural} = 0.00108 \times Area^{0.89} \times SAAR^{1.17} \times Soil^{2.17}$

Area = 0.0214km² … *Total site area in km²*
SAAR = 825mm … *Standard Average Annual Rainfall in mm*
SOIL = 0.37 … *The "SPR" index from FSR*

Note: Where a site is <0.5km², the $Q_{BARrural}$ formula should be applied for 0.5km² and the result factored based on the ratio of the actual site area and the applied area.

$Q_{BARrural} = 0.007m^3/s$
$Q_{BARrural} = 7.449$ l/s
$Q_{BARrural} = 3.482$ l/s/Ha

Return Period	1-year	30-year	100-year
Growth Factor	0.85	2.10	2.60
Q_{BAR} (l/s)	6.33	15.64	19.37
Q_{BAR} (l/s/Ha)	2.96	7.31	9.05
Allowable Discharge	7.45	7.45	7.45

Rainfall Data:

Rain Data From: Met Éireann Archive
Climate Change Factor: 20%

Duration	Return Period *(Years)*						
(Hours)	1	5	10	20	30	50	100
0.5	9.7	16.2	20.0	24.4	27.2	31.2	37.6
1	12.7	20.6	25.3	30.6	34.1	38.9	46.4
2	16.6	26.4	32.2	38.5	42.6	48.5	57.5
4	21.6	33.7	40.7	48.5	53.4	60.4	71.0
6	25.2	39.0	46.8	55.3	61.0	68.6	80.4
12	32.9	49.8	59.3	69.6	76.3	85.4	99.4
24	42.8	63.6	75.1	87.6	95.5	106.4	122.9
48	51.7	74.5	87.0	100.2	108.5	119.9	136.9

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Calculation By:	KM
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Summary

Project Name	Kilshane- Flow Rate
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Summary of GDSDS Calculations:

Criterion 1: River Protection Volume

Interception Volume	**81.24m³**
Treatment Volume	**243.73m³**

Criterion 2: River Regime Protection

Critical Storm:	24-hour 1-in-100-year storm
Volume Required	**1,852.18m³**

Criterion 4: River Flood Protection

Long Term Storage *(no interception provided)*	**689.28m³**
Long Term Storage *(Interception provided)*	**608.03m³**

Attenuation Volume Requirement for Various Storm Events:

1-in-1-Year Storm	350.93m³
1-in-5-Year Storm	689.67m³
1-in-10-Year Storm	882.22m³
1-in-20-Year Storm	1,135.61m³
1-in-30-Year Storm	1,296.47m³
1-in-50-Year Storm	1,518.27m³
1-in-100-Year Storm	1,852.18m³
Maximum Volume Requirement	**1,852.18m³**

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Calculation By:	KM
Approved by:	MD

Criterion 1
River Protection Volume

Project Name	Kilshane- Flow Rate
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

1.1 Interception

Paved surfaces connected to drainage system	*21395.5m² x 0.9493 x 1 =* 20,310.75m²	*21,396m² site area* *95% of the site is paved* *100% of the paved area*
Volume of Interception Storage	*20310.74815m² x 5mm x 0.8 =* **81.24m³**	*Paved area directly drained* *5mm rainfall depth* *80% paved runoff factor*

1.2 Treatment Volume

Paved surfaces draining to public drainage network	*21395.5m² x 0.9493 x 1 =* 20,310.75m²	*21,396m² site area* *95% of the site is paved* *100% of the paved area*
Volume of Treatment Storage	*20310.74815m² x 15mm x 0.8 =* **243.73m³**	*Paved area directly drained* *15mm rainfall depth* *80% runoff from paved surfaces*

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Criterion 2
River Regime Protection

Project Name	Kilshane- Flow Rate
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Rainfall Data *(Including 20% increase due to climate change)*

Duration	**Return Period** *(Years)*						
(Hours)	**1**	**5**	**10**	**20**	**30**	**50**	**100**
0.5	9.7	16.2	20.0	24.4	27.2	31.2	37.6
1	12.7	20.6	25.3	30.6	34.1	38.9	46.4
2	16.6	26.4	32.2	38.5	42.6	48.5	57.5
4	21.6	33.7	40.7	48.5	53.4	60.4	71.0
6	25.2	39.0	46.8	55.3	61.0	68.6	80.4
12	32.9	49.8	59.3	69.6	76.3	85.4	99.4
24	42.8	63.6	75.1	87.6	95.5	106.4	122.9
48	51.7	74.5	87.0	100.2	108.5	119.9	136.9

Inflow *(m^3)*

Duration	**Return Period** *(Years)*						
(Hours)	**1**	**5**	**10**	**20**	**30**	**50**	**100**
0.5	197.4	329.0	407.0	494.8	553.3	633.7	762.9
1	258.4	419.2	514.3	621.5	692.2	789.7	943.2
2	336.3	536.2	653.2	782.4	865.2	984.7	1,167.5
4	438.7	684.9	826.2	984.7	1,084.6	1,226.0	1,442.9
6	511.8	792.1	950.5	1,123.6	1,238.1	1,394.1	1,633.0
12	667.8	1,011.5	1,204.0	1,413.6	1,550.1	1,735.4	2,018.1
24	870.1	1,291.8	1,525.7	1,779.2	1,940.1	2,161.9	2,495.8
48	1,050.5	1,513.6	1,767.0	2,035.1	2,203.3	2,434.9	2,780.9

Outflow *(m^3)*

Duration	**Return Period** *(Years)*						
(Hours)	**1**	**5**	**10**	**20**	**30**	**50**	**100**
0.5	13.4	13.4	13.4	13.4	13.4	13.4	13.4
1	26.8	26.8	26.8	26.8	26.8	26.8	26.8
2	53.6	53.6	53.6	53.6	53.6	53.6	53.6
4	107.3	107.3	107.3	107.3	107.3	107.3	107.3
6	160.9	160.9	160.9	160.9	160.9	160.9	160.9
12	321.8	321.8	321.8	321.8	321.8	321.8	321.8
24	643.6	643.6	643.6	643.6	643.6	643.6	643.6
48	1,287.2	1,287.2	1,287.2	1,287.2	1,287.2	1,287.2	1,287.2

Storage Required *(m^3)*

Duration	**Return Period** *(Years)*						
(Hours)	**1**	**5**	**10**	**20**	**30**	**50**	**100**
0.5	184.0	315.6	393.6	481.4	539.9	620.3	749.5
1	231.5	392.4	487.5	594.7	665.4	762.9	916.4
2	282.7	482.6	599.6	728.7	811.6	931.0	1,113.8
4	331.4	577.6	719.0	877.4	977.3	1,118.7	1,335.6
6	350.9	631.2	789.6	962.7	1,077.2	1,233.2	1,472.1
12	346.0	689.7	882.2	1,091.8	1,228.3	1,413.5	1,696.3
24	226.5	648.2	882.1	1,135.6	1,296.5	1,518.3	1,852.2
48	0.0	226.3	479.8	747.9	916.1	1,147.6	1,493.7

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Calculation By:	KM
Approved by:	MD

Criterion 4
River Flood Protection

Project Name	Kilshane- Flow Rate
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Vol_{XS} = RD x A x 10 [(PIMP/100 x α0.8) + (1 - (PIMP/100))(β x Soil) - Soil]

Vol_{XS}			*… Extra runoff volume of development over Greenfield runoff*
RD	=	80 mm	*… Rainfall depth of the 100-year, 6-hour event*
A	=	2.140 Ha	*… Area of site*
PIMP	=	95%	*… Impermeable area of total site*
α0.8	=	100%	*… Proportion of paved area drained to drainage network or river with 80% runoff*
β	=	60%	*… Proportion of pervious area drained to the network or river*
Soil	=	0.37	*… SPR index*

Vol_{XS} = 689.28m³

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Calculation By:	KM
Approved by:	MD

Input Data

Project Name	Kilshane- No outflow
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Total Site Area: 20,944m² … *Entire redline area*

Paved Area

Total: 90% … *Total paved area as a percentage of site area*

Drained: 100% … *Proportion of paved area drained*

Soil Area

Drained: 0% … *Proportion of soil area drained*

Runoff Growth Factors:

1-Year 0.85 … *Typical value for Dublin is 0.85*

30-Year 2.10 … *Typical value for Dublin is 2.10*

100-Year 2.60 … *Typical value for Dublin is 2.60*

Soil Type: Type 3 … *From 1 to 5, preferably from Site Investigation report, or else estimate from the adjacent map*

SAAR: 825mm … *Values from the Word Document*

Climate Change Factor: 20% … *20% is typically used in Ireland*

Rain Data From: Met Éireann Archive

Rainfall return period data: contact enquiries@met.ie (provide Irish Grid coordinates).
Note: https://www.met.ie/climate/services/rainfall-return-periods is superseded.
New version here: https://www.met.ie/climate/services

Met Éireann Archive Rainfall Data

Duration (Hours)	Return Period (Years) 1	5	10	20	30	50	100
0.5	8.1	13.5	16.7	20.3	22.7	26.0	31.3
1	10.6	17.2	21.1	25.5	28.4	32.4	38.7
2	13.8	22.0	26.8	32.1	35.5	40.4	47.9
4	18.0	28.1	33.9	40.4	44.5	50.3	59.2
6	21.0	32.5	39.0	46.1	50.8	57.2	67.0
12	27.4	41.5	49.4	58.0	63.6	71.2	82.8
24	35.7	53.0	62.6	73.0	79.6	88.7	102.4
48	43.1	62.1	72.5	83.5	90.4	99.9	114.1

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Project Data

Project Name	Kilshane- No outflow
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Description		%	Area
Total Site Area		-	20,944m²
Paved Area	Total	90%	18,850m²
	Drained	100%	18,850m²
Soil Area	Total	10%	2,094m²
	Drained	0%	0m²

Soil Type:	Type 3
SPR Index (from FSR):	0.37
SAAR:	825mm
Rain Data:	Met Éireann
Climate Change Factor:	20%

Greenfield Runoff:

$Q_{BARrural} = 0.00108 \times Area^{0.89} \times SAAR^{1.17} \times Soil^{2.17}$

Area = 0.02094km² … *Total site area in km²*
SAAR = 825mm … *Standard Average Annual Rainfall in mm*
SOIL = 0.37 … *The "SPR" index from FSR*

Note: Where a site is <0.5km², the $Q_{BARrural}$ formula should be applied for 0.5km² and the result factored based on the ratio of the actual site area and the applied area.

$Q_{BARrural}$ = 0.007m³/s
$Q_{BARrural}$ = 7.292 l/s
$Q_{BARrural}$ = 3.482 l/s/Ha

Return Period	1-year	30-year	100-year
Growth Factor	0.85	2.10	2.60
Q_{BAR} (l/s)	6.20	15.31	18.96
Q_{BAR} (l/s/Ha)	2.96	7.31	9.05
Allowable Discharge	0.00	0.00	0.00

Rainfall Data:

Rain Data From: Met Éireann Archive
Climate Change Factor: 20%

Duration	Return Period *(Years)*						
(Hours)	1	5	10	20	30	50	100
0.5	9.7	16.2	20.0	24.4	27.2	31.2	37.6
1	12.7	20.6	25.3	30.6	34.1	38.9	46.4
2	16.6	26.4	32.2	38.5	42.6	48.5	57.5
4	21.6	33.7	40.7	48.5	53.4	60.4	71.0
6	25.2	39.0	46.8	55.3	61.0	68.6	80.4
12	32.9	49.8	59.3	69.6	76.3	85.4	99.4
24	42.8	63.6	75.1	87.6	95.5	106.4	122.9
48	51.7	74.5	87.0	100.2	108.5	119.9	136.9

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Summary

Project Name	Kilshane- No outflow
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Summary of GDSDS Calculations:

Criterion 1: River Protection Volume

Interception Volume	**75.40m³**
Treatment Volume	**226.20m³**

Criterion 2: River Regime Protection

Critical Storm:	48-hour 1-in-100-year storm
Volume Required	**2,580.89m³**

Criterion 4: River Flood Protection

Long Term Storage *(no interception provided)*	**626.75m³**
Long Term Storage *(Interception provided)*	**551.35m³**

Attenuation Volume Requirement for Various Storm Events:

1-in-1-Year Storm	974.90m³
1-in-5-Year Storm	1,404.67m³
1-in-10-Year Storm	1,639.92m³
1-in-20-Year Storm	1,888.73m³
1-in-30-Year Storm	2,044.80m³
1-in-50-Year Storm	2,259.69m³
1-in-100-Year Storm	2,580.89m³
Maximum Volume Requirement	**2,580.89m³**

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Criterion 1
River Protection Volume

Project Name	Kilshane- No outflow
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

1.1 Interception

Paved surfaces connected to drainage system	*20944m² x 0.9 x 1 =* 18,849.60m²	*20,944m² site area* *90% of the site is paved* *100% of the paved area*
Volume of Interception Storage	*18849.6m² x 5mm x 0.8 =* **75.40m³**	*Paved area directly drained* *5mm rainfall depth* *80% paved runoff factor*

1.2 Treatment Volume

Paved surfaces draining to public drainage network	*20944m² x 0.9 x 1 =* 18,849.60m²	*20,944m² site area* *90% of the site is paved* *100% of the paved area*
Volume of Treatment Storage	*18849.6m² x 15mm x 0.8 =* **226.20m³**	*Paved area directly drained* *15mm rainfall depth* *80% runoff from paved surfaces*

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Criterion 2
River Regime Protection

Project Name	Kilshane- No outflow
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Rainfall Data *(Including 20% increase due to climate change)*

Duration	**Return Period** *(Years)*						
(Hours)	**1**	**5**	**10**	**20**	**30**	**50**	**100**
0.5	9.7	16.2	20.0	24.4	27.2	31.2	37.6
1	12.7	20.6	25.3	30.6	34.1	38.9	46.4
2	16.6	26.4	32.2	38.5	42.6	48.5	57.5
4	21.6	33.7	40.7	48.5	53.4	60.4	71.0
6	25.2	39.0	46.8	55.3	61.0	68.6	80.4
12	32.9	49.8	59.3	69.6	76.3	85.4	99.4
24	42.8	63.6	75.1	87.6	95.5	106.4	122.9
48	51.7	74.5	87.0	100.2	108.5	119.9	136.9

Inflow *(m^3)*

Duration	**Return Period** *(Years)*						
(Hours)	**1**	**5**	**10**	**20**	**30**	**50**	**100**
0.5	183.2	305.4	377.7	459.2	513.5	588.1	708.0
1	239.8	389.1	477.3	576.8	642.4	732.9	875.4
2	312.1	497.6	606.2	726.1	803.0	913.8	1,083.5
4	407.2	635.6	766.8	913.8	1,006.6	1,137.8	1,339.1
6	475.0	735.1	882.2	1,042.8	1,149.1	1,293.8	1,515.5
12	619.8	938.7	1,117.4	1,311.9	1,438.6	1,610.5	1,872.9
24	807.5	1,198.8	1,416.0	1,651.2	1,800.5	2,006.4	2,316.2
48	974.9	1,404.7	1,639.9	1,888.7	2,044.8	2,259.7	2,580.9

Outflow *(m^3)*

Duration	**Return Period** *(Years)*						
(Hours)	**1**	**5**	**10**	**20**	**30**	**50**	**100**
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Storage Required *(m^3)*

Duration	**Return Period** *(Years)*						
(Hours)	**1**	**5**	**10**	**20**	**30**	**50**	**100**
0.5	183.2	305.4	377.7	459.2	513.5	588.1	708.0
1	239.8	389.1	477.3	576.8	642.4	732.9	875.4
2	312.1	497.6	606.2	726.1	803.0	913.8	1,083.5
4	407.2	635.6	766.8	913.8	1,006.6	1,137.8	1,339.1
6	475.0	735.1	882.2	1,042.8	1,149.1	1,293.8	1,515.5
12	619.8	938.7	1,117.4	1,311.9	1,438.6	1,610.5	1,872.9
24	807.5	1,198.8	1,416.0	1,651.2	1,800.5	2,006.4	2,316.2
48	974.9	1,404.7	1,639.9	1,888.7	2,044.8	2,259.7	2,580.9

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Criterion 4
River Flood Protection

Project Name	Kilshane- No outflow
Project Number	25-046
Client	Kilshane Energy Ltd.
Architect	McAtavey Architects
Status	Planning
Date	03/11/2025

Vol_{XS} = RD x A x 10 [(PIMP/100 x α0.8) + (1 - (PIMP/100))(β x Soil) - Soil]

Vol_{XS}			*… Extra runoff volume of development over Greenfield runoff*
RD	=	80 mm	*… Rainfall depth of the 100-year, 6-hour event*
A	=	2.094 Ha	*… Area of site*
PIMP	=	90%	*… Impermeable area of total site*
α0.8	=	100%	*… Proportion of paved area drained to drainage network or river with 80% runoff*
β	=	60%	*… Proportion of pervious area drained to the network or river*
Soil	=	0.37	*… SPR index*

Vol_{XS} = 626.75m³

UK and Ireland Office Locations