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EIAR Chapter 6 Land, Soils, Geology and Hydrogeology

Suir Island Infrastructure Links



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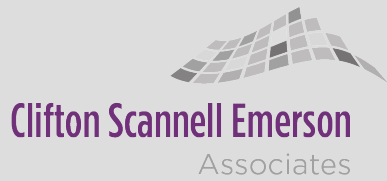
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Document Control Sheet

Project Name: Suir Island Infrastructure Links
Project Number: 20_071
Report Title: EIAR Chapter 6 Land, Soils, Geology and Hydrogeology
Filename: RPT-20_071-034

Issue No.	Issue Status	Date	Prepared by	Checked by
0	Final	22.09.2023	HB	LP

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6.1 Introduction

This chapter assesses and evaluates the potential impacts of the proposed development on the land, soil, geological and hydrogeological aspects of the site and surrounding area. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

The Geological Survey of Ireland (GSI) describes the underlying aquifer as “Locally Important Aquifer”. Bedrock was recorded at depths ranging from 13.00mbgl to 19.30mbgl with no bedrock encountered at BH02 (21.00mbgl) and BH05 (18.50mbgl). The bedrock is a moderately weak light grey muddy LIMESTONE with fossils, thin calcite veins and a fresh to slightly weathered state. Aquifer vulnerability (based on aquifer thickness and type) is ‘Moderate’ to ‘Low’ across the proposed development site.

Presently, the groundwater body in the region of the site Clonmel GWB (IE_SH_G_014) is classified under the WFD Risk Score system (EPA, 2021) as ‘Good’ and ‘Under Review’. The GWB was given a classification of “Good” for the last WFD cycle (2013-2018).

Based on the TII methodology (2009) (See **Appendix 6.1**), criteria for rating site importance of geological features, the importance of the bedrock and soil features at this site is rated as ‘Low importance’ with low significance or value on a local scale. This is due to the existence of poorly drained and/or low fertility soils within the proposed development site.

Based on the TII methodology (2009) (See **Appendix 6.1**) the importance of the hydrogeological features at this site is rated as ‘Extremely High importance’ based on the assessment that the attribute has a high-quality significance or value on a local scale. The aquifer is a Locally Important Aquifer but is not widely used for public water supply or generally for potable use. In addition, there is a direct hydrogeological connection between the site and any protected sites (SAC, SPA, NHA).

It is proposed that 2,000m³ of material will be excavated as part of the proposed development. It is estimated that approximately 500m³ of material will be reused for fill material on the existing flood protection berm located on Suir Island. This material will be sourced from the proposed North Plaza site and/or Raheen Road. Furthermore, it is estimated that 1,500m³ will be removed off-site while approx. 2,000m³ will be imported on-site to be used as engineered fill material.

During construction, specific mitigation measures will be implemented to manage risks to soil and water quality. The contractor will be required to operate in compliance with a Construction Environmental Management Plan (CEMP) and Environmental Operation Plan (EOP). Measures include, management of silt laden run-off, management of fuel storage and management of alkaline run-off from cement works, with or near construction areas.

Following implementation of mitigation measures the predicted impact during construction of the proposed development will be *short-term, imperceptible* and *neutral*.

This chapter assesses and evaluates the potential impacts of the proposed development on the land, soil, geological and hydrogeological aspects of the site and surrounding area. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

6.2 Methodology

6.2.1 Criteria for rating of effects

This chapter evaluates the effects, if any, which the proposed development will have on Land, Soils, Geology and Hydrogeology as defined in the Environmental Protection Agency (EPA) ‘Guidelines on the Information to be contained in Environmental Impact Assessment Reports’ (EPA, 2022). The Draft EPA document entitled ‘Advice Notes for Preparing Environmental Impact Statements’ (EPA, 2015)

was also followed in this geological and hydrogeological assessment and classification of environmental effects. Due consideration is also given to the guidelines provided by the Institute of Geologists of Ireland (IGI) in the document entitled 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI 2013). In addition, the document entitled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the Transport Infrastructure Ireland (TII, 2009) is referenced where the methodology for assessment of impact is appropriate.

The rating of potential environmental effects on the land, soil, geological and hydrogeological environment is based on the standard EIAR impact predictions table included in Chapter 1 which takes account of the quality, significance, duration, and type of effect characteristic identified (in accordance with impact assessment criteria provided in the EPA Guidelines (2022) publication).

The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are typically construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

The TII criteria for rating the magnitude and significance of impacts on the geological related attributes and the importance of hydrogeological attributes at the site during the EIA stage are also relevant in assessing the impact and are presented in Tables 1 to 5 in **Appendix 6.1**.

The assessment includes gathering relevant information of published literature sourced from web-based search and collating site-specific site investigation data to assess the likelihood of environmental impacts.

The principal attributes (and effects on same) assessed include the following:

- Geological heritage sites in the vicinity of the perimeter of the subject site;
- Landfills, industrial sites in the vicinity of the site and the potential risk of encountering contaminated ground;
- The quality, drainage characteristics and range of agricultural uses of soil around the site;
- Quarries or mines in the vicinity, the potential implications (if any) for existing activities and extractable reserves;
- The extent of topsoil and subsoil cover and the potential use of this material on site as well or requirement to remove it off-site as waste for disposal or recovery;
- High-yielding water supply springs/ wells in the vicinity of the site to within a 2km radius and the potential for increased risk presented by the proposed development;
- Classification (regionally important, locally important etc.) and extent of aquifers underlying the site perimeter area and increased risks presented to them by the proposed development associated with aspects such as for example removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in groundwater quality;
- Natural hydrogeological/karst features in the area and potential for increased risk presented by the activities at the site; and
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporally.
- Potential for impact on water body status as identified in Water Framework Directive and River Basin Management Plans.

6.2.2 Sources of Information

Desk-based geological information on the substrata (both Quaternary deposits and bedrock geology) underlying the extent of the site was obtained through accessing databases and other archives where available. Data was sourced from the following:

-
- Geological Survey of Ireland (GSI) - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1: 100,000 mapping;
 - Teagasc soil and subsoil database;
 - Ordnance Survey Ireland - aerial photographs and historical mapping;
 - Environmental Protection Agency (EPA) – website mapping and database information;
 - National Parks and Wildlife Services (NPWS) – Protected Site Register; and
 - Tipperary County Council - illegal landfill information.
 - River Basin Management Plan for Ireland 2018-2021.
 - Draft River Basin Management Plan for Ireland 2022-2027.

Site specific data was derived from the following sources:

- Ground Investigation Report, River Suir Drainage Scheme, Clonmel, County Tipperary, Volume 2: Clonmel North & East. Interpretative Report no. Kc5218/2. Geotech Specialists Limited (May 2007);
- Site Investigation Report, Suir Infrastructure Links, Clonmel, Co. Tipperary. Site Investigations Limited (SIL) (April 2022);
- Outline Construction Environmental Management Plan (OCEMP) – Suir Infrastructure Links, Clonmel, Co. Tipperary. CSEA (March 2023);
- Various design site plans and drawings; and
- Consultation with site engineers.

6.3 Receiving Environment

The receiving environment is discussed in terms of land, geology, soils, hydrogeology and site history including potential for existing and historical contamination.

6.3.1 General Description of the Site

The Suir Island Infrastructure Links proposed development is located within Clonmel Town in County Tipperary. The site is located in the centre of Clonmel Town along the River Suir as shown in Figure 6-1. The site is zoned as amenity and social and public. It is currently partially developed. To the north it is almost fully bordered by the River Suir and the Clonmel Town. To the south of the site is a mainly residential with agricultural lands.

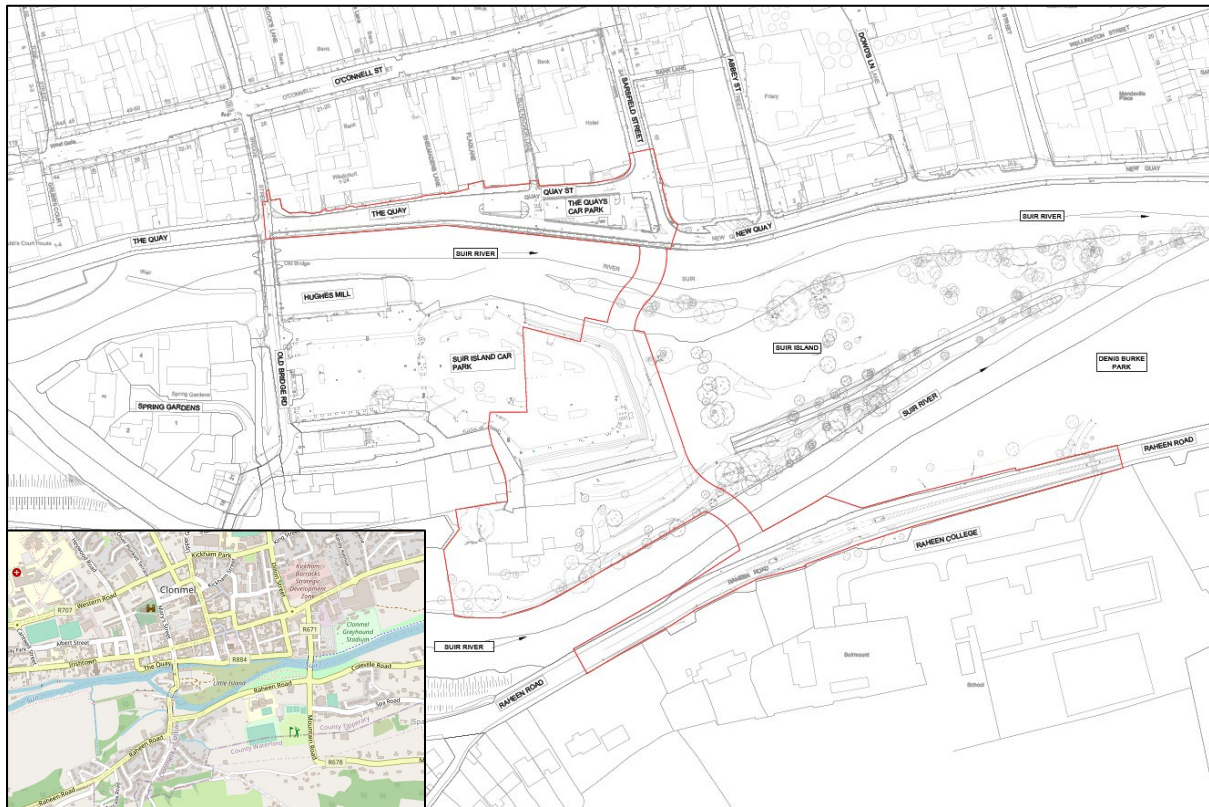


Figure Error! No text of specified style in document.-1: Site Location Map

6.3.2 Existing Land Use and Context

There are no licensed facilities within the site boundary of the proposed development site.

As the proposed development site is located in Clonmel Town Centre, there are a limited number of licenced facilities within a close proximity of the facility. These are referred to as follows:

- Bulmer's Limited (Dowd's Lane), Dowd's Lane, Clonmel, Tipperary (P0444-01). Located circa 0.06 km to the north of the proposed development site. The class of activity is classed as Commercial Brewing. The licence has been surrendered since 2015.

Consultation with Tipperary County Council has confirmed that there are no known illegal/historic landfills within 500 metres of the site.

Historical Ordnance Survey maps were examined during the preparation of this EIA Chapter. O.S. maps were available from 1830 (the historic 6" maps) and 1900 from the historic 25" maps. The historic maps indicate that the majority of the proposed development site was industrial and residential. Based on the historic 25" map, the proposed development site and surrounding areas was made up of a milk factory, a mill, a tannery and a range of residential buildings with lodges. In the 1995 map, the site was made up of a large building where the milk factory was located with some smaller buildings with a large greenfield / forested area. There was no dramatic change in the 2000 map. In 2005 – 2012 aerial photograph, it appears the smaller buildings around the larger building had been demolished as well as some woodland was cut down. Since the 2012 aerial photograph until present day the car park on Suir Island has been extended further to the east. Google Earth historical imagery shows the car park extension to be fully constructed and operational by 2019.

6.3.3 Soils

The GSI/ Teagasc mapping shows that the soil type beneath the local area is composed of Made Ground (urban) which is composed of concrete, tarmacadam. There are two other main soil groups in the area of the proposed development – coarse loamy drift with sandstones and river alluvium soils as presented in Figure 6-2 below.



Figure Error! No text of specified style in document.-2: Soils Map (Source: GSI, 2022)

6.3.4 Subsoils

The GSI/ Teagasc mapping database of the subsoils in the area of the subject site indicates four (4) no. principal soil types, as shown in Figure 6-3 below. The subsoil type present across the site and close to the proposed development site are:

- Urban (Urban). This subsoil type encompasses hardstanding areas associated with Clonmel Town.
- SANDSTONE till Carboniferous (TDSs). This subsoil type is located south of the Suir River. This till is made up of glacial CLAYs which are less permeable than alluvium subsoils.
- SANDSTONE till Carboniferous (TNSSs). This subsoil type is located north of the Suir River. This till is made up of glacial CLAYs which are less permeable than alluvium subsoils with sandstone and shales.
- Alluvium (A). This subsoil type denotes where the Suir River is located as well as its flood plain.

Two phases of site investigation inform the conceptual understanding of this site. These are described below.



Figure Error! No text of specified style in document.-3: Subsoils Map (Source: GSI, 2022)

6.3.5 2005/2006 Site Investigation Works

Previous site investigations were undertaken by Geotech Specialists Limited (Geotech) during November 2005 and March 2006 for proposed works in the River Suir Valley, Clonmel shown in Figure 6-4 below.

The scope of the investigation, which was specified by EGP, comprised the drilling of cable percussion, rotary cored boreholes, trial pits, slit trenches and in-situ testing together with geotechnical laboratory testing. The investigation was carried out in accordance with the contract specification and relevant standards. The fieldwork was carried out between the 23rd of November 2005 and the 24th of March 2006.

These investigations included the following:

- Rotary core drillholes (2 No.) with a maximum depth of 10 metres.
- Cable Percussion Boring (30 No.) with a maximum depth of 12.8 metres
- Trial Pits (19 No.) with a maximum depth of 4.2 metres.
- Silt Trenches (6 No.) with a maximum depth of 1.3 metres.
- Standpipes were installed in 12 no. locations.
- Groundwater monitoring
- Utility services surveying
- Surveying of 'as-built' exploratory locations

Site Investigation logs are included in **Appendix 6.2**, which include a description of the lithologies observed in site investigation location, assumed depth to bedrock, and any water strikes encountered during the excavations.

Samples were collected from the arisings from selected site investigation locations which were considered representative of the material observed at the sampling locations and were transferred

directly into laboratory-supplied containers. The containers were then clearly labelled to identify the sample location and depth. Standard sampling techniques were used to collect the samples, which are designed to reduce the risk of cross contamination between sampling events.

The locations of boreholes and trial pits from which representative samples were collected are presented Figure 6-4 below. Furthermore, the site investigation locations that are within or close to the vicinity of the proposed development are highlighted in a red box in the figure below.

Based on the 2005/2006 site investigations, the ground conditions encountered can be summarised as follows:

- Topsoil/ MADE GROUND
- Alluvium
- Glacial Deposits

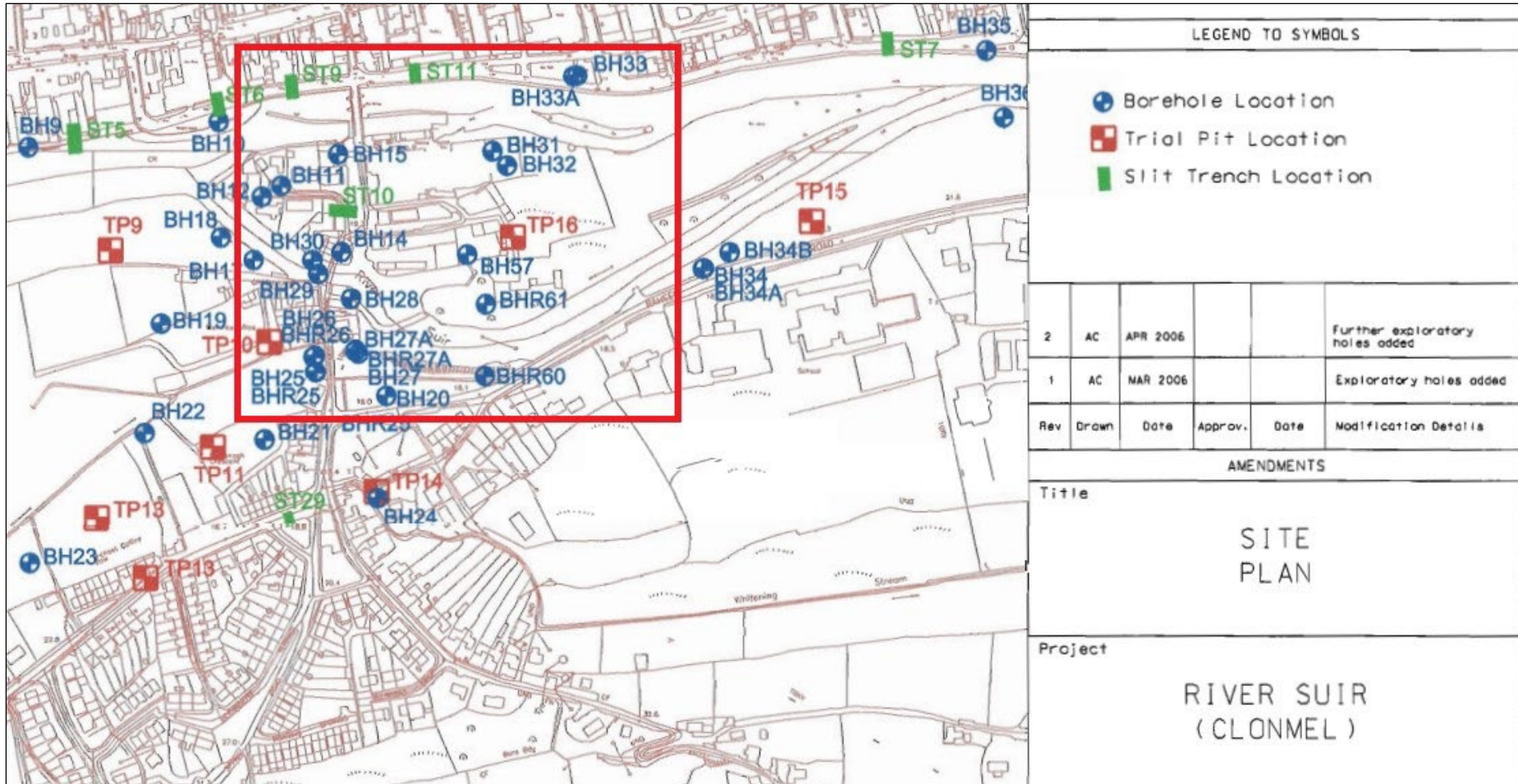


Figure Error! No text of specified style in document.-4: Site Investigation Points (Geotech, 2007), with the proposed development area highlighted with a red box.

Topsoil/ MADE GROUND

Topsoil was encountered across the site in the majority of the holes at thicknesses ranging from 0.15 to 1.74 metres although usually less than 0.5 metres was encountered. It is likely however that where topsoil was proven that this material is either a thin alluvial layer or as a consequence of filling. In this context naturally occurring topsoil would not normally be expected to be thicker than 600 mm.

Made Ground was encountered across the site, associated with various pavement constructions and where the ground had been raised for presumably construction purposes particularly close to the river. While up to 2.75 m (possibly 3.10 m) was encountered, typical thicknesses were less than 1.0 m. cohesive and granular layers were encountered. Indeed, only in Boreholes 32 and 33 was more than 1.0 m encountered.

Alluvium

Alluvium was encountered adjacent to the river on the flood plain but apparently only very close to the river channel itself and consequently was only found in four trial pits (TPs 21 and 23 to 25) which were located directly on the riverbanks. The materials were found to be predominantly cohesive but with local granular layers. It should be appreciated that the soils are assumed to be of alluvial origin based essentially on their low strength, as locally the materials are similar in grain size etc to the underlying glacial deposits.

Glacial Deposits

Both granular and cohesive glacial deposits were encountered across the site either below the Alluvium or presumably at the higher ground levels away from the river at virtually ground level that is below the topsoil. The granular deposits which are probably of fluvial-glacial origin represent the majority of the sequence. The cohesive deposits are probably a glacial till.

Bedrock was not proved or encountered during the site investigations to a depth of 12.8 metres below ground level.

Refer to Figure 6-4 above for locations of the site investigation locations. The selected borehole and trial pit logs from the 2007 Geotech investigations Report can be viewed in **Appendix 6.2**.

6.3.6 2022 Site Investigation Works

Most recent site investigations were undertaken by Site Investigations Limited (SIL) during March 2022 for proposed works under the Suir Island Infrastructure Links proposed development. The investigation was required due to the proposed works including 2 No. bridges over the River Suir.

The fieldworks comprised a programme of rotary boreholes, trial pits, slit trenches, road cores and dynamic probes. 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.

These investigations included the following:

- Rotary core drillholes (6 No.)
- Trial Pits (3 No.)
- Silt Trenches (4 No.)
- Road cores (2 No.)
- Dynamic Probes (3 No.)

The following ground conditions were encountered during the recent site investigations.

Made Ground

MADE GROUND was encountered across the site at each trial pit and slit trenches with granular fill recorded at TP01 and TP02 to the north of the river and TP04 recorded cohesive clay soils with some

concrete, timber, red brick and glass fragments. The depth of the fill material was not always reached with natural soils only recorded in TP02 at 1.05mbgl and ST04 at 1.20mbgl.

Overburden

The natural ground conditions recorded varied with granular GRAVEL recorded at TP02 at 1.05mbgl and a cohesive SILT soil recorded at ST04. The coreholes are difficult to log for soils due to the lack of returns but the driller reported a cohesive CLAY/SILT soil with some cobbles and boulders. The SPT tests vary across the site with N-values of 4 to 44 at 3.00mbgl and then 13 to 33 at 4.50mbgl and then continuing to increase as the coreholes progress.

Bedrock

Bedrock was recorded at depths ranging from 13.00mbgl to 19.30mbgl with no bedrock encountered at BH02 (21.00mbgl) and BH05 (18.50mbgl). The bedrock is a moderately weak light grey muddy LIMESTONE with fossils, thin calcite veins and a fresh to slightly weathered state. BH03 did record the LIMESTONE interbedded with moderately weak dark grey calcareous MUDSTONE. The discontinuities are rough, planar to slightly undulating, occasionally stepped, tight to open, sub-horizontal, 40° to 80° and sub-vertical dip, clean surfaces with occasional grey and brown staining.

Groundwater

Groundwater ingresses were recorded at all three trial pits at 1.20mbgl with a rapid ingress rate. Water was also recorded in ST01 at 1.00mbgl and was noted as heavy (rapid).

Site Investigation logs from 2022 are included in **Appendix 6.3**, which include a description of the lithologies observed in site investigation location, assumed depth to bedrock, and any water strikes encountered during the excavations.

Samples were collected from the arisings from selected site investigation locations which were considered representative of the material observed at the sampling locations and were transferred directly into laboratory-supplied containers. The containers were then clearly labelled to identify the sample location and depth. Standard sampling techniques were used to collect the samples, which are designed to reduce the risk of cross contamination between sampling events. Soil Quality is further discussed in **Section 6.3.9** below.

The locations of boreholes and trial pits from which representative samples were collected are presented Figure 6-5 below.

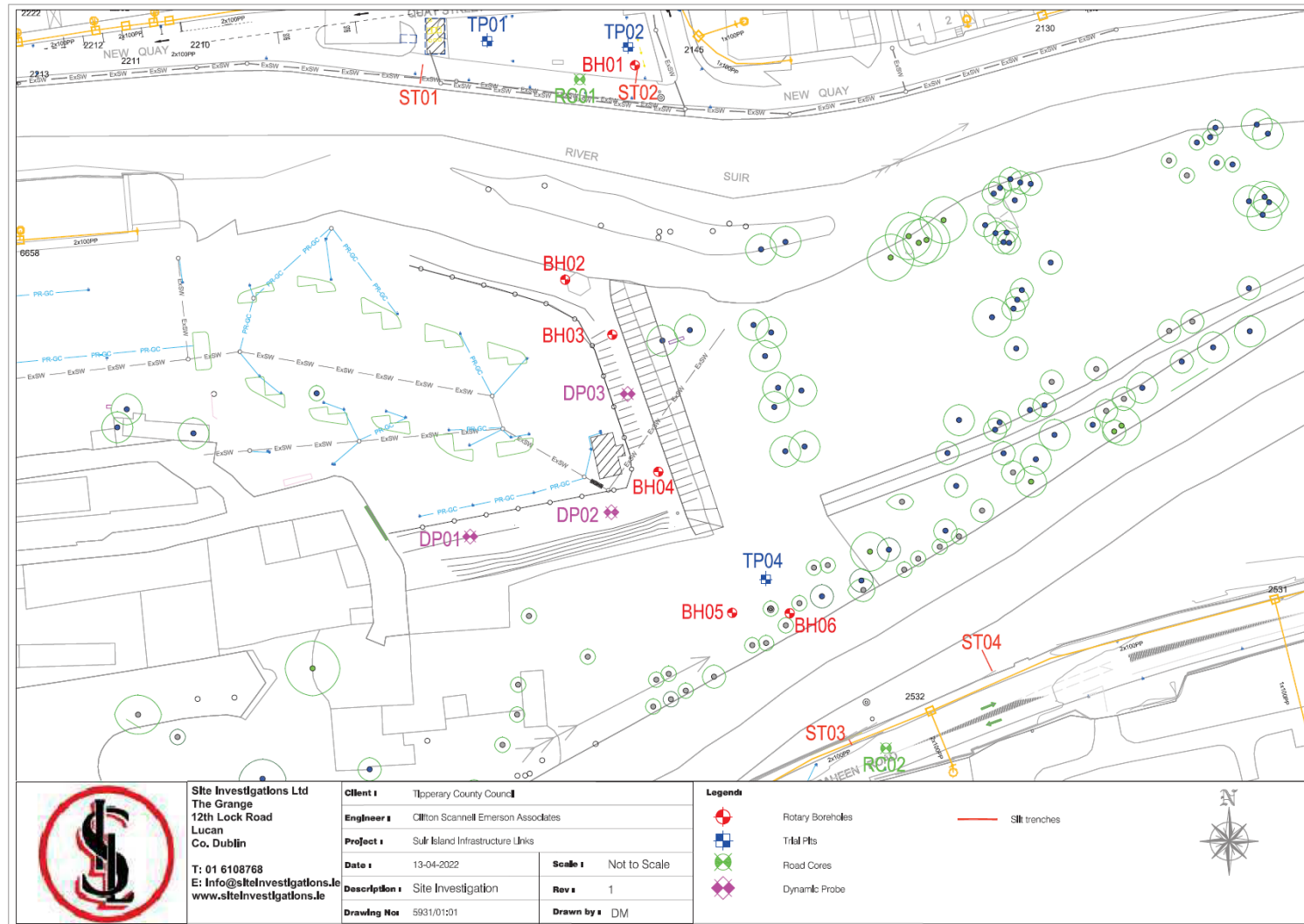


Figure Error! No text of specified style in document.-5: Site Investigation Points (SIL, 2022)

6.3.7 Bedrock Geology

Inspection of the available GSI (2022) records (Data Sheet 22 and on-line mapping database) shows that the bedrock geology of the site and the surrounding area is dominated by rocks from the Carboniferous Era in Dinantian in age and Devonian. The site is located in dark muddy limestone, shale referred to as the Ballysteen Formation (Rock Unit code: BA) (refer to Figure 6-6 below).

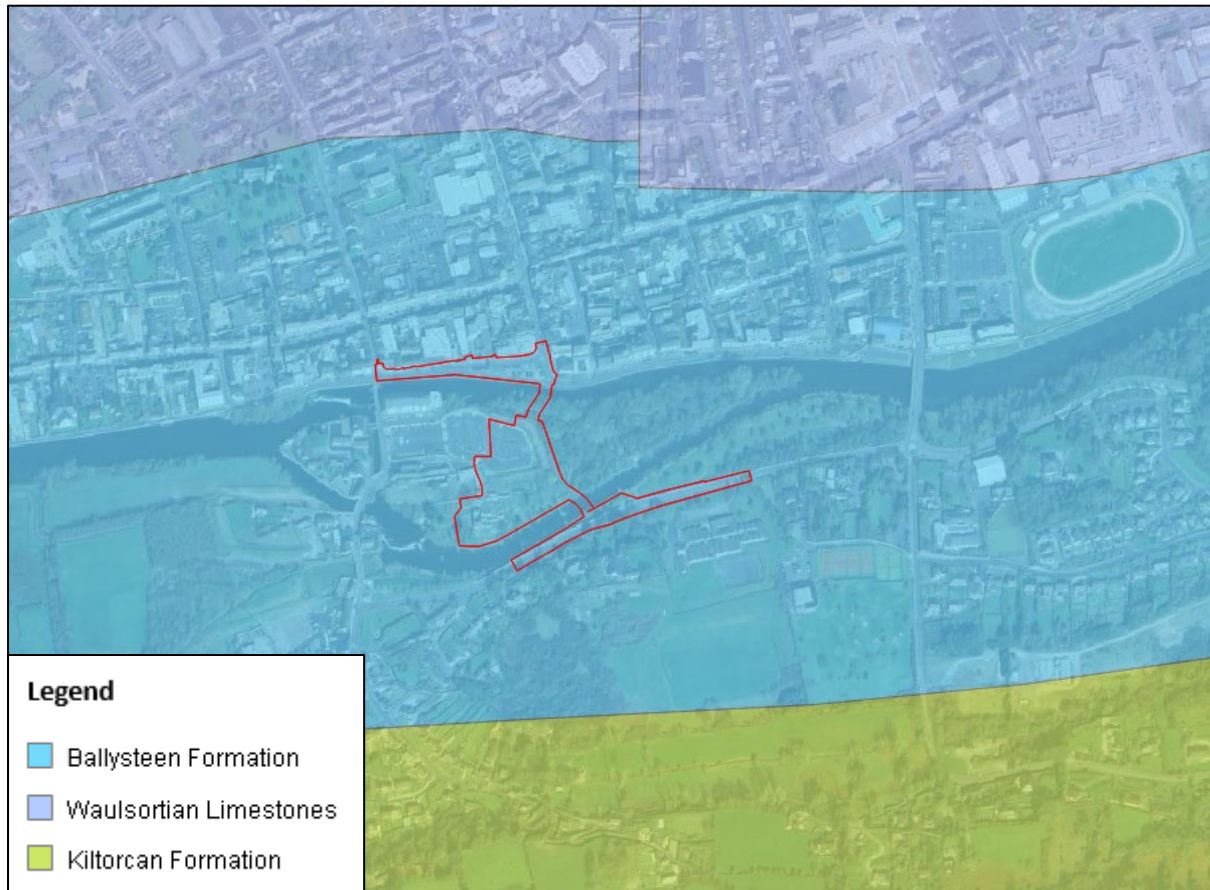


Figure *Error! No text of specified style in document.-6: Bedrock Geology Map* (Source: GSI, 2022)

The site is also located close to two (2) other geological formations. These are as follows:

- I. Kiltorcan Formation (DUKILT): Yellow & red sandstone & green mudstone.
- II. Waulsortian Limestones (CDWAUL): Massive unbedded lime-mudstone.

6.3.8 Regional Hydrogeology

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km²), well yield (m³/d), specific capacity (m³/d/m) and groundwater transmissivity (mm³/d). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (LI). Similarly, poor aquifers are classed as either generally unproductive except for local zones (PI) or generally unproductive (Pu).

GSI mapping has shown the site overlies a Locally Important Aquifer (LI) which is described as bedrock which is Moderately Productive only in Local Zones (refer to Figure 6-7 below). Furthermore, to the north and south of the River Suir lies Regionally Important Aquifers which are defined to be karstified (diffuse) and fissure, respectively.



Figure Error! No text of specified style in document.-7: Aquifer Classification Map (Source: GSI, 2022)

6.3.9 Aquifer Vulnerability

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures, the main feature that protects groundwater from contamination, and therefore the most important feature in protection of groundwater, is the subsoil (which can consist solely or of mixtures of peat, sand, gravel, glacial till, clays or silts).

The GSI currently classifies the aquifer vulnerability in the region as 'High to Moderate' with some areas classified as 'Extreme' (Figure 6-8). As can be seen from Table 6-1 below a 'High' vulnerability with clayey subsoil denotes a depth to bedrock of 3-5 m bgl with 'Extreme' vulnerability categorised as 0-3 mbgl. While 'Moderate' vulnerability is classified with 3-10 m bgl. However, based on the available site investigations, there is approx. 13 metres of overburden which is made up of approx. 1.20 metres of made ground (infill material). This MADE GROUND is overlying approx. CLAY/SILT overburden to depths of approx. 13 mbgl. This indicates a 'Moderate' to 'Low' aquifer vulnerability.

The aquifer vulnerability class in the region of the site is presented below as Figure 6-8.

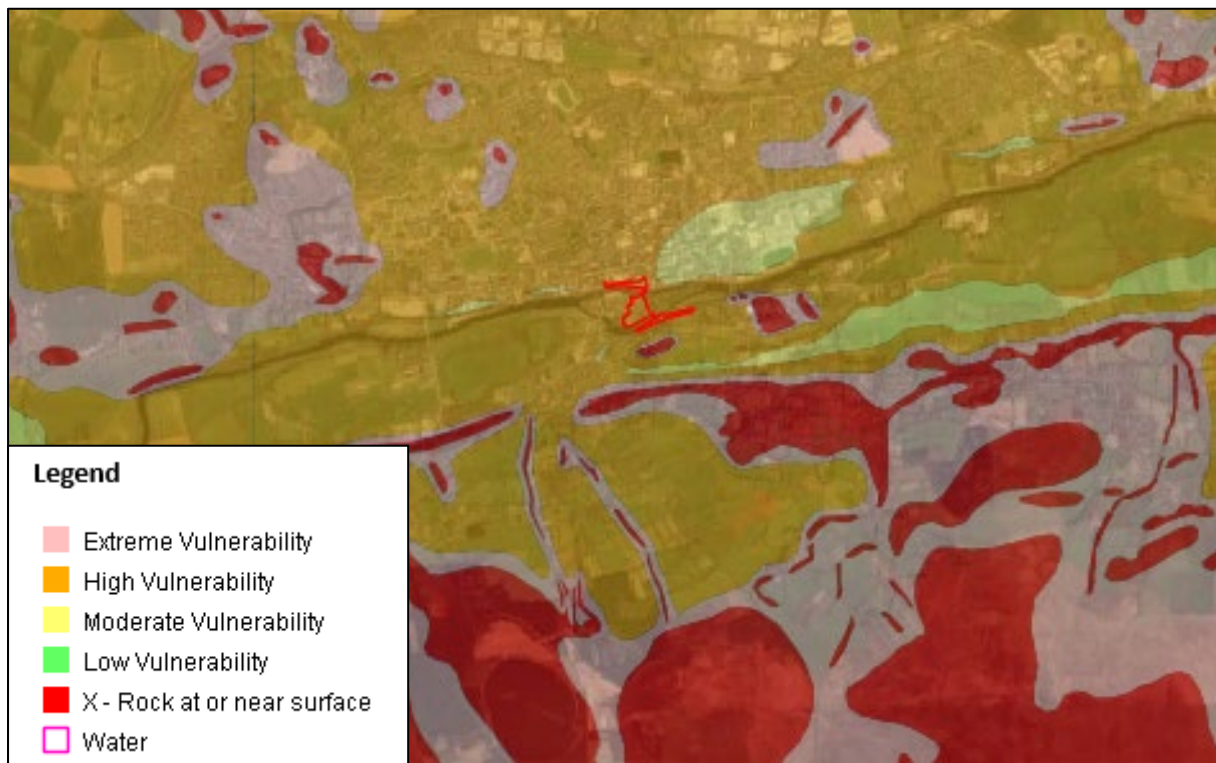


Figure Error! No text of specified style in document.-8: Aquifer Vulnerability Map (Source: GSI, 2022)

Table Error! No text of specified style in document.-1: Vulnerability Mapping Guidelines (Source: GSI, 2021)

Vulnerability Rating	Hydrogeological Condition				
	Subsoil Permeability (type) and Thickness			Unsaturated Zone	Karst Features
	High Permeability (sand/gravel)	Moderate Permeability (e.g., sandy subsoil)	Low Permeability (e.g., clayey subsoil, clay, peat)	(Sand/ gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3 m	0 - 3 m	0 - 3 m	0 - 3 m	-
High (H)	> 3 m	3 - 10 m	3 - 5 m	> 3 m	n/a
Moderate (M)	n/a	> 10 m	5 - 10 m	n/a	n/a
Low (L)	n/a	n/a	> 10 m	n/a	n/a

Notes: (1) n/a: Not applicable

(2) Precise permeability values cannot be given at present

(3) Release point of contaminants is assumed to be 1-2 below ground surface

Recent investigations carried out in 2022 by SIL confirmed bedrock was encountered. The bedrock was recorded at depths ranging from 13.00mbgl to 19.30mbgl with no bedrock encountered at BH02 (21.00mbgl) and BH05 (18.50mbgl). The bedrock is a moderately weak light grey muddy LIMESTONE with fossils, thin calcite veins and a fresh to slightly weathered state. BH03 did record the LIMESTONE interbedded with moderately weak dark grey calcareous MUDSTONE. The discontinuities are rough,

planar to slightly undulating, occasionally stepped, tight to open, sub-horizontal, 40° to 80° and sub-vertical dip, clean surfaces with occasional grey and brown staining.

6.3.10 Groundwater Wells and Flow Direction

The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in the Republic of Ireland. This current index does not show any wells drilled or springs at the site or surrounding area, with the nearest recorded well (GSI Name – 2011NE035) located 0.07 km to the north of the proposed development site (associated with the town of Clonmel which was drilled in 1962). This well was drilled to 15.2 metres and bedrock was encountered at 14 metres. It was noted on the registry as being used for domestic purposes. However, it is assumed that this well is now redundant as the town of Clonmel is serviced by public water mains. The area is serviced by Local Authority mains therefore it is unlikely that any wells are used for potable supply. The site is not located near any public groundwater supplies or group schemes. There are no groundwater source protection zones in the immediate vicinity of the site. The closest groundwater supply well is approx. 2.6 km to the south-east (Poulnagunoge PWS) and the proposed site is outside of the zone of contribution of this supply as it falls outside the outer protection area of this groundwater source, as delineated by GSI.

Figure 6-9 below presents the GSI well search for the area surrounding the site (note this source does not include all wells) and Table 6-2 below summarises the details of recorded wells present within this search area.

Regional groundwater flow would most likely be to the east to north-east based on the flow of the River Suir.

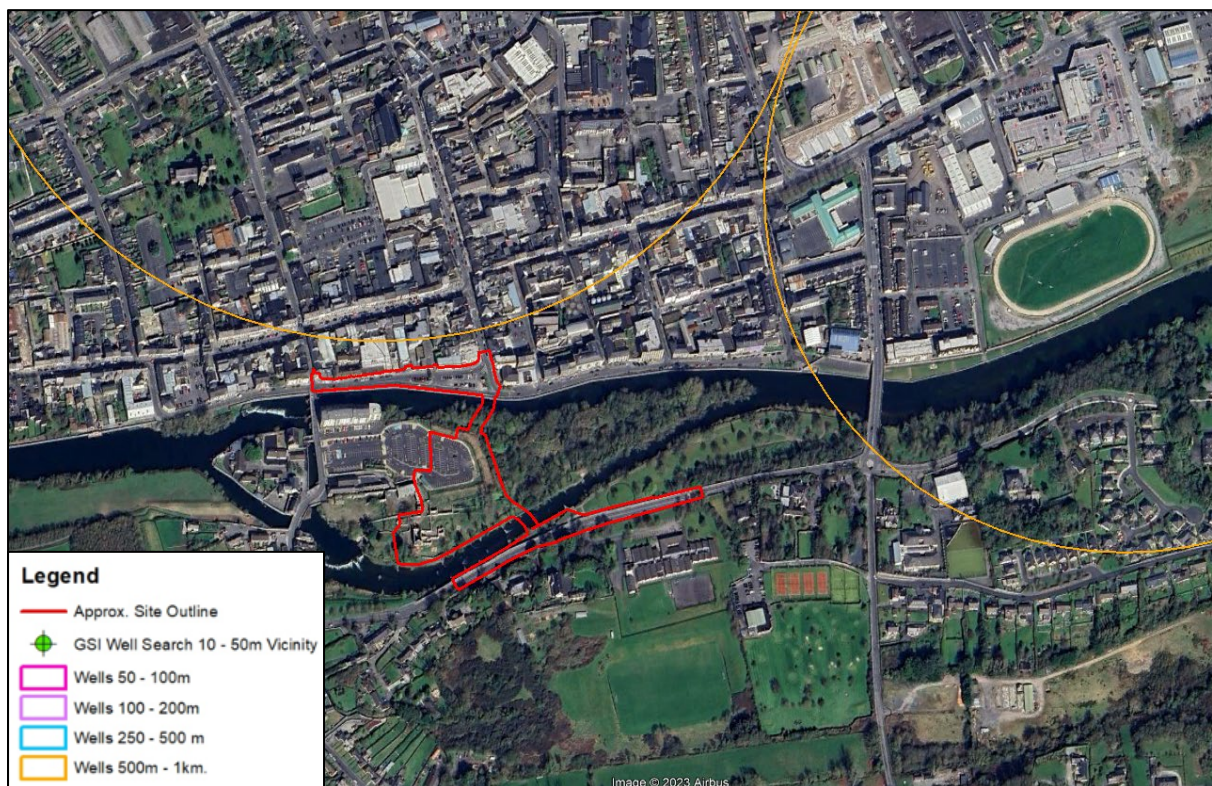


Figure Error! No text of specified style in document.-9: GSI Well Search Map (Source: GSI, 2022)

Table Error! No text of specified style in document.-2: GSI Well Card Index (Source: GSI, 2022)

GSI NAME	TYPE	Depth (m)	Depth to Rock (m)	Date	EASTING	NORTHING	Townland	Use	Yield Class	Yield (m ³ /d)
2011NEW022	Borehole	16.7	16.7	1970	221120	122460	CLONMEL	Domestic use only	Moderate	81.7
2011NEW035	Borehole	15.2	14	1962	220300	122800	CLONMEL	Domestic use only	Good	131

6.3.11 Soil Quality

In total, thirteen (13) no. soil samples were collected throughout the site investigations carried out by Geotech in 2007. However, only one (1) no. soil sample was collected within the proposed development site. This soil sample was collected from TP16 from a depth of 0.4 metres below ground level. This sample was analysed for a range of parameters to examine the soil quality and to investigate any present and/or past contamination.

The soil sample was analysed for the following parameters:

- A range of metals and inorganics;
- Polycyclic aromatic hydrocarbons; and,
- Phenols.

The soil results were compared to the available Generic Assessment Criteria (GAC) concentrations. GACs are soil concentrations that have been derived for a defined set of generic assumptions and are used as trigger values in determining whether further risk management action is required in cases where detailed quantitative risk assessment is not being undertaken. There are no published Generic Assessment Criteria for soils in the Republic of Ireland. Instead, reliance is often placed on criteria from the UK and the Netherlands. Soil sample analysis are summarised below. The table below (Table 6-3) exhibit the soil quality compared to the available guidelines.

Table **Error! No text of specified style in document.-3**: Soil Quality Summary for the soil sample collected at TP16 (Geotech, 2007)

AWN CONSULTING			Sample ID	TP16
			Sample Depth (m)	0.40
			Sample Date (Year)	2006
Parameters	Units	LQM/CIEH S4ul for HHRA Residential Threshold (mg/kg)	LQM/CIEH S4ul for HHRA Commercial Threshold (mg/kg)	
Arsenic	mg/kg	40	640	5.5
Cadmium	mg/kg	85	190	0.47
Chromium	mg/kg	910	8,600	8.9
Copper	mg/kg	7,100	68,000	9.5
Lead	mg/kg	nv	nv	53.9
Mercury	mg/kg	1.2	58 ^{vap} (25.8)	<0.1
Nickel	mg/kg	180	980	13.2
Selenium	mg/kg	430	12,000	0.56
Zinc	mg/kg	40,000	730,000	45.6
Natural Moisture Content	%	nv	nv	14.6
pH	pH units	nv	nv	8.4
Phenol	mg/kg	750	760 (31000)	<0.1
PAH MS				
PAH Screening	mg/kg	nv	nv	59
<u>Legend</u>				
0.45 Results exceed LQM/CIEH S4ul for HHRA Residential Threshold <u>without</u> homegrown produce at 1% SOM (mg/kg)				
0.45 Results exceed LQM/CIEH S4ul for HHRA Commercial Threshold <u>at</u> 1% SOM (mg/kg)				
nv Guideline threshold value not available. Note for PAH Screening Total PAH values used eg none available				
<u>Notes</u>				
HHRA 2015 - LQM/CIEH Sutable 4 Use Levels based on 'Commercial' and/or 'residential' land use using 1% SOM. Metals are compared against a 6% SOM				
Sol : sol S4UL presented exceed the solubility saturation limit, which is presented in brackets				
Vap: vap S4UL presented exceed the vapour stauration limit which is presented in brackets				

Summary of Soil Quality

Soil quality is considered to be free of contamination as there was no contamination encountered. There are minor concentrations of hydrocarbons, and heavy metals. However, concentrations are below the available LQM/CIEH for HHRA Residential Threshold at 1% SOM, where available.

Furthermore, more recent site investigations are planned prior to the commencement of any construction works. This will aid in the disposal options of the many materials that are being disposed off-site.

During the most recent site investigations carried out by SIL (2022), environmental testing was carried out on six (6) no. samples. For material to be removed from site, Suite I (Rilta Suite) 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 created using HazWasteOnline™ software shows that the material tested can be classified as non-hazardous material. Two samples did detect total petroleum hydrocarbons above the limit of detection but the level was low and not in the liquid phase so the soils can be classified as non-hazardous. ”

Following this analysis of the solid test results, the leachate results generally remained within the Inert thresholds. Six 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 facilities before acceptance to reuse, recovery, recycling and / or disposal facilities, and a testing regime designed by an environmental engineer would be recommended to satisfy the facilities.

6.3.12 Groundwater Quality

6.3.12.1 Regional Scale

The Water Framework Directive (WFD) 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present. 'Good Status' was to be achieved in all waters by 2015, as well as maintaining 'high status' where the status already exists. The EPA co-ordinates the activities of the River Basin Districts, local authorities and state agencies in implementing the directive, and operates a groundwater quality monitoring programme undertaking surveys and studies across the Republic of Ireland.

Presently, the groundwater body in the region of the site Clonmel GWB (IE_SH_G_014) is classified under the WFD Risk Score system (EPA, 2021) as 'Good' and 'Under Review'. The GWB was given a classification of "Good" for the last WFD cycle (2013-2018).

6.3.12.2 Site-Specific Groundwater Quality

There is no available groundwater quality for the proposed development site. However, based on the absence of soil contamination on the site, it can be assumed that the groundwater quality is of good quality.

6.3.13 Economic Geology

The GSI (2021) mineral database was consulted to determine whether there were any mineral sites close to the study area. The closest active quarry is located approx. 8.10 km north-east of the proposed

development site – Ballyknockane Pit Quarry (TY014). This is a sand and gravel quarry which produces RMC, concrete sand, plastering sand, blocks, aggregates, general fill.

6.3.14 Geological Heritage

The Geological Survey of Ireland (GSI) Public Viewer (www.gsi.ie/mapping) was reviewed to identify sites of geological heritage for the site and surrounding area. The Marfield – holy well site (Site Code TY049) located approx. 4 km west is the closest audited site.

6.3.15 Radon

According to the EPA (now incorporating the Radiological Protection Institute of Ireland), at the proposed development site location it is estimated that about 1 in 10 homes in this area are likely to have high radon levels exceeding the Reference Level of 200 Bq/m³.

6.3.16 Geohazards

Much of the Earth's surface is covered by unconsolidated sediments which can be especially prone to instability. Water often plays a key role in lubricating slope failure. Instability is often significantly increased by man's activities in building houses, roads, drainage and agricultural changes. Landslides, mud flows, bog bursts (in Ireland) and debris flows are a result. In general, Ireland suffers few landslides. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff and leads to recession of the cliffs. Landslides have also occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities. The GSI landslide database was consulted and the nearest landslide to the proposed development was c. 9.00 km to the north-east of the proposed development site, referred to as the Ballypatrick Event. There have been no recorded landslide events at the site. Due to the local topography and the underlying strata, there is a negligible risk of a landslide event occurring at the site.

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics at the Dublin Institute for Advanced Studies (DIAS) has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. Currently there are five permanent broadband seismic recording stations in Ireland and operated by DIAS. The seismic data from the stations comes into DIAS in real-time and are studied for local and regional events. Records since 1980 show that the nearest seismic activity to the proposed location was in the Irish sea (1.0 – 2.0 MI magnitude) and ~100 km to the south-west in County Clare. There is a very low risk of seismic activity to the proposed development site.

There are no active volcanoes in Ireland so there is no risk from volcanic activity.

6.3.17 Areas of Conservation

According to the NPWS (2021) on-line database there are a number of areas of conservation on or in the vicinity of the subject site. The closest European and National listed sites are as follows;

- Lower River Suir Special Area of Conservation – SAC (Site code 002137), located within the proposed development site.
- Marfield Lake proposed National Heritage Area (pNHA) (site code: 001981), located 2.50 km west.
- Nier Valley Woodlands SAC and pNHA (Site code: 001952), located c. 8.77 km south-east.
- Comeragh Mountains SAC and pNHA (Site code: 001952), located c. 11.37 km south-east.

There are direct hydrological links to some of these Natura 2000 sites, notably the Lower River Suir SAC which borders the proposed development site.

6.3.18 Conceptual Site Model

The subsoil underlying the site is classified as alluvium by the GSI and the underlying limestone aquifer (*Locally Important aquifer*) has a 'Moderate' to 'Low' vulnerability across the proposed development site based on recent onsite investigations.

Most recent site investigations were undertaken by Site Investigations Limited (SIL) during March 2022 for proposed works in the Suir Island Infrastructure Links proposed development. The investigation was required due to the proposed works including 2 No. bridges over the River Suir.

The fieldworks comprised a programme of rotary coreholes, trial pits, slit trenches, road cores and dynamic probes. 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.

These investigations included the following:

- Rotary core drillholes (6 No.)
- Trial Pits (3 No.)
- Silt Trenches (4 No.)
- Road cores (2 No.)
- Dynamic Probes (3 No.)

The following ground conditions were encountered during the recent site investigations.

Made Ground

MADE GROUND was encountered across the site at each trial pit and slit trenches with granular fill recorded at TP01 and TP02 to the north of the river and TP04 recorded cohesive clay soils with some concrete, timber, red brick and glass fragments. The depth of the fill material was not always reached with natural soils only recorded in TP02 at 1.05mbgl and ST04 at 1.20mbgl.

Overburden

The natural ground conditions recorded varied with granular GRAVEL recorded at TP02 at 1.05mbgl and a cohesive SILT soil recorded at ST04. The coreholes are difficult to log for soils due to the lack of returns but the driller reported a cohesive CLAY/SILT soil with some cobbles and boulders. The SPT tests vary across the site with N-values of 4 to 44 at 3.00mbgl and then 13 to 33 at 4.50mbgl and then continuing to increase as the coreholes progress.

Bedrock

The bedrock was recorded at depths ranging from 13.00mbgl to 19.30mbgl with no bedrock encountered at BH02 (21.00mbgl) and BH05 (18.50mbgl). The bedrock is a moderately weak light grey muddy LIMESTONE with fossils, thin calcite veins and a fresh to slightly weathered state. BH03 did record the LIMESTONE interbedded with moderately weak dark grey calcareous MUDSTONE. The discontinuities are rough, planar to slightly undulating, occasionally stepped, tight to open, sub-horizontal, 40° to 80° and sub-vertical dip, clean surfaces with occasional grey and brown staining.

Groundwater

Groundwater ingresses were recorded at all three trial pits at 1.20mbgl with a rapid ingress rate. Water was also recorded in ST01 at 1.00mbgl and was noted as heavy (rapid).

Site Investigation logs from 2022 are included in **Appendix 6.3**, which include a description of the lithologies observed in site investigation location, assumed depth to bedrock, and any water strikes encountered during the excavations.

Samples were collected from the arisings from selected site investigation locations. As described in section 6.3.11, results indicate that the soil is suitable for disposal off site to a non-hazardous facility.

Review of the hydrogeology and geology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, Council Water Supplies/ Group Water Schemes or geological heritage sites which could be impacted by this development. No evidence of disposal of waste material was identified in the location area proposed for excavation. Collection and analysis of the soil sample for a wide range of parameters shows no evidence of contamination.

However, it should be noted that the Lower Suir River SAC is within the proposed site. This Natura Site is a protected site and there is a direct hydrological link due to distance to the site. A local cross section can be seen in Figure 6-10 below.

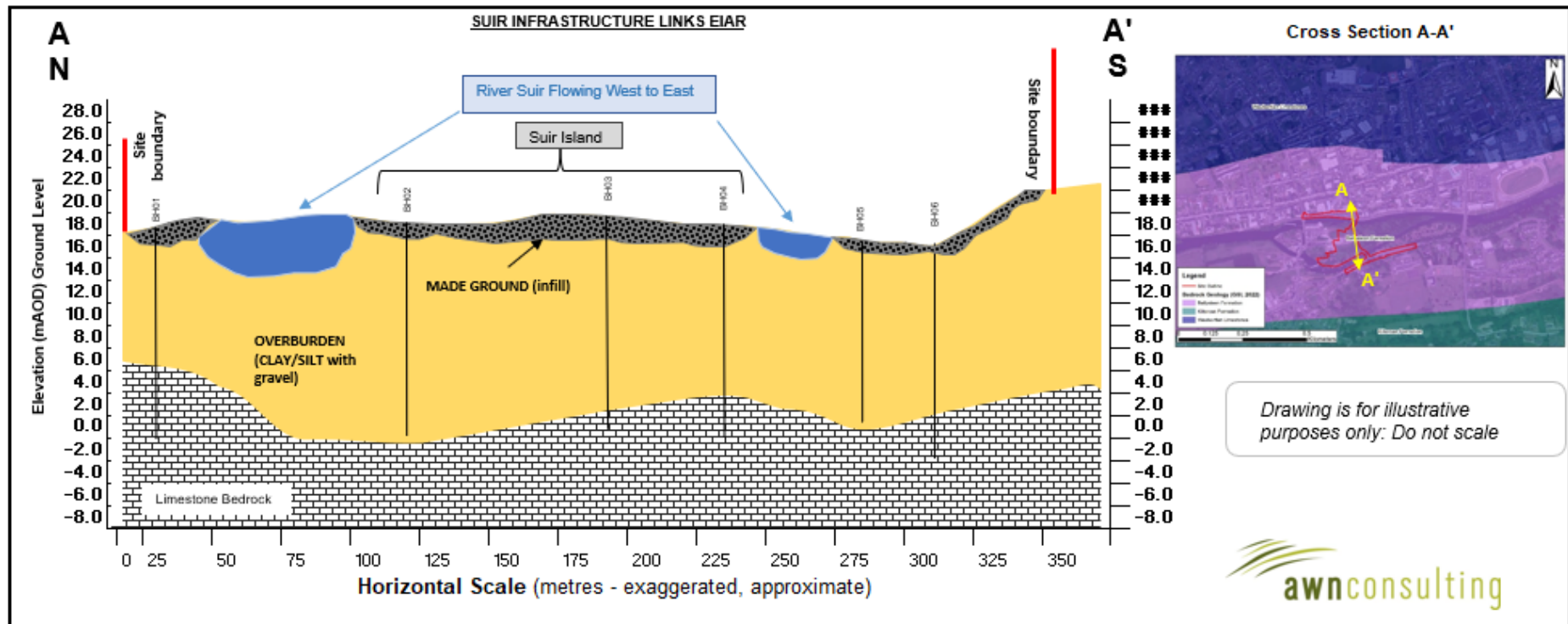


Figure Error! No text of specified style in document.-10: Local Cross Section based on available data and site investigations

6.3.19 Rating of Importance of Geological and Hydrogeological Attributes

Based on the TII methodology (2009) (See **Appendix 6.1**), criteria for rating site importance of geological features, the importance of the bedrock and soil features at this site is rated as '*Low importance*' with low significance or value on a local scale. This is due to the existence of poorly drained and/or low fertility soils within the proposed development site.

Based on the TII methodology (2009) (See **Appendix 6.1**) the importance of the hydrogeological features at this site is rated as '*Extremely High importance*' based on the assessment that the attribute has a high-quality significance or value on a local scale. The aquifer is a Locally Important Aquifer but is not widely used for public water supply or generally for potable use. In addition, there is a direct hydrogeological connection between the site and any protected sites (SAC, SPA, NHA).

6.4 Characteristics Of The Proposed Development

The development design includes two (2) no. pedestrian bridges for this proposed development, the first bridge linking the proposed North Plaza to Suir Island, and the second bridge connecting Suir Island to Raheen Road as well as other associated works for the proposed development. A more detailed description is provided in Chapter 2 Project Description & Planning Policy Context.

The details of the construction and operation of the development in terms of Land, Soils Geology and Hydrogeology is detailed in Table 6-4 below.

Table Error! No text of specified style in document.-4: Summary of site activities

Phase	Activity	Description
Construction	Discharge to Ground	Run-off percolating to ground at the construction site.
	Earthworks and excavations	<p>Excavations and infilling across the site are required for the site preparation and levelling works, to achieve foundation level and facilitate construction.</p> <p>Based on the site investigations and data available, there is no known contamination present on site. Environmental testing was carried out on six (6) no. samples from the site investigations carried out by SIL (SIL, 2022). For material to be removed from site, Suite I (Rilta Suite) 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. However, as there is evidence of infill material, any material required to be removed from site will be stockpiled separately and subsequently sampled to ensure appropriate disposal.</p> <p>It is proposed that 2,000m³ of material will be excavated as part of the proposed development. It is estimated that approximately 500m³ of material will be reused for fill material on the existing flood protection berm located on Suir Island. This material will be sourced from the proposed North Plaza site area and/or Raheen Road. Furthermore, it is estimated that 1,500m³ will be removed off-site, due to the limited opportunities for reuse on site, while approx. 2,000m³ will be imported on-site to be used as engineered fill material. The surplus of excavated material from the excavations will be disposed off-site to licenced facility by a licenced contractor.</p>
	Storage of soils/aggregates	<p>Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a compound area to prevent contamination.</p> <p>Temporary storage of spoil will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment and solid matter. Materials will be sent off site for recycling where possible and, if not suitable for recycling, materials will be disposed of to an appropriate permitted/licensed waste disposal facility.</p>
	Storage of hazardous Material	Temporary storage of fuel required on-site for construction traffic. Liquid materials i.e., fuel storage will be located within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications - BS8007-1987) to prevent spillage.
Import/Export of Materials	<p>It has been estimated that 500m³ of the excavated soil that will be generated for this development will be reused as backfilling. Approx. 2,000m³ will be imported on-site to be used as engineered fill material.</p> <p>Any material removed from site may be re-used offsite for beneficial use on other sites with appropriate planning/waste permissions/derogations</p>	

		(e.g., in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011) as amended or will be reused, recovered and/or disposed off-site at appropriately authorised waste facilities. The removal of waste from the site will be carried out in accordance with Waste Regulations, Regional Waste Plan (Eastern Midland Region) and Waste Hierarchy/Circular Economy Principals. Refer to Chapter 13 Waste Management for further detail.
	Dewatering	There will be a requirement for dewatering of groundwater during the construction phase due to the presence of perched water table within the made ground and overburden units.
	Bridge Construction	It is proposed to construct the proposed development by piles and pile caps followed by the construction of reinforced concrete piers and abutments. This will be followed by the construction of land bridge superstructure sections on supports. Cased piles will be used to prevent the use of bentonite and will be cast using ready-mix concrete trucks transported to site and pumped into the casings due to restricted access for concrete trucks. No batching plants will be allowed on site. Refer to CSEA report (RPT-20_071-020) – Construction Methodology Suir Island Infrastructure Links (2022) for further details on the construction methodology.
Operation	Increase in hard standing area	The proposed development will result in minimal increase in hardstanding (3,125 m ²) as the majority of the proposed development will be located on already hardstanding area.
	Storage of hazardous Material	During operation measures there is no requirement for bulk fuels or chemical storage, no requirement for discharge to ground and no requirement for abstraction of groundwater.

As outlined in Table 6-4 above the activities required for the construction phase of the proposed development represents the greatest risk of potential impact on the geological and hydrogeological environment. These activities primarily pertain to the site preparation, excavation, and infilling activities required to facilitate construction of the proposed development.

6.5 Potential Impacts Of The Proposed Development

An analysis of the potential impacts of the proposed development on the land, soils, geology and hydrogeological environment during the construction and operation is outlined below. Due to the inter-relationship between soils, geology and hydrogeology and surface water (hydrology) the following impacts discussed will be considered applicable to both Chapter 6 and 7 (Hydrology) of the EIAR. Design and mitigation measures included in the design of this project to address these potential impacts are presented in **Section 6.6** below.

6.5.1 Construction Phase

6.5.1.1 Excavation and Infilling

Due to the nature of the existing development at the site and assessment of SI data, the risk of contaminated soils being present onsite is *low*. However, it is noted that the presence of made ground potentially contains contaminated material. Any made ground excavated on site shall 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 facilities before acceptance to reuse, recovery, recycling and / or disposal facilities. As it is estimated that 1,500m³ of soil will be removed off-site as not suitable

for engineering fill, there is a potential for contamination offsite if adequate assessment is not undertaken to determine suitability for reuse or licenced disposal.

As 2,000 m³ of soil will be imported on-site for engineered fill material, there is a potential for import of contaminated soil if adequate assessment of source of material is not undertaken.

It is expected during the excavation works that localised dewatering of subsoils will be required to address perched groundwater and ingress of rainfall in the excavation during construction phase.

6.5.1.2 Accidental Spills and Leaks

As with all construction projects there is potential for water (rainfall and/or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant short-term risk to groundwater quality for the duration of the construction if contaminated water is allowed percolate to the aquifer. The potential main contaminants include:

During construction of the development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials and piling works;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

Accidental spillages which are not mitigated may result in localised contamination of soils and groundwater underlying the site, should contaminants migrate through the subsoils and impact the underlying groundwater.

Groundwater vulnerability at the site is currently classified as ‘Moderate’ to ‘High’ across the site. Any soil stripping will further reduce the thickness of subsoil and the natural protection they provide to the underlying aquifer.

6.5.1.3 Summary of the Construction Phase Impacts

A summary of construction phase impacts for the proposed development (without mitigation) following EPA (2022) EIA guidelines is provided below.

The magnitude of the impact for the construction phase without mitigation is *short-term* in duration with *Slight impact* rating to the underlying subsoil and aquifer present across the proposed development site.

However, with the implementation of mitigation measures (see **Section 6.6** below) for the proposed development site the impact of the construction phase is *short-term* in duration with an *Imperceptible impact* rating.

6.5.2 Operational Phase

6.5.2.1 Change in the groundwater flow regime

There are no discharges to ground included in the design and no abstractions from the aquifer. Piling as it is not a contiguous barrier will not interfere with the natural groundwater regime or result in any long-term impacts on land soils and geology

6.5.2.2 Increase in hardstanding

The proposed development will result in minimal increase in hardstanding (3,125 m²) as the majority of the proposed development will be located on already hardstanding area. The Quays and Raheen Rd consist of existing hardstanding areas that drain to the river either with existing drainage systems or overland flow. The existing surface water drainage system in the Suir Island Carpark consists of multiple pipelines, ranging from 225mm to 450mm in diameter and drains to manhole SI-01. A 600mm diameter pipeline is connected to manhole SI-01 which discharges into the Little Island Mill Race. On Drawing A5243-C066, a connection is shown to the existing surface water pump station via a 450mm diameter pipeline and indicates that the pumping station discharges into the Little Island Mill Race via a 300mm diameter ductile-iron pipeline. The as-built drawings are included in Appendix B of the Engineering Planning Report. (RPT-20_071-059). The proposed surface water drainage service to the development comprises various drainage components including positive stormwater networks, attenuation systems and several Sustainable Drainage Systems (SuDS) elements as highlighted in Engineering Report. The proposed surface water drainage was designed in accordance with the SuDS Manual 2015. The impact on the overall groundwater regime will be insignificant considering the proportion of the site area capped in relation to the total aquifer area.

6.5.2.3 Accidental Spill and Leaks

The development does not include any bulk storage and use of diesel fuel therefore there is no potential for any long-term deleterious impact on the underlying waterbody. There is potential of a small leak from vehicles during operation of the development which has the potential to have water quality impacts if a leak/ spill occurs and is not adequately mitigated. Any accidental leakage in the car parks could cause localised contamination if the emissions enter the soil and groundwater environment without adequate mitigation. However, it is noted that any accidental discharge will be collected in stormwater drainage due to the hardstand and drainage infrastructure proposed and any releases to drainage will be mitigated through petrol interceptors. As such there is only a potential for a temporary localised impact on the underlying soils and groundwater with no potential for an off-site impact or deterioration in waterbody status.

6.5.2.4 Water Framework Directive

In terms of the operational phase, this assessment has considered the current water status of the underlying aquifer (**Section 6.3.10** above), and potential impacts have been considered (**Section 6.5** above). With mitigation measures (**Section 6.6** below) in place, it is concluded there will be no degradation of the current water body (chemically, ecological and quantity) or any impact on its potential to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

There are appropriately designed mitigation and design measures which will be implemented during the construction phase to protect the hydrogeological environment. There is a potential of accidental discharges during the construction and operational phases, however these are temporary short-lived events that will not impact on the water status of underlying aquifer long-term and as such will not impact on trends in water quality and overall status assessment.

The project-specific CEMP which the works Contractor will develop will implement strict mitigation measures to ensure the protection of the hydrogeological environment during construction which will ensure that there will be no negative impact on the quantitative or qualitative of the underlying aquifer.

Overall, the potential effects on the WFD status to the waterbodies are considered *Neutral, Imperceptible to Not Significant* and *Temporary*.

6.5.2.5 Summary of the Operational Phase Impacts

A summary of operational phase impacts for the proposed development (with and without mitigation) following EPA (2022) EIA guidelines is provided below.

The magnitude of the impact for the operational phase without and without mitigation and design measures is *Long-term* in duration with *Imperceptible impact* rating to the underlying soil and aquifer present across the proposed development site.

6.6 Remedial And Mitigation Measures

The design has taken account of the potential impacts of the development on the land, soils, geology, and hydrogeology environment local to the area where construction is taking place and containment of contaminant sources during operation. Measures have been incorporated in the design to mitigate the potential effects on the surrounding soils, geology, and hydrogeology.

Due to the inter-relationship between soils, geology, hydrogeology and hydrology, the following mitigation measures discussed will be considered applicable to all. Waste Management is also considered an interaction in some sections.

6.6.1 Construction Phase

In order to reduce impacts on the soils and geology environment, a number of mitigation measures will be adopted as part of the construction works on site. The measures will address the main activities of potential impact which include:

- Control of soil excavation and export from site;
- Fuel and chemical handling, transport and storage; and
- Control of water during construction.

6.6.1.1 Construction Management Plan

As part of the EIAR, an Outline Construction Environmental Management Plan (OCEMP) has been prepared for the proposed development. The works Contractor will prepare a detailed Construction Environmental Management Plan (CEMP) prior to commencement of work. The detailed CEMP will set out the overarching vision of how the construction of the proposed development will be managed in a safe and organised manner by the Contractor. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent planning conditions/restrictions relevant to the proposed development.

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

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
- BPGCS005, Oil Storage Guidelines;
- Inland Fisheries Ireland (IFI), (2016), Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;
- CIRIA 697, The SUDS Manual, 2015; and
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

6.6.1.2 Control of Soil Excavation

Site preparation, excavations and levelling works are required to facilitate the construction of the two pedestrian bridges, construction of path/ promenade, bike cycle path, road improvements, landscape works and associated works. Excavated soils will be disposed off-site to a licenced facility by a licenced contractor. Contractors shall be required to submit and adhere to a method statement indicating the extent of areas likely to be affected and demonstrating that this is the minimum disturbance necessary to achieve the required works.

According to onsite investigations, the bedrock vulnerability is 'Moderate' to 'High' across the proposed development site. The deposition of infill soil would increase the overburden thickness and thus may even decrease the groundwater vulnerability. Furthermore, the proposed development will be covered by concrete and other impermeable material which will act as a protective layer to the underlying geology and bedrock.

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust. All excavated material will be temporarily stored adjacent to the trench prior to disposal off-site.

Although there is no evidence of historical contamination in the proposed development area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Site investigations classified the subsoils as 'inert'. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the site and the direct link or pathway from this area to any surface water will be minimised through the use of silt fencing etc as appropriate. Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible.

6.6.1.3 Sources of Fill and Aggregates

It is estimated that 2000 m³ of imported fill and aggregates will be required, all fill and aggregate for the proposed development will be sourced from reputable suppliers. All suppliers will be vetted for:

- Aggregate compliance certificates/declarations of conformity for the classes of material specified for the Proposed Development;
- Environmental Management status; and
- Regulatory and Legal Compliance status of the Company.

6.6.1.4 Fuel and Chemical Handling

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area – contractors' compound - (or where possible off the site) which will be away from surface water gullies or drains. In the event of a machine requiring refuelling outside of this area,

fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as “Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors” (CIRIA 532, 2001) will be complied with.

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

In the case of drummed fuel or other chemical which may be used during construction, containers shall be stored in a dedicated internally banded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

6.6.1.5 Control of Water during Construction

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.

Should any discharge of construction water be required during the construction phase, discharge will be to the existing stormwater sewer network. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt or sediment traps, buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors. All water runoff from car park areas will be channelled to an oil interceptor or an alternative treatment system prior to discharge.

Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction. It is estimated that the inflow rate of groundwater will be moderate to fast according to the available field data logs. It is therefore proposed that the water be discharged via the existing stormwater sewer network. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the existing stormwater sewer network. The use of slit traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no silt or contaminated water permitted to discharge to the sewer. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry. Due to the very low permeability of the glacial subsoils and the relative shallow nature for excavations, infiltration to the underlying aquifer is not anticipated.

6.6.2 Operational Phase

During operation measures there is no requirement for any bulk fuels or chemical storage, no requirement for discharge to ground and no requirement for abstraction of groundwater.

The existing surface and sub-surface drainage systems on the North Plaza and Southern Arrival Point will be maintained as part of the development. Storm runoff discharge into the existing drainage system will not contribute to flooding in the Suir River. The interception of rainfall by the c. 500 m² bridge deck will be imperceptible in terms of runoff reduction. These drainage design measures are discussed further Chapter 7 Hydrology.

The proposed pedestrian and cyclists bridge is likely to be lightly trafficked and the application of salts and grits to mitigate ice/snow conditions is not expected.

6.7 Residual Impacts Of The Proposed Development

6.7.1 Construction Phase

The implementation of mitigation measures outlined above (**Section 6.6**) will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the construction phase and that the residual impact will be **short-term-imperceptible-neutral**. Following the TII criteria (refer to **Appendix 6.1**) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered **negligible**.

6.7.2 Operational Phase

The implementation of mitigation measures highlighted above (**Section 6.6**) will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the operational phase and that the residual impact will be **long-term-imperceptible-neutral**. Following the TII criteria (refer to **Appendix 6.1**) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered **negligible**.

6.8 Monitoring Or Reinstatement

6.8.1 Construction Phase

During construction phase the following monitoring measures will be considered:

- Regular inspection of surface water run-off and sediments controls e.g., silt traps will be utilised during the construction phase.
- Soil sampling to confirm disposal options for excavated soils.
- Regular inspection of construction/mitigation measures will be undertaken e.g., concrete pouring, refuelling etc.

6.8.2 Operational Phase

There will be no requirement for groundwater monitoring as there is no discharge to ground or storage of bulk fuels or chemicals.

6.9 Cumulative Impacts Of The Proposed Development

A comprehensive review of all other projects occurring in the vicinity of the proposed development has been completed by undertaking a review of the Tipperary County Council online planning applications portal and identifying all recently approved and live planning applications in the vicinity of the River Suir, upstream and downstream of the proposed development site. Relevant projects identified during this review are listed in Section 1.15 of the EIAR Chapter 1 Introduction and are examined for their potential to result in likely significant effects to the Lower River Suir SAC. In addition to the planning application projects to Tipperary County Council as listed in Section 1.15 in Chapter 1, Tipperary County Council have also applied for Part VIII planning for the refurbishment of the Suir Island gardens located adjacent to the proposed Suir Island Infrastructure Links development. The Part VIII Planning Application for the Suir Island Gardens development was approved in October 2022.

In respect of substantial developments that may result in cumulative effects in respect of land, soils, geology and hydrogeology are the permitted Suir Island Gardens (TCC Reg. Ref.: P8/22/01), the redevelopment works to an existing service station and oil depot (TCC Reg. Ref.: 19/600729), and the demolition and clearance at a site known as the former Clonmel Meat Factory (TCC Reg. Ref.: 19/600102).

The works contractors for other planned or permitted developments will be obliged to ensure that measures are in place to protect soil and water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016)).

6.9.1 Construction Phase

In relation to the potential cumulative impact on land, soils, geology and hydrogeology during the construction phases, the construction works which would have potential cumulative impacts are as follows:

- Run-off percolating to ground at the construction site.
- Excavations and infilling across the site are required for the site preparation and levelling works
- Storage of soils/aggregates and hazardous materials such as fuel
- There will be a requirement for dewatering of groundwater during the construction phase due to the presence of perched water table within the made ground and overburden units.

The application TCC Reg. Ref.: P8/22/01 includes an EIA Screening and engineering report which features measures for the protection of the land, soils, geological and hydrogeological environment including:

- The EIA Screening states that Inland Fisheries Ireland and NPWS will be consulted during the preparation of method statements for the approach to all works at the bankside. The methods to be used during the works will adhere to best practice pollution control measures such as the measures outlined in Construction Industry Research and Information Association (CIRIA) guidelines and the UK statutory environment agencies Pollution Prevention Guidelines (PPG), with particular regard to PPG5.
- The EIA Screening states that best practice measures relating to the use and storage of potentially polluting substances will minimise the potential impact posed by these substances to humans. All relevant best practice mitigation measures required for avoiding likely significant effects to populations and human health through potential effects to soils, water, noise, air etc will be required to be implemented as part of the project.

The Grant of Permission TCC Reg. Ref.: 19/600729 includes conditions for the protection of the land, soils, geological and hydrogeological environment including:

- Condition 7: (a) No surface or stormwater run-off shall be allowed to discharge onto the public road or to adjoining properties (b) Surface water drainage and attenuation proposals shall be as per details submitted (c) The development shall include grease removal system on the wastewater discharge from the shop/deli
- Condition 9: Rock and soil excavated during construction works shall not be left stockpiled on-site following completion of the development. Details of the treatment of excavated rock and soil shall be submitted to and agreed with the planning authority prior to commencement of development. On completion of site development works all machinery, equipment and spoil materials not used in the landscaping of the site shall be removed from the site

The Grant of Permission TCC Reg. Ref.: 19/600102 includes conditions for the protection of the land, soils, geological and hydrogeological environment including:

- Condition 2: All surface water runoff from roofs, driveways and paved areas shall be collected and disposed into the existing surface water collection system. Surface water runoff shall not be allowed to discharge onto the public road or adjoining properties.

-
- Condition 3: Prior to development commencing a Waste Management Plan shall be submitted for the written agreement of the Planning Authority. The Waste Management Plan shall set out details of the licences waste contractor, volumes of waste generated by the development, etc
 - Condition 5: Prior to development commencing an Environmental Management Plan shall be submitted for the written agreement of the Planning Authority

The implementation of mitigation and monitoring measures detailed in Section 5.6.1; and 5.7.1 as well as the compliance of the above permitted development with their respective planning conditions, will ensure there will be minimal cumulative potential for change to the land, soils, geology, hydrogeological environment during the construction phase of the proposed development. The residual cumulative impact of the proposed development in combination with other planned or permitted developments can therefore be considered to be **neutral, imperceptible** and **short-term**.

6.9.2 Operational Phase

In relation to the potential cumulative impact on land, soil, geology and hydrogeology during the operational phases, the operational activities which would have potential cumulative impacts are as follows:

- The proposed development will result in minimal increase in hardstanding (3,125 m²). Cumulatively this development and others in the area will result in localised reduced recharge to ground and increase in surface run-off.

The application TCC Reg. Ref.: P8/22/01 includes an EIA Screening and engineering report which features measures for the protection of the land, soils, geological and hydrogeological environment including:

- The engineering report states that the proposed surface water drainage system has been designed using Causeway Flow software in accordance with the Department of Environment and Local Government's guidance document "Recommendations for Site Development Works for Housing Areas", with guidance taken from the "Greater Dublin Strategic Drainage Study" (GSDSDS) and the South Tipperary Development Plan 2009.
- The engineering report states that a new surface water sewer network shall be provided for the proposed development which will be entirely separated from the foul water sewer network.

The Grant of Permission TCC Reg. Ref.: 19/600729 includes conditions for the protection of the land, soils, geological and hydrogeological environment including:

- Condition 7: (a) No surface or stormwater run-off shall be allowed to discharge onto the public road or to adjoining properties (b) Surface water drainage and attenuation proposals shall be as per details submitted (c) The development shall include grease removal system on the wastewater discharge from the shop/deli

As permitted development TCC Reg. Ref.: 19/600102 consists of demolishing and clearing a site of all existing buildings it is not anticipated to have any significant impacts in relation to land, soils, geology and hydrogeology when operational. As such, it has been excluded from this section of the cumulative assessment.

The implementation of mitigation and monitoring measures detailed in Section 5.6.1; and 5.7.1 as well as the compliance of the above permitted development with their respective planning conditions, will ensure there will be minimal cumulative potential for change to the land, soils, geology, hydrogeological environment during the operational phase of the proposed development. The residual cumulative impact of the proposed development in combination with other planned or permitted developments can therefore be considered to be **neutral, imperceptible** and **long-term**.

6.10 Construction Phase References

CIRIA, (2011). *Environmental good practice on site*; Construction Industry Research and Information Association publication C692 (3rd Edition - an update of C650 (2005)); (I. Audus, P. Charles and S. Evans), 2011

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NRA, (2008). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*; June 2009. National Roads Authority, Dublin



Appendix 6.1 Criteria for Rating the Magnitude and Significance of Impacts at EIA Stage National Roads Authority (NRA-TII, 2009)

Table 1: Criteria for Rating Site Attributes – Estimation of Importance of Soil and Geology Attributes (NRA)

Importance	Criteria	Typical Example
Very High	<p>Attribute has a high quality, significance or value on a regional or national scale.</p> <p>Degree or extent of soil contamination is significant on a national or regional scale.</p> <p>Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.</p>	<p>Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit.</p> <p>Proven economically extractable mineral resource</p>
High	<p>Attribute has a high quality, significance or value on a local scale.</p> <p>Degree or extent of soil contamination is significant on a local scale.</p> <p>Volume of peat and/or soft organic soil underlying route is significant on a local scale.</p>	<p>Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes.</p> <p>Geological feature of high value on a local scale (County Geological Site).</p> <p>Well drained and/or high fertility soils.</p> <p>Moderately sized existing quarry or pit.</p> <p>Marginally economic extractable mineral resource.</p>
Medium	<p>Attribute has a medium quality, significance or value on a local scale.</p> <p>Degree or extent of soil contamination is moderate on a local scale.</p> <p>Volume of peat and/or soft organic soil underlying route is moderate on a local scale</p>	<p>Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed wastes.</p> <p>Moderately drained and/or moderate fertility soils.</p> <p>Small existing quarry or pit.</p> <p>Sub-economic extractable mineral resource.</p>
Low	<p>Attribute has a low quality, significance or value on a local scale.</p> <p>Degree or extent of soil contamination is minor on a local scale.</p>	<p>Large historical and/or recent site for construction and demolition wastes.</p> <p>Small historical and/or recent landfill site for construction and demolition wastes.</p> <p>Poorly drained and/or low fertility soils.</p>

	Volume of peat and/or soft organic soil underlying route is small on a local scale.	Uneconomically extractable mineral resource.
--	---	--

Table 2: Criteria for Rating Site Attributes – Estimation of Importance of Hydrogeological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple well fields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer. Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

Table 3: Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Soil/ Geology Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	<p>Loss of high proportion of future quarry or pit reserves.</p> <p>Irreversible loss of high proportion of local high fertility soils.</p> <p>Removal of entirety of geological heritage feature.</p> <p>Requirement to excavate/remediate entire waste site.</p> <p>Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.</p>
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	<p>Loss of moderate proportion of future quarry or pit reserves.</p> <p>Removal of part of geological heritage feature.</p> <p>Irreversible loss of moderate proportion of local high fertility soils.</p> <p>Requirement to excavate/remediate significant proportion of waste site.</p> <p>Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.</p>
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	<p>Loss of small proportion of future quarry or pit reserves.</p> <p>Removal of small part of geological heritage feature.</p> <p>Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils.</p> <p>Requirement to excavate/remediate small proportion of waste site.</p> <p>Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.</p>
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes

Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

Table 4: Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrogeological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	<p>Removal of large proportion of aquifer.</p> <p>Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems.</p> <p>Potential high risk of pollution to groundwater from routine run-off.</p> <p>Calculated risk of serious pollution incident >2% annually.</p>
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	<p>Removal of moderate proportion of aquifer.</p> <p>Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems.</p> <p>Potential medium risk of pollution to groundwater from routine run-off.</p> <p>Calculated risk of serious pollution incident >1% annually.</p>

<p>Small Adverse</p>	<p>Results in minor impact on integrity of attribute or loss of small part of attribute</p>	<p>Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems.</p> <p>Potential low risk of pollution to groundwater from routine run-off.</p> <p>Calculated risk of serious pollution incident >0.5% annually.</p>
<p>Negligible</p>	<p>Results in an impact on attribute but of insufficient magnitude to affect either use or integrity</p>	<p>Calculated risk of serious pollution incident <0.5% annually.</p>

Table 5: Rating of Significant Environmental Impacts at EIS Stage (NRA)

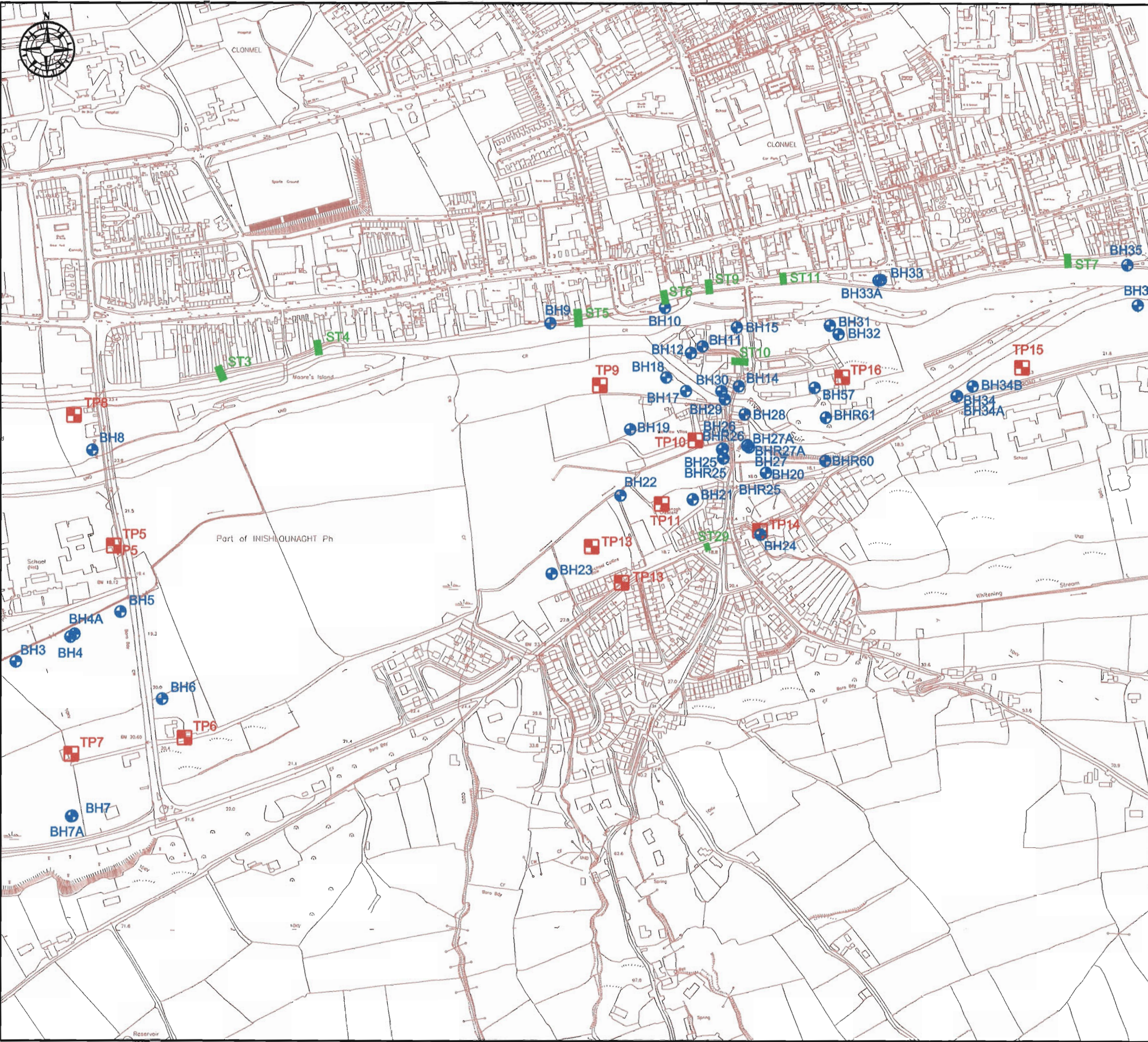
Importance of Attribute	Magnitude of Importance			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

Project Number: 20_071

Project: Suir Island Infrastructure Links

Title: Chapter 6 Land and Soils

Appendix 6.2 Geotech Investigation Logs (Geotech, 2007)



GENERAL NOTES

1. Reproduced from Ordnance Survey Data with the permission of The Government of Ireland. © Crown Copyright. Licence No. nnnnnnnn.
2. Reproduced from Drawing No. C_Top1.dwg to C_Top4.dwg
3. Hole Locations to National Grid Co-ordinate Reference System.
4. All dimensions are in metres unless indicated otherwise.
5. All levels are in metres and related to Ordnance Datum (Malin) unless indicated otherwise.

LEGEND TO SYMBOLS

- Borehole Location
- Trial Pit Location
- Slit Trench Location

Rev	Drawn	Date	Apprv.	Date	Modification Details
2	AC	APR 2006			Further exploratory holes added
1	AC	MAR 2006			Exploratory holes added

AMENDMENTS

Title		SITE PLAN			
Project		RIVER SUIR (CLONMEL)			
Client		MOTT MACDONALD PETTIT			



Date	Drawn By	Apprv. By
MAR 2006	AC	
Sheet Size	Scale	Project No
A3	1:5000	KC5218
Drawing No	Rev	
03	2	

DATES \$TIMES \$FILES

ENCLOSURE A
EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records

Cable Percussion Borehole Logs

Rotary borehole logs

Trial Pit Logs (machine dug)

Slit trenches (Hand dug)

Key

BH 31, 32, 33A, 33, 35,
36, 37, 38, 39, 40, 41, 42,
43, 44, 45, 46, 47, 47A,
48, 49, 50, 51, 52, 53, 54,
55, 56, 57, 58 and 59.

RBH60 and RBH61

TP16, 20, 21, 22, 23, 24,
25, 26, 27, 28, 29, 30, 31,
32, 33, 34, 35, 36 and 37

ST 7, 11, 23, 24, 25, 26

Key to Exploratory Hole Records

SAMPLES

Undisturbed

U	Driven tube sample	} nominally 100 mm diameter and full recovery unless otherwise stated
TW	Pushed thin wall tube sample	
P	Pushed piston sample	
L	Liner sample (from Windowless or similar sampler), full recovery unless otherwise stated	
CBR	CBR mould sample	
BLK	Block sample	
CS	Core sample (from rotary core) taken for laboratory testing	
AMAL	Amalgamated sample	

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample

ES	Environmental chemistry samples (in more than one container where appropriate)
EW	Soil sample
	Water sample

Comments

Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that attempt was made to take a tube sample, however, there was no recovery.

Monitoring samples taken after completion of hole construction are not shown on the exploratory hole logs.

TESTS

SPT S or SPT C Standard Penetration Test, open shoe (S) or solid cone (C)

The Standard Penetration Test is defined in BS 1377 Part 9 (1990). The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 (either in total or for a single increment) the total blow count beyond the seating drive is given (without the N = prefix).

IV	<i>in situ</i> Vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Variable head permeability tests (KFH = falling head test, KRH = rising head test, KPI = packer test), permeability value

Test results provided in Field Records column

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930 (1999)

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacings are presented. The term non-intact (NI) is used where the core is fragmented.

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss
N/A	Not applicable

GROUNDWATER

▼	Groundwater strike
▽	Groundwater level after standing period

Notes:

Project: Wexford Collection- Lady's Bridge
 Project No. Kc6046/2
 Carried out for: Wexford County Council

Key

Sheet 1 of 2

Key to Exploratory Hole Records

INSTALLATION

Standpipe/ piezometer

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

SP
SPIE
PPIE
EPIE

The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:
Standpipe
Standpipe piezometer
Pneumatic piezometer
Electronic piezometer

Inclinometer or Slip Indicator

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

ICE
ICM
SLIP

The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:
Biaxial inclinometer
Inclinometer tubing for use with probe
Slip indicator

Settlement Points or Pressure Cells

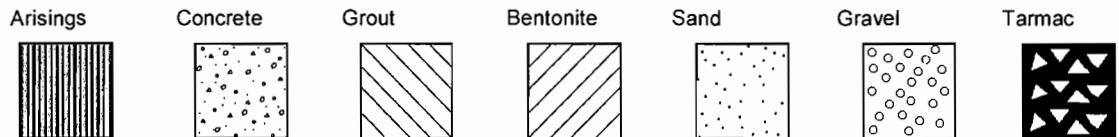
The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column.

ESET
ETM
EPCE
PPCE

The type of instrument installed is indicated by a code in the Legend column:
Electronic settlement cell/gauge
Magnetic extensometer settlement point
Electronic embedment pressure cell
Electronic push in pressure cell

INSTALLATION LEGENDS

A legend describing the installation is shown in the rightmost column. Legends additional to BS5930 are used to describe the backfill materials as indicated below.



NOTES

- 1 Strata legends are in accordance with BS 5930 (1999).
- 2 Water level observations of discernible entries during the advancing of the exploratory hole are given at the foot of the log and in the Legend column. The term "none observed" is used where no discrete entries are identified although this does not necessarily indicate that the hole has not been advanced below groundwater level. Under certain conditions groundwater cannot be observed, for instance, drilling with water flush or overwater, or boring at a rate much faster than water can make its way into the borehole (ref BS5930 : 1999, Clause 47.2.7). In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.
- 3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs, however, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.
- 4 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.
- 5 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.
- 6 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures

REFERENCES

BS 1377 : 1990 : British Standard Methods of test for soils for civil engineering purposes. British Standards Institution
BS 5930 : 1999 : Code of Practice for site investigations. British Standards Institution

Updated July 2006

Notes:	<p>Project: Wexford Collection- Lady's Bridge</p> <p>Project No. Kc6046/2</p> <p>Carried out for: Wexford County Council</p>	<p style="text-align: center;">Key</p> <p style="text-align: right;">Sheet 2 of 2</p>
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Borehole Log



Drilled PM Logged COK Checked RC	Start 08/12/2005 End 08/12/2005	Equipment, Methods and Remarks Inspection Pit from 0.00m - 1.30m. Cable Percussion 200mm diameter from 0.00m - 5.00m. Backfilled with bentonite.	Depth from 0.00m to 5.00m Diameter 200mm Casing Depth 5.00m	Ground Level +18.66 mOD Coordinates E 220324.19 National Grid N 122200.53
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Samples and Tests				Strata			Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description				
0.30-1.30	B 1				MADE GROUND: Concrete.	(0.30)			
					Brown black clayey sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to coarse. Cobbles are angular to subangular. (GLACIAL DEPOSITS)	0.30 +18.36			
1.30-2.00	B 2				Very stiff brown black sandy gravelly CLAY with occasional cobbles. Gravel is angular to subangular fine to coarse. Cobbles are angular to subangular. (GLACIAL DEPOSITS)	1.30 +17.36			
2.00-2.45 2.00-3.00	SPT C B 3	N=34 (12,9/11,10,7,6)				(1.70)			
3.00-4.00 3.10-3.55	B 4 SPT C	N=30 (6,9/8,9,6,7)			Medium dense to dense brown slightly clayey sandy GRAVEL with cobbles. Gravel is angular to rounded fine to coarse of various lithologies. (GLACIAL DEPOSITS)	3.00 +15.66			
4.00-4.45 4.00-5.00	SPT C B 5	N=22 (5,6/4,7,8,5)				(2.00)			
			08/12/2005	1800 dry		5.00 +13.66			
EXPLORATORY HOLE ENDS AT 5.00 m									

Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)	Depth sealed (m)	Depth Related Remarks * From to (m)	Chiselling Depths (m) 1.50 -1.75 2.80 -3.05	Time 60 mins 45 mins	Tools used
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH31 Sheet 1 of 1
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Borehole Log



Drilled PM Logged COK Checked RC		Start 09/12/2005 End 12/12/2005		Equipment, Methods and Remarks Inspection Pit from 0.00m - 1.20m. Cable Percussion 200mm diameter from 0.00m - 8.00m. 50mm standpipe installed.		Depth from 0.00m to 8.00m		Diameter 200mm		Casing Depth 8.00m		Ground Level Coordinates National Grid		+18.54 mOD E 220335.89 N 122188.88	
Samples and Tests						Strata									
Depth	Type & No	Records	Date Casing	Time Water	Description						Depth, Level/ (Thickness)	Legend	Backfill/ Instruments		
0.00-1.35	B 1				MADE GROUND: Very stiff brown black sandy gravelly CLAY with bricks. Gravel is angular to subangular fine to coarse.										
1.00-1.45	SPT C	N=35 (4,3/7,9,11,8)		dry							(2.20)				
1.35-2.20	B 2				MADE GROUND: Brown red sandy CLAY. Sand is fine to coarse.										
2.00-2.45	SPT C	N=34 (6,5/7,9,12,6)		dry							2.20 +16.34				
2.20-3.10	B 3			2.40	Medium dense to dense brown slightly clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse. (GLACIAL DEPOSITS)										
3.10-4.00	B 4			1.95							3.10 +15.44				
4.00-4.45	SPT C	N=28 (4,5/6,6,7,9)		1.90											
4.00-5.00	B 5			1.90											
5.00-5.45	SPT C	N=31 (6,5/4,3,3,21)	09/12/2005	1800											
5.00-6.50	B 6		5.00	1.90											
			12/12/2005	2.00											
			5.00	0800											
				1.80											
6.50-8.00	B 7			3.10											
8.00	KFH	k=8.9E-7 m/s	12/12/2005	1800	EXPLORATORY HOLE ENDS AT 8.00 m						8.00 +10.54				
			8.00	3.10											
														SP	
Depth	Type & No	Records	Date Casing	Time Water	Depth Related Remarks *						Chiselling Depths (m)	Time	Tools used		
Groundwater Entries					None observed (see Key Sheet)										
No. Struck Post strike behaviour (m)					Depth sealed (m)						From to (m)				
None observed (see Key Sheet)											3.25 -3.50 45 mins				
											5.60 -5.70 25 mins				
											6.30 -6.43 25 mins				
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project River Suir Clonmel Drainage Scheme						Borehole				
Scale 1:50					Project No. KC5218						BH32				
(c) ESGL www.esgl.co.uk 402.24 09/01/2007 15.39 24					Carried out for G. Pettit & Company						Sheet 1 of 1				
AGS															

Borehole Log



Drilled GW Logged DB Checked RC	Start 11/01/2006 End 11/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m - 1.20m. Cable Percussion 200mm diameter from 0.00m - 2.75m. Backfilled with bentonite.	Depth from 0.00m to 2.75m Diameter 200mm Casing Depth 2.70m	Ground Level +17.56 mOD Coordinates E 220392.68 National Grid N 122261.25
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Samples and Tests					Strata			Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description					
0.30-1.20	B 1				MADE GROUND Tarmacadam.			(0.30)		
1.20-1.65 1.20-2.00	SPT C B 2	N=41 (2,2/3,11,11,16)	1.20	dry	Dense to very dense grey slightly sandy becoming sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of various lithologies. (MADE GROUND)			0.30 +17.26		
1.70	KFH	k=2.5E-3 m/s			0.30-0.70 m Driller Reports: Clause 804			(2.45)		
2.00-2.45 2.00-2.45	SPT C B 3	50 (5,5/10,10,10,20 for 70mm)	2.00	1.37						
2.70-2.75	SPT C	50 (25 for 20mm/50 for 25mm)	11/01/2006 2.70	1800 1.37	EXPLORATORY HOLE ENDS AT 2.75 m			2.75 +14.81		

Groundwater Entries No. Struck Post strike behaviour 1 1.70 Rose to 1.37 m after 20 minutes.	Depth sealed (m) -	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used 1.70 -1.75 120 mins
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH33 Sheet 1 of 1
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Borehole Log



Drilled PM Logged DB Checked RC		Start 13/01/2006 End 13/01/2006		Equipment, Methods and Remarks Inspection Pit from 0.00m - 1.20m. Cable Percussion 200mm diameter from 0.00m - 5.00m. 50mm standpipe installed.		Depth from 0.00m to 5.00m		Diameter 200mm		Casing Depth		Ground Level Coordinates National Grid		+17.53 mOD E 220389.66 N 122260.81	
Samples and Tests					Strata										
Depth	Type & No	Records	Date Casing	Time Water	Description					Depth, Level/ (Thickness)	Legend	Backfill/ Instruments			
0.12-1.10	B 1			0.55	MADE GROUND: Tarmacadam.					0.12 +17.41					
0.85	KFH	k=2.1E-3 m/s			Grey slightly clayey sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is angular to subangular fine to coarse. Cobbles are subangular of limestone. (GLACIAL DEPOSITS)					(0.96)					
1.10-2.00	B 2			1.80	Brown sandy gravelly CLAY with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone. (GLACIAL DEPOSITS)					1.10 +16.43					
2.00-3.00	B 3			1.80	Brown slightly clayey sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of sandstone. (GLACIAL DEPOSITS)					2.00 +15.53					
3.00-4.00	B 4			1.80						(3.00)					
4.00-5.00	B 5			1.80											
5.00	KFH		13/01/2006 5.00	1800 1.80	EXPLORATORY HOLE ENDS AT 5.00 m					5.00 +12.53			SP		
Depth	Type & No	Records	Date Casing	Time Water											
Groundwater Entries No. Struck Post strike behaviour (m)			Depth sealed (m)		Depth Related Remarks * From to (m)					Chiselling Depths (m)		Time	Tools used		
None observed (see Key Sheet)															
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				Project River Suir Clonmel Drainage Scheme				Borehole BH33A				Sheet 1 of 1			
Scale 1:50				Project No. KC5218											
(c) ESGL www.esgl.co.uk 402 24 09/01/2007 15:40 21				Carried out for G. Pettit & Company											

Borehole Log



Drilled PM Logged DB Checked RC	Start 12/01/2006 End 12/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m - 1.20m. Cable Percussion 200mm diameter from 0.00m - 4.80m.	Depth from 0.00m to 4.80m Diameter 200mm Casing Depth 4.80m	Ground Level Coordinates National Grid +17.03 mOD E 220724.65 N 122282.60
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Samples and Tests					Strata			Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description					
0.00-1.10	B 1				TOPSOIL: Brown slightly mottled black slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse.			(1.10)		
1.10-2.50	B 2			1.20	Brown slightly clayey sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is angular to subangular fine to coarse. Cobbles are angular to subangular of sandstone. (GLACIAL DEPOSITS)			1.10 +15.93		
1.40	KFH	k=6.0E-7 m/s						(1.40)		
2.50-2.85	B 3			1.60	Grey slightly mottled black slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse. (GLACIAL DEPOSITS)			2.50 +14.53		
2.85-4.00	B 4			1.54				(0.35)		
4.00-4.80	B 5			1.60	Brown slightly clayey very sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone. (GLACIAL DEPOSITS)			(1.95)		
4.80	KFH	k=6.8E-8 m/s	12/01/2006	1800	4.00-4.80 m Sandy GRAVEL.			4.80 +12.23		
			4.80	1.60	EXPLORATORY HOLE ENDS AT 4.80 m					SP

Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)	Depth sealed (m)	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH35 Sheet 1 of 1
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Borehole Log



Drilled Logged Checked		Start End		Equipment, Methods and Remarks		Depth from to		Diameter Casing Depth		Ground Level Coordinates National Grid	
GW ROD RC		30/11/2005 01/12/2005		Cable Percussion 200mm diameter from 0.00m - 9.85m. 50mm standpipe installed.		0.00m 9.85m		200mm 9.85m		+16.85 mOD E 220738.70 N 122228.75	
Samples and Tests					Strata						
Depth	Type & No	Records	Date Casing	Time Water	Description			Depth, Level/ (Thickness)	Legend	Backfill/ Instruments	
0.00-0.20 0.20-1.00	D 1 B 2				TOPSOIL: Brown slightly silty slightly gravelly SAND. Sand is fine to medium. Gravel is subangular fine to medium.			0.20 +16.65			
1.20-1.65 1.20-2.00	SPT C B 4	N=15 (3,3/3,4,5,3)	1.20		Medium dense brown slightly silty becoming silty slightly gravelly SAND. Sand is fine to medium. Gravel is angular to subangular fine to coarse. (ALLUVIUM)			(1.80)			
2.00-2.45 2.00-2.45	SPT C B 6	N=6 (1,-/2,1,1,2)	2.00	1.00	Loose to medium dense brown slightly silty very sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular fine to coarse. (ALLUVIUM)			2.00 +14.85 (1.00)			
3.00-3.45 3.00-3.45	SPT C B 8	N=18 (3,4/4,5,5,4)	2.00	1.00	Medium dense brown very gravelly becoming gravelly SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			3.00 +13.85			
4.00-4.45 4.00-4.45	SPT C B 10	N=12 (3,4/4,4,2,2)	2.00	1.00							
5.00-5.45 5.00-5.45	SPT C B 12	N=24 (5,5/6,6,6,6)	5.00	1.00	5.00-5.45 m SAND and GRAVEL			(4.80)			
6.00-6.45 6.00-6.45	SPT C B 14	N=24 (6,6/6,6,6,6)	6.00	1.00	6.00-6.45 m Slightly gravelly						
7.00-7.45 7.00-7.45	SPT C B 16	N=24 (5,4/4,6,7,7)	7.00	1.00							
7.80 8.00-8.45 8.00-8.45	D 17 SPT C B 19	N=41 (5,6/6,7,13,15)	8.00	1.00	Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine. (GLACIAL DEPOSITS)			7.80 +9.05 (1.20)			
9.00-9.45 9.00-9.45	SPT C B 21	N=48 (8,8/10,10,16,12)	9.00	1.00	Dense brown slightly sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Cobbles are subangular of medium grained of sandstone. (GLACIAL DEPOSITS)			9.00 +7.85 (0.45)			
9.50-9.85 9.60	B 22 KFH	k=2.4E-6 m/s	01/12/2005 9.85	1800 1.00				9.45 +7.40 (0.40) 9.85 +7.00			
Depth	Type & No	Records	Date Casing	Time Water							
Groundwater Entries					Depth Related Remarks *			Chiselling			
No.	Struck (m)	Post strike behaviour	Depth sealed (m)		From	to (m)		Depths (m)	Time	Tools used	
1	1.00	Remained at 1.00 m after 20 minutes. Slow inflow	-					9.80-9.85	60 mins		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project River Suir Clonmel Drainage Scheme			Borehole			
Scale 1:50					Project No. KC5218			BH36			
(c) ESGL www.esgl.co.uk 402 24 20/12/2006 10:57:23					Carried out for G.Pettit & Company			Sheet 1 of 2			

Borehole Log



Drilled RM Logged SC Checked RC	Start 01/02/2006 End 02/02/2006	Equipment, Methods and Remarks Cable Percussion 200mm diameter from 0.00m to 10.00m. 50mm standpipe installed.	Depth from 0.00m to 10.00m Diameter 200mm Casing Depth 10.00m	Ground Level Coordinates National Grid	+17.98 mOD E 220775.32 N 122299.47
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Samples and Tests				Strata			Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description				
0.15-0.60	B 1				MADE GROUND: Concrete.	0.15 +17.83			
0.60-1.00	B 2				Dark brown slightly sandy slightly gravelly CLAY with cobbles and brick fragments. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular. (GLACIAL DEPOSITS)	(0.45) 0.60 +17.38			
1.00-1.45 1.00-1.50	SPT C B 3	N=32 (4,5/6,8,9,9)	1.00		Dark brown slightly sandy gravelly CLAY with occasional cobbles of limestone. Sand is fine to coarse. Gravel subangular to subrounded fine to coarse. Cobbles are subrounded. (GLACIAL DEPOSITS)	1.00 +16.98 (0.50)			
1.50-2.00	B 4				Dense brown grey slightly clayey very sandy GRAVEL with occasional cobbles. Sand is fine to coarse. gravel is subrounded to rounded fine to coarse. Cobbles is rounded of limestone. (GLACIAL DEPOSITS)	1.50 +16.48 (0.50)			
2.00-2.45 2.00-3.00	SPT C B 5	N=27 (3,4/6,7,6,8)	2.00		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine to medium. (GLACIAL DEPOSITS)	2.00 +15.98			
3.00-3.45 3.00-4.00	SPT C B 6	N=38 (6,9/8,9,10,11)	3.00		Dense brown slightly clayey sandy GRAVEL with cobbles and boulders. Sand is fine to coarse. Gravel is subrounded to rounded. Cobbles are subrounded. (GLACIAL DEPOSITS)	(5.00)			
4.00-4.45 4.00-5.00	SPT C B 7	N=40 (6,9/9,10,11,10)	4.00						
5.00-5.45 5.00-6.00	SPT C B 8	N=38 (7,8/9,9,10,10)	5.00						
6.00-6.45 6.00-7.00	SPT C B 9	N=41 (8,9/10,10,11,10)	01/02/2006 6.00 02/01/2006 6.00	1800 1.46 0800 1.67					
7.00-7.45 7.00-8.00	SPT C B 10	N=40 (8,9/10,9,10,11)	7.00		Brown slightly clayey slightly sandy slightly gravelly COBBLES and BOULDERS. Cobbles and boulders are subangular of sandstone and limestone. (GLACIAL DEPOSITS)	7.00 +10.98 (1.00)			
8.00-8.45 8.00-9.00	SPT C B 11	N=41 (7,9/9,11,10,11)	8.00		Dense brown slightly clayey sandy to very sandy GRAVEL with cobbles and boulders. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular to subrounded. (GLACIAL DEPOSITS)	8.00 +9.98 (2.00)			
9.00-9.45 9.00-10.00	SPT C B 12	N=41 (9,8/12,10,9,10)	9.00						
			02/01/2006 10.00	1800	EXPLORATORY HOLE ENDS AT 10.00 m				

Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)	Depth sealed (m)	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used 2.45 -2.50 30 mins 4.50 -4.70 45 mins 7.30 -7.55 30 mins 8.00 -8.20 30 mins 9.50 -9.90 30 mins
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH37 Sheet 1 of 1
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Borehole Log



Drilled RM Logged SC Checked RC	Start 14/02/2006 End 14/02/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m - 1.30m Cable Percussion 200mm diameter from 0.00m to 10.00m. 50mm standpipe installed.	Depth from 0.00m to 10.00m Diameter 200mm Casing Depth 8.70m	Ground Level +17.11 mOD Coordinates E 221162.26 National Grid N 122393.27
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Samples and Tests			Strata		Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water			
0.00-0.40	B 1				TOPSOIL: Brown sandy slightly gravelly CLAY with cobbles, boulders and rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subrounded.	(0.40)	
0.40-1.30	B 2				Brown very sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)	0.40 +16.71 (0.90)	
1.30-1.70 1.30-1.45	B 3 U NR	No recovery			Firm brown red slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is subangular fine to medium. (GLACIAL DEPOSITS)	1.30 +15.81	
1.70-2.15 1.70-3.00	SPT S B 4	N=11 (2,2,4,3,2)	1.70		Medium dense brown slightly clayey sandy GRAVEL with cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subrounded. (GLACIAL DEPOSITS)	(1.70)	
3.00-3.45 3.00-4.00	SPT C B 5	N=17 (3,4/5,4,4,4)	3.00		Brown slightly sandy slightly gravelly COBBLES and BOULDERS. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium. Cobbles and boulders are subangular to subrounded. (GLACIAL DEPOSITS)	3.00 +14.11 (1.00)	
4.00-4.45 4.00-5.00	SPT C B 6	N=29 (4,5/6,8,7,8)	4.00		Medium dense to dense brown slightly clayey slightly gravelly SAND. Sand is fine to coarse. Gravel is subangular fine to medium. (GLACIAL DEPOSITS)	4.00 +13.11 (1.00)	
5.00-5.45 5.00-6.00	SPT C B 7	N=23 (3,3/4,6,6,7)	5.00		7.00-8.00 m Clayey gravelly SAND.	5.00 +12.11 (3.70)	
6.00-6.45 6.00-7.00	SPT C B 8	N=24 (5,5/6,7,5,6)	6.00				
7.00-7.45 7.00-8.00	SPT C B 9	N=19 (5,4/5,5,4,5)	7.00		Medium dense brown slightly silty slightly gravelly SAND with cobbles and boulders. Sand is fine to medium. Gravel is subangular to subrounded fine to medium. Cobbles and boulders are subangular to subrounded. (GLACIAL DEPOSITS)	8.70 +8.41 (1.30)	
8.00-8.45 8.00-8.70	SPT C B 10	N=32 (5,7/9,8,7,8)	8.70				
8.70-9.15 8.70-10.00	SPT C B 11	N=28 (4,5/6,9,7,6)					
			14/02/2006 1800 15/02/2006 2.30		EXPLORATORY HOLE ENDS AT 10.00 m		

Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)	Depth sealed (m)	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used 3.30-3.50 30 mins
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH38 Sheet 1 of 1
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Borehole Log



Drilled MW Logged DB Checked RC		Start 24/01/2006 End 25/01/2006		Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 12.80m. Backfilled with grout.		Depth from 1.20m to 12.80m		Diameter 200mm		Casing Depth 11.00m		Ground Level Coordinates National Grid		+16.93 mOD E 221545.16 N 122553.91	
Samples and Tests					Strata										
Depth	Type & No	Records	Date Casing	Time Water	Description							Depth, Level/ (Thickness)	Legend	Backfill/ Instruments	
					Driller Reports: TOPSOIL.							(1.00)			
1.20-1.70 1.20-1.70	B 1 U NR	100 blows No recovery	1.20	dry	Driller Reports: Brown slightly sandy CLAY. Sand is fine to medium. (GLACIAL DEPOSITS)							1.00 +15.93			
2.00-2.38 2.00-2.50	SPT C B 2	N=15 (3 for 79mm/3,4,4,4)	2.00	dry								(1.20)			
3.00-3.45 3.00-3.50	SPT C B 3	N=27 (4,5/6,7,7,7)	3.00	2.00	Medium dense brown grey sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of limestone. (GLACIAL DEPOSITS)							2.20 +14.73			
					3.00-3.50 m Slightly clayey very sandy GRAVEL.										
4.00-4.45 4.00-4.50	SPT C B 4	N=31 (4,5/8,8,9,6)	4.00	3.00											
5.00-5.45 5.00-5.50	SPT C B 5	N=31 (5,6/7,8,9,7)	5.00	3.00								(5.80)			
6.50-6.95 6.50-7.00	SPT C B 6	N=25 (4,5/5,6,7,7)	6.50	2.50											
			24/01/2006 6.50	1800											
			25/01/2006 6.50	0800 2.20											
8.00-8.45 8.00-8.50	SPT C B 7	N=24 (5,6/6,6,6,6)	8.00	3.00	Multicoloured slightly sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles are subrounded of limestone. (GLACIAL DEPOSITS)							8.00 +8.93			
8.80	D 8											(1.50)			
9.50-9.95 9.50-10.00	SPT C B 9	N=25 (4,5/5,6,7,7)	9.50	3.80	Medium dense brown slightly gravelly SAND. Sand is fine to coarse. Gravel							9.50 +7.43			
Depth	Type & No	Records	Date Casing	Time Water	Stratum continues to 11.50 m										
Groundwater Entries				Depth sealed (m)		Depth Related Remarks *					Chiselling				
No.	Struck (m)	Post strike behaviour			From to (m)					Depths (m)	Time	Tools used			
1	2.20	Rose to 2.00 m after 20 minutes. Fast Inflow								6.00 -6.40	45 mins				
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				Project		River Suir Clonmel Drainage Scheme					Borehole				
Scale 1:50				Project No.		KC5218					BH39				
(c) ESGL www.esgl.co.uk 402 24 0901/2007 16.33.02				Carried out for		G. Pettit & Company					Sheet 1 of 2				

Borehole Log



Drilled MW Logged DB Checked RC	Start 24/01/2006 End 25/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 12.80m. Backfilled with grout.	Depth from 1.20m	to 12.80m	Diameter 200mm	Casing Depth 11.00m	Ground Level Coordinates National Grid	+16.93 mOD E 221545.16 N 122553.91	
Samples and Tests				Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 1)	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments	
11.00-11.45 11.00-11.50	SPT C B 10	N=28 (6,6/7,7,7,7)	11.00	4.70	is subrounded fine to coarse. (GLACIAL DEPOSITS)	(2.00)			
11.60	D 11				Light brown slightly gravelly CLAY with patches of brown sand. Gravel is subangular fine to medium.	11.50 +5.43 11.60 +5.33 (0.40)			
12.30-12.80	KFH		25/01/2006 11.00	1800	Driller Reports: Brown sandy gravelly CLAY. (GLACIAL DEPOSITS) Driller Reports: Brown sandy gravelly CLAY. (GLACIAL DEPOSITS)	12.00 +4.93 (0.80)			
					EXPLORATORY HOLE ENDS AT 12.80 m	12.80 +4.13			
Depth	Type & No	Records	Date Casing	Time Water					
Groundwater Entries No. Struck Post strike behaviour (m)			Depth sealed (m)	Depth Related Remarks * From to (m)			Chiselling Depths (m)	Time	Tools used
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project River Sulr Clonmel Drainage Scheme	Borehole BH39			Sheet 2 of 2		
(c) ESGL www.esgl.co.uk 402 24 09/01/2007 16 33.06			Project No. KC5218	Carried out for G. Pettit & Company					
Scale 1:50			AGS						

Borehole Log



Drilled MW Logged DB Checked RC	Start 22/01/2006 End 22/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 10.60m. Backfilled with grout.	Depth from 0.00m to 10.60m Diameter 200mm Casing Depth 10.50m	Ground Level Coordinates National Grid +15.74 mOD E 221628.10 N 122580.01
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Samples and Tests					Strata			Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description					
					Driller Reports: TOPSOIL.			(1.20)		
1.20-1.65	U 1	100 blows	1.20	dry	Stiff brown slightly sandy gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of limestone. (GLACIAL DEPOSITS)			1.20 +14.54		
2.00-2.45 2.00-2.50	SPT C B 2	N=19 (2,3/4,5,5,5)	2.00	1.50				(1.10)		
2.50	D 3				Dense to medium dense grey brown slightly clayey very sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded of limestone. (GLACIAL DEPOSITS)			2.30 +13.44		
3.00-3.45 3.00-3.50	SPT C B 4	N=30 (4,5/7,7,8,8)	3.00	1.20						
4.00-4.45 4.00-4.50	SPT C B 5	N=20 (4,5/5,5,5,5)	4.00	1.20				(4.20)		
5.00-5.45 5.00-5.50	SPT C B 6	N=25 (3,4/5,6,7,7)	5.00	1.20						
6.50-6.95 6.50-7.00	SPT C B 7	N=17 (2,3/4,4,4,5)	6.50	3.00	Medium dense to dense brown slightly silty becoming more silty slightly gravelly SAND with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to medium. (GLACIAL DEPOSITS)			6.50 +9.24		
8.00-8.38 8.00-8.50	SPT C B 8	50 (8,10/15,15,20)	8.00	3.00				(2.00)		
8.50	D 9				Medium dense to dense brown slightly clayey sandy GRAVEL. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			8.50 +7.24		
9.00	D 10							(1.00)		
9.50-9.95 9.50-10.00	SPT C B 11	N=32 (6,7/7,8,8,9)	9.50	4.20	Very stiff slightly sandy slightly gravelly CLAY with occasional cobbles.			9.50 +6.24		
Depth	Type & No	Records	Date Casing	Time Water	Stratum continues to 10.60 m					

Groundwater Entries			Depth Related Remarks *		Chiselling			
No.	Struck (m)	Post strike behaviour	Depth sealed (m)	From	to (m)	Depths (m)	Time	Tools used
1	1.50	Rose to 1.20 m after 20 minutes. Fast Inflow	-					

Borehole Log



Drilled MW Logged DB Checked RC	Start 22/01/2006 End 22/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 10.60m. Backfilled with grout.	Depth from 0.00m	to 10.60m	Diameter 200mm	Casing Depth 10.50m	Ground Level Coordinates National Grid	+15.74 mOD E 221628.10 N 122580.01
Samples and Tests				Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 1)	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
10.50-10.65 10.60-10.62	SPT C SPT C	(25,40/10 for 0mm) 50 (25 for 0mm/50 for 20mm)	22/01/2004 10.50	1800 4.50	(GLACIAL DEPOSITS)	(1.10)		
			24/01/2006 10.50	0800 5.20	EXPLORATORY HOLE ENDS AT 11.60 m	10.60 +5.14		
12.30-12.80	KFH							
Depth	Type & No	Records	Date Casing	Time Water	Depth Related Remarks *	Chiselling Depths (m)	Time	Tools used
						10.50 -10.60	120 mins	
Groundwater Entries No. Struck Post strike behaviour					Depth sealed (m)			
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project River Sulr Clonmel Drainage Scheme	Borehole BH40		
Scale 1:50					Project No. KC5218	Sheet 2 of 2		
(c) ESGL www.esgl.co.uk 402 24 0901/2007 16.33.15					Carried out for G. Pettit & Company			

Borehole Log



Drilled MW Logged SC Checked RC		Start 23/01/2006 End 24/01/2006		Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion from 0.00m to 12.80m. Backfilled with sand and gravel.		Depth from 0.00m to 12.80m Diameter 200mm Casing Depth 9.50m		Ground Level Coordinates National Grid +16.14 mOD E 221720.74 N 122617.47			
Samples and Tests					Strata						
Depth	Type & No	Records	Date Casing	Time Water	Description			Depth, Level (Thickness)	Legend	Backfill/ Instruments	
					Driller Reports: TOPSOIL.			(1.00)			
1.20-1.65	U 1		1.20	dry	Driller Reports: Brown CLAY. (GLACIAL DEPOSITS)			1.00 +15.14 (0.50)			
2.00-2.45 2.00-2.50	SPT C B 2	N=26 (4,5/6,6,6,8)	2.00	dry	Medium dense brown slightly clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			1.50 +14.64 (1.00)			
3.00-3.45 3.00-3.50	SPT C B 3	N=31 (5,6/7,7,8,9)	3.00	1.50	Dense to medium dense grey sandy GRAVEL with cobbles and boulders. Sand is fine to coarse. gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subrounded. (GLACIAL DEPOSITS)			2.50 +13.64 (3.10)			
5.00-5.45 5.00-5.50	SPT C B 5	N=21 (6,7/4,4,6,7)	5.00 24/01/2006 11:00	1.20 0800	5.00-5.45 m Slightly clayey sandy GRAVEL with cobbles						
5.60	D 6				Stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse. (GLACIAL DEPOSITS)			5.60 +10.54 (2.30)			
6.50-6.95 6.50-7.00	SPT C B 7	N=60 (8,10/15,15,15,15)	6.50	3.00	6.50-7.00 m Rounded boulder of sandstone.						
8.00-8.45 8.00-8.50	SPT C B 8	N=35 (8,8/8,9,9,9)	8.00	3.00	Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine to coarse. (GLACIAL DEPOSITS)			7.90 +8.24 (2.00)			
9.50-9.95 9.50-10.00	SPT C B 9	N=30 (8,8/9,7,7,7)	9.50	5.20	9.50-10.00 m Subangular to subrounded cobbles and boulders			9.90 +6.24			
9.90	D 10				Stratum continues to 10.20 m						
Groundwater Entries					Depth Related Remarks *					Chiselling	
No.	Struck (m)	Post strike behaviour	Depth sealed (m)		From to (m)			Depths (m)	Time	Tools used	
1	1.50	Rose to 1.10 m after 20 minutes. Fast inflow						4.00-4.30 6.50-6.70	60 mins 15 mins		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project River Suir Clonmel Drainage Scheme					Borehole	
Scale 1:50					Project No. KC5218					BH41	
(c) ESGL www.esgl.co.uk 402.24.20/12/2006 10.58.05					Carried out for G.Pettit & Company					Sheet 1 of 2	

Borehole Log



Drilled MW Logged SC Checked RC	Start 23/01/2006 End 24/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion from 0.00m to 12.80m. Backfilled with sand and gravel.	Depth from 0.00m to 12.80m Diameter 200mm Casing Depth 9.50m	Ground Level +16.14 mOD Coordinates E 221720.74 National Grid N 122617.47
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Samples and Tests				Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 1)	Depth, Level (Thickness)	Legend	Backfill/ Instruments
10.20	D 11		23/01/2006 9.50	1800	Brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)	(0.30) 10.20 +5.94		
11.00-11.45 11.00-11.50	SPT C B 12	N=58 (7,9/10,15,16,17)	11.00	3.00	Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse. (GLACIAL DEPOSITS)	(0.80) 11.00 +5.14		
					Very dense grey slightly clayey very sandy GRAVEL with cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded of limestone. (GLACIAL DEPOSITS)	(1.80) 12.80 +3.34		
EXPLORATORY HOLE ENDS AT 12.80 m								

Groundwater Entries No. Struck Post strike behaviour (m)	Depth sealed (m)	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH41 Sheet 2 of 2
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Scale 1:50

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402.24 20/12/2006 10:56:10



Borehole Log



Drilled GW Logged DB Checked RC	Start 13/01/2006 End 13/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.00m. Cable Percussion 200mm diameter from 0.00m to 8.00m. 50mm standpipe installed.	Depth from 0.00m to 8.00m Diameter 200mm Casing Depth 7.00m	Ground Level Coordinates National Grid +16.06 mOD E 221854.71 N 122577.68
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Samples and Tests					Strata			Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description					
0.00-0.25 0.25-1.00	D 1 B 2				TOPSOIL: Brown slightly sandy gravelly CLAY with occasional rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse.			0.25 +15.81		
1.00-1.45 1.00-1.45	SPT S B 4	N=6 (1,2/1,1,2,2)	1.00	dry	Soft to firm brown slightly sandy slightly gravelly becoming gravelly CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			(2.75)		
1.90 2.00-2.45 2.00-2.45	D 5 SPT S B 7	N=12 (3,3/3,3,3,3)	2.00	dry	1.90 m Becoming slightly mottled black 1.90-2.60 m Driller Reports cobbles. 2.00-3.00 m Becoming more gravelly					
2.60-3.00 3.00-3.45 3.00-3.45	B 8 SPT C B 10	N=23 (4,4/5,6,6,6)	3.00	1.20	Medium dense to dense slightly clayey sandy becoming very sandy with depth GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded of sandstone. (GLACIAL DEPOSITS)			3.00 +13.06		
4.00-4.20 4.00-4.45	SPT C B 12	50 (4,8/50 for 50mm)	4.00	1.20	4.00-4.45 m Becoming very sandy					
5.00-5.45 5.00-5.45	SPT C B 14	N=26 (6,6/6,6,7,7)	5.00	1.20				(5.00)		
6.00-6.45 6.00-6.45	SPT C B 16	N=26 (6,6/6,6,6,6)	6.00	1.00	6.00-6.45 m Slightly clayey SAND and GRAVEL.					
7.00-7.45 7.00-7.45	SPT C B 18	N=38 (8,8/8,8,10,12)	7.00	1.20						
8.00	KFH	k=7.8E-4 m/s	13/01/2006 7.00	1800 1.20	EXPLORATORY HOLE ENDS AT 8.00 m			8.00 +8.06		SP

Groundwater Entries				Depth Related Remarks *		Chiselling	
No.	Struck (m)	Post strike behaviour	Depth sealed (m)	From	to (m)	Depths (m)	Time
1	2.80	Rose to 1.20 m after 20 minutes. Fast Inflow	-			4.20 -4.50	35 mins
						Tools used	

Borehole Log



Drilled GW Logged DB Checked RC	Start 12/01/2006 End 12/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 8.00m. 50mm standpipe installed. Backfilled with Bentonite.	Depth from 0.00m	to 8.00m	Diameter 200mm	Casing Depth 8.00m	Ground Level Coordinates National Grid	+19.94 mOD E 221880.28 N 122518.40
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Samples and Tests					Strata			Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description					
0.00-0.30	D 1			dry	TOPSOIL: Brown slightly sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to medium. Gravel is subangular fine to medium.			(0.30)		
0.30-1.20	B 2		2.00	0.50	Brown very clayey SAND and GRAVEL with occasional rootlets and rare cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			(0.90)		
1.20-1.65	SPT C B 4	N=16 (3,3/3,4,4,5)	0.00	dry	Medium dense brown grey gravelly becoming slightly gravelly SAND. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			1.20-1.65 m Clayey gravelly SAND	1.20	+18.74
2.00-2.45	SPT C B 6	N=16 (3,4/4,4,4,4)	2.00	0.50	Stiff brown grey sandy gravelly CLAY with occasional to many cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			2.00-2.45 m Slightly clayey very sandy GRAVEL.	(1.80)	
3.00-3.45	SPT C B 8	N=18 (4,4/4,5,5,4)	3.00	0.50	Dense brown grey clayey becoming less clayey with depth sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to rounded fine to coarse. Cobbles are subrounded of limestone. (GLACIAL DEPOSITS)			3.35 m Becoming less cobbly	3.00	+16.94
3.45	D 9								(1.00)	
4.00-4.28	SPT C B 11	50 (8,17 for 62mm/ 22,28 for 63mm)	4.00	0.50	Dense brown grey clayey becoming less clayey with depth sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to rounded fine to coarse. Cobbles are subrounded of limestone. (GLACIAL DEPOSITS)				4.00	+15.94
5.00-5.45	SPT C B 13	N=41 (10,10/10,11,10,10)	5.00	0.50				5.00-8.00 m Becoming less clayey		
6.00-6.45	SPT C B 15	N=42 (8,9/10,10,11,11)	6.00	0.50					(4.00)	
7.00-7.45	SPT C B 17	N=38 (6,8/7,10,10,11)	7.00	0.50						
8.00	D-18		12/01/2006 8.00	1800	EXPLORATORY HOLE ENDS AT 8.00 m				8.00	+11.94

Groundwater Entries		Depth sealed		Depth Related Remarks *		Chiselling	
No.	Struck	Post strike behaviour	(m)	From	to (m)	Depths (m)	Time
None observed (see Key Sheet)				1.20	8.00	4.30-4.40	30 mins
						Tools used	
						Chisel	

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme	Borehole BH43
Scale: 1:50	Project No. KC5218	Sheet 1 of 1
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Borehole Log



Drilled Logged Checked		Start End		Equipment, Methods and Remarks		Depth from to		Diameter Casing Depth		Ground Level Coordinates National Grid							
GW DB RC		17/01/2006 18/01/2006		Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 8.00m. Backfilled with bentonite.		0.00m 8.00m		200mm 5.00m		+17.64 mOD E 222107 17 N 122493.29							
Samples and Tests						Strata											
Depth		Type & No	Records	Date Casing	Time Water	Description					Depth, Level (Thickness)	Legend	Backfill/ Instruments				
0.00-0.23		D 1				TOPSOIL: Brown sandy slightly gravelly CLAY with occasional rootlets. Gravel is subangular to subrounded fine to coarse.					0.23	+17.41					
0.23-1.20		B 2									Stiff brown mottled yellow sandy becoming very sandy slightly gravelly CLAY with rare rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)					(1.42)	
1.20-1.65 1.20-1.65 1.31		SPT C B 4 KFH	N=22 (2,2/5,5,5,7)	0.00	dry	Medium dense grey brown slightly clayey sandy becoming very sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded of sandstone and limestone. (GLACIAL DEPOSITS)										1.65	+15.99
2.00-2.45 2.00-2.45		SPT C B 6	N=22 (4,6/7,5,5,5)	2.00	0.50						3.00-3.45 3.00-3.45						
3.00-3.45 3.00-3.45		SPT C B 8	N=21 (5,5/5,5,6,5)	3.00	0.50	4.00-4.45 4.00-4.45											
4.00-4.45 4.00-4.45		SPT C B 10	N=23 (5,6/6,7,5,5)	17/01/2006 4.00 18/01/2006 4.00	1800 0.50 0800 0.50						5.00-5.45 5.00-5.45						
5.00-5.45 5.00-5.45		SPT C B 12	N=20 (4,5/5,5,5,5)	5.00	0.50	6.00-6.45 6.00-6.45											
6.00-6.45 6.00-6.45		SPT C B 14	N=20 (5,5/5,5,5,5)	5.00	0.50						7.00-7.45 7.00-7.45						
7.00-7.45 7.00-7.45		SPT C B 16	N=21 (3,5/5,5,6,5)	5.00	0.50	8.00 8.00											
8.00 8.00		KFH D 17		18/01/2006	1800						EXPLORATORY HOLE ENDS AT 8.00 m					8.00	+9.64
Depth		Type & No	Records	Date Casing	Time Water												
Groundwater Entries No. Struck Post strike behaviour				Depth sealed (m)		Depth Related Remarks *					Chiselling Depths (m) Time Tools used						
None observed (see Key Sheet)						1.31 8.00 Water added to assist drilling											
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project River Suir Clonmel Drainage Scheme						Borehole					
Scale 1:50						Project No. KC5218						BH44					
(c) ESGL www.esgl.co.uk 402.24.20/12/2006 10:58:25						Carried out for G.Pettit & Company						Sheet 1 of 1					

Borehole Log



Drilled Logged Checked		Start End	Equipment, Methods and Remarks		Depth from to	Diameter	Casing Depth	Ground Level Coordinates National Grid	
GW DB RC		19/01/2006 20/01/2006	Cable Percussion 200mm diameter from 0.00m to 8.00m. 50mm standpipe installed.		0.00m 8.00m	200mm	7.00m	+16.32 mOD E 222142.45 N 122564.51	
Samples and Tests					Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments	
0.00-0.90	B 1				TOPSOIL: Brown black sandy gravelly CLAY with occasional rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse.	(0.90)			
0.90	D 2					0.90 +15.42			
1.20-1.65 1.20-1.65	SPT C B 4	N=14 (1,3/3,3,4,4)	19/01/2006 1.20	1800	Firm brown red slightly mottled orange sandy gravelly CLAY with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone. (GLACIAL DEPOSITS)	(0.75)			
2.00-2.45 2.00-2.45	SPT C B 6	N=16 (2,2/2,3,4,7)	20/01/2006 1.20	0800 1.42		1.65 +14.67			
2.00-2.45 2.00-2.45	SPT C B 6	N=16 (2,2/2,3,4,7)	2.00	1.40	Medium dense clayey sandy becoming very sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of sandstone. (GLACIAL DEPOSITS)				
3.00-3.45 3.00-3.45	SPT C B 8	N=17 (2,5/4,4,4,5)	3.00	2.80				3.00-3.45 m Slightly clayey slightly sandy GRAVEL with cobbles. Cobbles of sandstone and limestone.	
4.00-4.45 4.00-4.45	SPT C B 10	N=20 (3,5/5,5,5,5)	4.00	2.80				4.00-7.45 m Becoming very sandy	
5.00-5.45 5.00-5.45	SPT C B 12	N=20 (4,4/5,5,5,5)	5.00	2.80					
6.00-6.45 6.00-6.45	SPT C B 14	N=32 (3,6/5,5,12,10)	6.00	2.80					
7.00-7.36 7.00-7.45	SPT C B 16	52 (5,5/19,19,14 for 59mm)	7.00	2.80					
7.30	D 17					7.30 +9.02			
7.50-8.00	B 18				Very stiff brown sandy gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of sandstone and limestone. (GLACIAL DEPOSITS)	(0.70)			
8.00	KFH	k=8.7E-5 m/s	20/01/2006 7.00	1800		8.00 +8.32		SP	
					EXPLORATORY HOLE ENDS AT 8.00 m				
Depth	Type & No	Records	Date Casing	Time Water					
Groundwater Entries			Depth sealed (m)		Depth Related Remarks *		Chiselling		
No.	Struck (m)	Post strike behaviour			From to (m)		Depths (m)	Time	Tools used
None observed (see Key Sheet)									
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project			Borehole	
Scale 1:50					River Suir Clonmel Drainage Scheme			BH45	
(c) ESGL www.esgl.co.uk 402.24 20/12/2006 10:58:30					Project No. KC5218			Sheet 1 of 1	
AGS					Carried out for G.Pettit & Company				

Borehole Log



Drilled GW Logged DB Checked RC	Start 18/01/2006 End 19/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00 to 1.00m. Cable Percussion 200mm diameter from 0.00m to 8.00m. Backfilled with bentonite.	Depth from 0.00m to 8.00m Diameter 200mm Casing Depth 7.00m	Ground Level Coordinates National Grid +15.99 mOD E 222197.85 N 122659.71
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Samples and Tests					Strata			
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-1.00	B 1				TOPSOIL: Soft brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse.	(1.74)		
1.00-1.45 1.00-1.45	SPT C B 3	N=2 (1,0/0,0,0,2) SW=75		dry				
1.74	D 4				Driller Reports: Light brown CLAY. (GLACIAL DEPOSITS)	1.74 +14.25		
2.00-2.45 2.00-2.45	SPT C B 6	N=16 (1,1/2,4,5,5)	2.00	0.80	Medium dense to dense brown slightly clayey sandy becoming very sandy with depth GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone. (GLACIAL DEPOSITS)	1.88 +14.11		
3.00-3.45 3.00-3.45	SPT C B 8	N=16 (2,3/3,4,4,5)	3.00	0.80		3.00-5.00 m Becoming very sandy	(3.12)	
4.00-4.41 4.00-4.45	SPT C B 10	50 (5,8/16,12,15,7 for 37mm)	4.00	0.80		4.00-4.41 m Dense		
			18/01/2006 4.00	1800 0.80				
5.00-5.45 5.00-5.45	SPT C B 12	N=20 (4,5/5,5,5,5)	19/01/2006 8.00	0800 0.80	Medium dense grey sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded. Cobbles are subangular of sandstone. (GLACIAL DEPOSITS)	5.00 +10.99		
6.00-6.45 6.00-6.45	SPT C B 14	N=21 (6,3/5,5,6,5)	6.00	0.80		(3.00)		
7.00-7.45 7.00-7.45	SPT C B 16	N=25 (6,6/6,6,6,7)	7.00	0.80				
7.50-8.00	B 17							
			19/01/2006	1800				
8.00	KFH				EXPLORATORY HOLE ENDS AT 8.00 m	8.00 +7.99		
Depth	Type & No	Records	Date Casing	Time Water				

Groundwater Entries	Depth Related Remarks *	Chiselling
No. Struck 1 1.88	From to (m)	Depths (m) 4.65 - 4.75
Post strike behaviour Rose to 0.80 m after 20 minutes. Slow Inflow	Depth sealed (m) -	Time 40 mins
		Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme	Borehole BH46
Scale 1:50	Project No. KC5218	Sheet 1 of 1
(c) ESGL www.esgl.co.uk 402 24 0901/2007 15 48 07	Carried out for G. Pettit & Company	

Borehole Log



Drilled Logged Checked		Start End		Equipment, Methods and Remarks		Depth from to		Diameter Casing Depth		Ground Level Coordinates National Grid	
GW DB RC		25/01/2006 25/01/2006		Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 3.10m. Backfilled with bentonite.		0.00m 3.10m		200mm 3.10m		+15.32 mOD E 222770.45 N 122824.92	
Samples and Tests					Strata						
Depth		Type & No	Records	Date Casing	Time Water	Description			Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-1.00		B 1				TOPSOIL. Brown red slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse.			(1.00)		
1.20-1.65 1.20-1.65		SPT S B 3	N=17 (1,1/4,4,4,5)	1.20	1 10	Stiff brown sandy gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			1.00 +14.32 (1.00)		
2.00 2.00-2.45 2.00-2.45		KFH SPT C B 5	k=2.4E-5 m/s N=18 (3,4/4,4,5,5)	2.00	1 10	Medium dense to very dense brown slightly clayey sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of sandstone. (GLACIAL DEPOSITS)			2.00 +13.32 (1.10)		
3.00-3.11 3.00-3.10 3.10-3.13		SPT C B 7 SPT C	50 (25 for 60mm/50 for 48mm) 50 (25 for 10mm/50 for 16mm)	25/01/2006 3.00 3.10	1800 1.10 1.10	EXPLORATORY HOLE ENDS AT 3.10 m			3.00 +12.22		
						3.00-3.10 m Very dense 3.10 m Driller Reports: boulder.					
Depth		Type & No	Records	Date Casing	Time Water						
Groundwater Entries						Depth Related Remarks *			Chiselling		
No.	Struck (m)	Post strike behaviour		Depth sealed (m)		From to (m)			Depths (m)	Time	Tools used
1	1.30	Rose to 1.10 m after 20 minutes. Slow Inflow				0.00 2.00 Water added to assist drilling.			3.10-3.10	60 mins	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				Project Project No. Carried out for				River Suir Clonmel Drainage Scheme KC5218 G.Pettit & Company			
Scale 1:50				AGS				Borehole BH47 Sheet 1 of 1			

Borehole Log



Drilled Logged Checked		Start End		Equipment, Methods and Remarks		Depth from to		Diameter Casing Depth		Ground Level Coordinates National Grid							
GW DB RC		25/01/2006 25/01/2006		Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 2.90m. Backfilled with bentonite.		0.00m 2.90m		200mm 2.90m		+15.32 mOD E 222770.45 N 122824.92							
Samples and Tests						Strata											
Depth		Type & No		Records		Date Casing Time Water		Description				Depth, Level (Thickness)		Legend	Backfill/ Instruments		
0.00-1.20		B 1				25/01/2006 1800 2.90		TOPSOIL: Brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to medium. Gravel is subangular to subrounded				(1.20)		1	1		
1.20-1.65 1.20-1.65 1.50		SPT C B 3 KFH		N=6 (1,0/0,1,2,3) SW=75		1.20 0.40		Soft to firm brown sandy gravelly CLAY Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)				1.20 +14.12 (0.45)		1	1		
2.00-2.38 2.00-2.45		SPT C B 5		50 (5,12/16,13,19,2 for 2mm)		2.00 0.40		Dense brown slightly clayey sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone. (GLACIAL DEPOSITS)				1.65 +13.67 (1.25)		2.00-2.45 m Slightly sandy			
2.50-2.90		B 6															
2.90-2.92		SPT C		50 (25 for 10mm/50 for 13mm)		2.90 0.40		EXPLORATORY HOLE ENDS AT 2.90 m				2.90 +12.42		2.90 m Driller Reports: Cobbles and boulders.			
Depth		Type & No		Records		Date Casing Time Water											
Groundwater Entries								Depth Related Remarks *				Chiselling					
No.		Struck (m)		Post strike behaviour		Depth sealed (m)		From to (m)				Depths (m)		Time	Tools used		
1		1.20		Rose to 0.40 m after 20 minutes. Fast Inflow		-						2.90 -2.90		60 mins			
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project Project No. Carried out for						River Suir Clonmel Drainage Scheme KC5218 G.Pettit & Company					
Scale 1:50						AGS						Borehole BH47A Sheet 1 of 1					

Borehole Log



Drilled RM Logged SC Checked RC		Start 26/01/2006 End 30/01/2006		Equipment, Methods and Remarks Cable Percussion 200mm diameter from 0.00m to 5.00m. Backfilled with grout.		Depth from 0.00m to 5.00m Diameter 200mm Casing Depth 3.00m		Ground Level Coordinates National Grid		
								+16.57 mOD E 222686.39 N 122768.36		
Samples and Tests					Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments		
0.00 0.00-0.50	KFH B 1	k=2.6E-5 m/s			TOPSOIL: Dark brown sandy slightly gravelly CLAY with rootlets. Sand is fine to coarse. Gravel is subangular fine to coarse.	(0.50)				
0.50-1.00	B 2					0.50 +16.07				
1.00-1.45 1.00-2.00	SPT C B 3	N=12 (2,3/3,2,3,4)	1.00		Firm brown slightly sandy slightly gravelly CLAY with cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded. (GLACIAL DEPOSITS)	(1.50)				
2.00-2.45 2.00-3.00	SPT C B 4	N=22 (4,6/6,5,6,5)	2.00			2.00 +14.57				
3.00-3.45 3.00-4.00	SPT C B 5	N=19 (2,3/5,5,5,4)	25/01/2006 3.00 3.00 30/01/2006 3.00	1800 2.40 2.40 0800 2.40						
4.00-4.45 4.00-5.00	SPT C B 6	N=22 (3,4/6,5,5,6)	4.50		Medium dense brown slightly clayey very sandy to sandy GRAVEL with cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded to rounded. (GLACIAL DEPOSITS)	(3.00)				
			30/01/2006	1800						
EXPLORATORY HOLE ENDS AT 5.00 m						5.00 +11.57				
Depth	Type & No	Records	Date Casing	Time Water						
Groundwater Entries No. Struck Post strike behaviour (m)			Depth sealed (m)		Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used			
None observed (see Key Sheet)					1.15 3.00 Water added to assist drilling.		1.15 -1.15 30 mins			
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project River Suir Clonmel Drainage Scheme			Borehole		
Scale 1:50					Project No. KC5218			BH48		
(c) ESGL www.esgl.co.uk 402.24 20/12/2006 10:58:50					Carried out for G.Pettit & Company			Sheet 1 of 1		

Borehole Log



Drilled RM Logged DB Checked RC	Start 31/01/2006 End 31/01/2006	Equipment, Methods and Remarks Cable Percussion 200mm diameter from 0.00m to 5.00m, 50mm standpipe installed.	Depth from 0.00m to 5.00m Diameter 200mm Casing Depth 5.00m	Ground Level +15.84 mOD Coordinates E 222905.88 National Grid N 122765.03
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Samples and Tests					Strata			Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description					
0.00-1.00	B 1				TOPSOIL: Brown red sandy slightly gravelly CLAY with occasional rootlets. Gravel is subangular to subrounded fine to coarse.			(1.00)		
1.00-1.45 1.00-2.00	SPT C B 2	N=12 (1,1/2,3,3,4)	1.00		Firm to very stiff brown red sandy slightly gravelly becoming very gravelly CLAY with occasional to many cobbles. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			1.00 +14.84		
1.55	KFH									
2.00-2.45 2.00-3.00	SPT C B 3	N=20 (4,5/5,4,5,6)	2.00							
3.00-3.45 3.00-4.00	SPT C B 4	N=32 (5,6/7,8,8,9)	3.00		3.00-5.00 m Very stiff			(4.00)		
4.00-4.45 4.00-5.00	SPT C B 5	N=38 (5,7/9,9,10,10)	4.00		4.00-5.00 m Becoming very gravelly					
5.00	KFH	k=6.4E-7 m/s	31/01/2006 5.00	1800	EXPLORATORY HOLE ENDS AT 5.00 m			5.00 +10.84		SP

Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)	Depth sealed (m)	Depth Related Remarks * From 1.00 to 4.00 Water added to assist drilling.	Chiselling Depths (m) 3.40 -3.80 Time 30 mins Tools used
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH49 Sheet 1 of 1
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Borehole Log



Drilled Logged Checked		Start End		Equipment, Methods and Remarks		Depth from to		Diameter Casing Depth		Ground Level Coordinates National Grid	
GW SC RC		26/01/2006 26/01/2006		Inspection Pit from 0.00m to 1.00m. Cable Percussion 200mm diameter from 0.00m to 8.00m. Backfilled with bentonite.		0.00m 8.00m		200mm 7.00m		+14.93 mOD E 223015.09 N 122879.02	
Samples and Tests						Strata					
Depth		Type & No	Records	Date Casing	Time Water	Description		Depth, Level (Thickness)	Legend	Backfill/ Instruments	
0.00-0.18 0.18-1.00		D 1 B 2				TOPSOIL: Dark brown sandy CLAY with grass and rootlets. Sand is fine to medium.		(1.00)			
1.00-1.45 1.00-1.45		SPT S B 4	N=1 (1,0/0,0,0,1) SW=75	0.00	0.40	Soft dark brown slightly sandy gravelly CLAY with cobbles. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are rounded. (GLACIAL DEPOSITS)		1.00 +13.93 (0.45) 1.45 +13.48			
2.00-2.45 2.00-2.45		SPT C B 6	N=18 (3,4/4,5,6,3)	2.00	0.40	Medium dense brown sandy GRAVEL with cobbles. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse. Cobbles are rounded. (GLACIAL DEPOSITS)		(2.55)			
3.00-3.45 3.00-3.45		SPT C B 8	N=20 (4,4/4,5,5,6)	3.00	0.40						
4.00-4.45 4.00-4.45 4.20		SPT C B 10 D 11	N=39 (4,4/5,6,20,8)	4.00	0.40	Very stiff brown slightly sandy slightly gravelly CLAY with cobbles. Sand is fine to coarse. Gravel is subangular fine to medium. Cobbles are subrounded to rounded fine to coarse. (GLACIAL DEPOSITS)		4.00 +10.93 4.20 +10.73			
5.00-5.45 5.00-5.45		SPT C B 13	N=35 (6,6/6,8,10,11)	5.00		Dense brown SAND and GRAVEL with occasional cobbles and brown pockets of clay. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subrounded. (GLACIAL DEPOSITS)		(1.80)			
6.00-6.45 6.00-6.40		SPT C B 15	N=38 (5,6/10,4,11,11)	6.00	0.40	Dense brown clayey sandy gravelly COBBLES and BOULDERS. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles and boulders are subangular of limestone. (GLACIAL DEPOSITS)		6.00 +8.93			
7.00-7.19 7.00-7.50		SPT C B 17	50 (12,13 for 46mm/ 50 for 67mm)	7.00	0.40			(2.00)			
8.00		KFH	k=3.1E-7 m/s	26/01/2006 7.00	1800	EXPLORATORY HOLE ENDS AT 8.00 m		8.00 +6.93			
Groundwater Entries		No. Struck		Post strike behaviour		Depth sealed (m)		Depth Related Remarks *		Chiselling Depths (m)	
1		1.00		Rose to 0.40 m after 20 minutes. Fast Inflow		-		From to (m)		7.60 -7.80 Time 30 mins Tools used	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project River Suir Clonmel Drainage Scheme					
Scale 1:50						Project No. KC5218					
(c) ESGL www.esgl.co.uk 402.24 20/12/2006 10:58:59						Carried out for G.Pettit & Company					
AGS						Borehole BH50 Sheet 1 of 1					

Borehole Log



Drilled Logged Checked		Start End		Equipment, Methods and Remarks		Depth from to		Diameter Casing Depth		Ground Level Coordinates National Grid							
GW DB RC		24/01/2006 24/01/2006		Inspection Pit form 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 8.00m. 50mm standpipe installed.		0.00m 8.00m		200mm 7.00m		+15.39 mOD E 223062.52 N 122819.24							
Samples and Tests						Strata											
Depth		Type & No	Records	Date Casing	Time Water	Description				Depth, Level/ (Thickness)	Legend	Backfill/ Instruments					
0.00-0.42		D 1				TOPSOIL: Brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine. Gravel is subangular to subrounded fine.				(0.42)							
0.42-1.20		B 2								Compacted (soft) brown orange sandy slightly gravelly SILT. Sand is fine to medium. Gravel is subangular to subrounded fine to medium.				0.42 +14.97			
1.20-1.65 1.30-1.65		SPT S B 3	N=5 (1,1/1,1,1,2)	1.20	dry					(1.58)							
1.95 2.00-2.45 2.00-2.45		D 5 SPT C B 7	N=11 (1,1/2,3,3,3)	2.00	0.60	Slightly clayey sandy gravelly COBBLES. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone.				2.00 +13.39 (0.45)							
3.00-3.45 3.00-3.45		SPT C B 9	N=16 (2,4/4,4,4,4)	3.00	0.60	Medium dense slightly silty slightly gravelly SAND with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone and limestone.				(0.55) 3.00 +12.94							
4.00-4.45 4.00-4.45		SPT C B 11	N=28 (4,5/7,7,7,7)	4.00	0.60	Medium dense to very dense grey sandy GRAVEL with occasional to many cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of limestone and sandstone.				(3.90)							
5.00-5.45 5.00-5.45		SPT C B 13	N=29 (5,4/7,7,7,8)	5.00	0.60												
5.58		D 14				5.58-6.00 m Driller Reports: Clay and gravel.											
6.00-6.34 6.00-6.45		SPT C B 16	50 (10,16/19,21,10 for 40mm)	6.00	1.40	6.00-6.45 m Slightly clayey sandy GRAVEL with cobbles.											
7.00-7.36 7.00-7.45		SPT C B 18	50 (12,13/17,17,16 for 62mm)	7.00	dry	Very stiff brown slightly sandy gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of limestone.				6.90 +8.49 (1.10)							
8.00 8.00		KFH D 19		24/01/2006 7.00	1800	EXPLORATORY HOLE ENDS AT 8.00 m				8.00 +7.39		SP					
Depth		Type & No	Records	Date Casing	Time Water	Groundwater Entries				Depth Related Remarks *		Chiselling Depths (m) Time Tools used					
						No. Struck (m) Post strike behaviour Depth sealed (m)				From to (m)		4.72 -4.82 35 mins 6.50 -6.80 60 mins					
						1 2.00 Rose to 0.60 m after 20 minutes. Slow Inflow -											
						2 6.00 Rose to 1.40 m after 20 minutes. Fast Inflow -											
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project River Suir Clonmel Drainage Scheme						Borehole					
Scale 1:50						Project No. KC5218						BH51					
(c) ES&L www.es&l.co.uk 402.24 20/12/2006 10:59:04						Carried out for G.Pettit & Company						Sheet 1 of 1					

Borehole Log



Drilled GW Logged SC Checked RC	Start 27/01/2006 End 27/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion from 0.00m to 5.00m. Backfilled with bentonite.	Depth from 0.00m to 5.00m Diameter 200mm Casing Depth 4.00m	Ground Level Coordinates National Grid +14.86 mOD E 223218.61 N 122819.90
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Samples and Tests					Strata			
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-0.21	D 1				TOPSOIL: Dark brown slightly sandy slightly gravelly CLAY with rootlets. Sand is fine to medium. Gravel is subrounded fine to medium.	0.21 +14.65	1	1
0.21-1.00	B 2					(0.89)		
1.00	D 3	N=4 (1,0/0,0,2,2) SW=75	1.10	0.40	Soft brown sandy slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium. (GLACIAL DEPOSITS)	1.10 +13.76	1	1
1.10-1.55	SPT C B 5							
1.10-1.55	B 5							
1.50	KFH	N=44 (2,6/14,14,8,8)	2.00	0.40	Brown slightly clayey slightly sandy becoming sandy slightly gravelly becoming very gravelly COBBLES and BOULDERS. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular to subrounded. (GLACIAL DEPOSITS)	2.00-2.45 m Slightly clayey sandy GRAVEL with cobbles.		
2.00-2.45	SPT C B 7							
2.00-2.45	B 7							
3.00-3.45	SPT C B 9	N=29 (5,8/8,8,6,7)	3.00	0.40		(3.90)		
3.00-3.45	B 9							
4.00-4.45	SPT C B 11	N=38 (6,10/11,8,9,10)	4.00	0.40				
4.00-4.45	B 11							
4.50-5.00	B 12							
5.00	KFH		27/01/2006	1800				
			4.00	0.40				
EXPLORATORY HOLE ENDS AT 5.00 m						5.00 +9.86		

Groundwater Entries No. Struck Post strike behaviour Depth sealed (m)			Depth Related Remarks * From to (m)			Chiselling Depths (m) Time Tools used 3.70 -3.80 30 mins		
1	1.10	Rose to 0.40 m after 20 minutes. Fast Inflow	-					

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH52 Sheet 1 of 1
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Borehole Log



Drilled MW Logged SC Checked RC	Start 26/01/2006 End 26/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 5.00m.	Depth from 0.00m to 5.00m Diameter 200mm Casing Depth 4.80m	Ground Level +14.87 mOD Coordinates E 223569.65 National Grid N 122778.68
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Samples and Tests					Strata			
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
1.20-1.65	U 1	100 blows	1.20	dry	Driller Reports: TOPSOIL.	(1.60)		
2.00-2.45 2.00-2.50	SPT C B 2	N=12 (1,0/2,3,3,4) SW=75	2.00	1.00	Driller Reports: Clayey brown SAND and GRAVEL. (GLACIAL DEPOSITS) Firm dark brown slightly sandy gravelly becoming slightly gravelly CLAY with rootlets. Sand is fine coarse. Gravel is subangular fine to medium. (GLACIAL DEPOSITS)	1.60 +13.27 (0.40) 2.00 +12.87 (0.50) 2.50 +12.37		
3.00-3.45 3.00-3.50	SPT C B 3	N=23 (3,4/5,6,6,6)	3.00	2.80	Firm to stiff dark brown slightly sandy gravelly becoming slightly gravelly CLAY. Sand is fine coarse. Gravel is subangular fine to medium. (GLACIAL DEPOSITS)	(1.00)		
3.50	D 4				3.00-3.50 m No rootlets.	3.50 +11.37		
4.00-4.45 4.00-4.50	SPT C B 5	N=27 (4,5/6,7,7,7)	4.00	dry	Stiff sandy very gravelly CLAY. Sand is fine to coarse. gravel is subangular fine to coarse. (GLACIAL DEPOSITS)	(1.50)		
5.00-5.23	SPT C	50 (6,15/40,10 for 0mm)	4.80	1800	EXPLORATORY HOLE ENDS AT 5.00 m	5.00 +9.87		

Groundwater Entries No. Struck (m) Post strike behaviour Depth sealed (m)	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used
1 1.60 Rose to 1.00 m after 20 minutes. Fast Inflow - 2 5.00 Rose to 3.90 m after 20 minutes. Fast Inflow -		4.80 -5.00 30 mins

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH53 Sheet 1 of 1
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Borehole Log



Drilled MW Logged SC Checked RC	Start 26/01/2006 End 26/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 5.00m.	Depth from 0.00m to 5.00m Diameter 200mm Casing Depth 4.80m	Ground Level +14.87 mOD Coordinates E 223569.65 National Grid N 122778.68
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Samples and Tests					Strata			
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
1.20-1.65	U 1	100 blows	1.20	dry	Driller Reports: TOPSOIL.	(1.60)		
2.00-2.45 2.00-2.50	SPT C B 2	N=12 (1,0/2,3,3,4) SW=75	2.00	1.00	Driller Reports: Clayey brown SAND and GRAVEL. (GLACIAL DEPOSITS) Firm dark brown slightly sandy gravelly becoming slightly gravelly CLAY with rootlets. Sand is fine coarse. Gravel is subangular fine to medium. (GLACIAL DEPOSITS)	1.60 +13.27 (0.40) 2.00 +12.87 (0.50) 2.50 +12.37		
3.00-3.45 3.00-3.50	SPT C B 3	N=23 (3,4/5,6,6,6)	3.00	2.80	Firm to stiff dark brown slightly sandy gravelly becoming slightly gravelly CLAY. Sand is fine coarse. Gravel is subangular fine to medium. (GLACIAL DEPOSITS)	(1.00)		
3.50	D 4					3.00-3.50 m No rootlets.		
4.00-4.45 4.00-4.50	SPT C B 5	N=27 (4,5/6,7,7,7)	4.00	dry	Stiff sandy very gravelly CLAY. Sand is fine to coarse. gravel is subangular fine to coarse. (GLACIAL DEPOSITS)	3.50 +11.37 (1.50)		
5.00-5.23	SPT C	50 (6,15/40,10 for 0mm)	26/01/2006 4.80 4.80	1800 4.80 4.80	EXPLORATORY HOLE ENDS AT 5.00 m	5.00 +9.87		

Groundwater Entries No. Struck Post strike behaviour Depth sealed (m) 1 1.60 Rose to 1.00 m after 20 minutes. Fast Inflow - 2 5.00 Rose to 3.90 m after 20 minutes. Fast Inflow -	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used 4.80-5.00 30 mins
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH53 Sheet 1 of 1
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Borehole Log



Drilled MW Logged DB Checked RC	Start 26/01/2006 End 26/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 7.20m. 50mm standpipe installed.	Depth from 0.00m to 7.20m Diameter 200mm Casing Depth 7.20m	Ground Level +14.46 mOD Coordinates E 223676.43 National Grid N 122731.05
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Samples and Tests					Strata			Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description					
1.00	D 1				TOPSOIL: Brown sandy gravelly CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium.		(0.90)			
1.20-1.65 1.20-1.70	SPT C B 2	N=14 (2,2/3,3,4,4)	1.20	damp	Firm brown sandy gravelly CLAY with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of limestone. (GLACIAL DEPOSITS)	1.20-1.70 m Clayey very sandy GRAVEL.	0.90 +13.56 (1.80)			
2.00-2.45 2.00-2.50	SPT C B 3	N=14 (3,3/3,4,4,3)	2.00	damp						
3.00-3.45 3.00-3.50	SPT C B 4	N=11 (1,-/2,3,3,3)	3.00	1.50	Medium dense clayey sandy becoming very sandy GRAVEL with occasional to many cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded of limestone. (GLACIAL DEPOSITS)		2.70 +11.76			
4.00-4.45 4.00-4.50	SPT C B 5	N=24 (4,5/6,6,6,6)	4.00	3.20						
5.00-5.45 5.00-5.50	SPT C B 6	N=23 (4,4/5,6,6,6)	5.00	1.40		5.00-7.00 m Becoming very sandy. Sand is fine to medium.	(4.50)			
6.50-6.95 6.50-7.00	SPT C B 7	N=28 (4,5/6,7,7,8)	6.50	2.00						
7.20-7.50	SPT C	50 (10,15/25,25,- for 9mm)	26/01/2006 7.20	1800 7.20	EXPLORATORY HOLE ENDS AT 7.20 m		7.20 +7.26			SP

Groundwater Entries No. 1 Struck (m) 2.70 Post strike behaviour Rose to 2.40 m after 20 minutes. Fast Inflow Depth sealed (m) -	Depth Related Remarks * From 7.00 to 7.20 (m)	Chiselling Depths (m) 7.00 - 7.20 Time 60 mins Tools used
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Borehole Log



Drilled RM Logged BD Checked RC	Start 19/12/2005 End 20/12/2005	Equipment, Methods and Remarks Cable Percussion 200mm diameter from 0.00m - 8.00m. Backfilled with bentonite.	Depth from 0.00m to 8.00m Diameter 200mm Casing Depth 8.00m	Ground Level Coordinates National Grid +15.47 mOD E 223706.41 N 122661.32
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Samples and Tests					Strata			Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description					
0.00-1.00	B 1				Becoming very stiff brown slightly sandy gravelly becoming very gravelly CLAY with occasional cobbles and occasional rootlets. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of mixed lithology. (GLACIAL DEPOSITS)					
1.00-1.45 1.00-2.00	SPT C B 2	N=36 (4,5/7,9,10,10)	1.00			(2.00)				
2.00-2.45 2.00-3.00	SPT C B 3	N=36 (5,6/9,9,7,11)	2.00		Dense brown slightly clayey slightly sandy GRAVEL with cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of limestone and sandstone. (GLACIAL DEPOSITS)	2.00	+13.47			
3.00-3.45 3.00-4.00	SPT C B 4	N=41 (5,9/11,9,10,11)	19/12/2005 3.00 3.00	1800 0.86	Dense brown clayey gravelly becoming very gravelly SAND with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone. (GLACIAL DEPOSITS)	3.00	+12.47			
			20/12/2005 3.00	0800 0.85						
4.00-4.45 4.00-5.00	SPT C B 5	N=41 (6,8/9,9,10,13)	4.00		4.00-5.00 m Very gravelly	(2.00)				
5.00-5.45 5.00-5.60	SPT C B 6	N=34 (5,6/8,9,9,8)	5.00		Medium dense to dense brown clayey very gravelly SAND with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone. (GLACIAL DEPOSITS)	5.00	+10.47			
5.60-6.05 5.60-6.50	SPT C B 7	N=19 (2,3/4,4,5,6)	5.60		Medium dense brown silty becoming very silty gravelly SAND with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of mixed lithology. (GLACIAL DEPOSITS)					
6.50-6.95 6.50-7.50	SPT C B 8	N=21 (3,4/5,6,5,5)	6.50			6.60	+8.87			
7.50-7.95 7.50-8.00	SPT C B 9	N=33 (4,5/7,8,8,10)	7.50		(1.40)					
8.00	KFH	k=7.5E-7 m/s	20/12/2005 8.00	1800	EXPLORATORY HOLE ENDS AT 8.00 m	8.00	+7.47			

Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)	Depth sealed (m)	Depth Related Remarks * From to (m) 0.00 1.00 Water added to assist drilling.	Chiselling Depths (m) Time Tools used 2.00 -2.30 30 mins 2.30 -2.40 45 mins 4.20 -4.60 30 mins 5.10 -5.40 30 mins 5.40 -5.60 45 mins
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH55 Sheet 1 of 1
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Borehole Log



Drilled PM Logged DB Checked RC	Start 06/01/2006 End 09/01/2006	Equipment, Methods and Remarks Cable Percussion 200mm diameter from 0.00m to 5.10m. 50mm standpipe installed. Permeability test - water level approx 1 cm after 60 minutes.	Depth from 0.00m to 5.10m Diameter 200mm Casing Depth	Ground Level +16.22 mOD Coordinates E 223565.15 National Grid N 122557.06
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Samples and Tests					Strata			Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description					
0.00-1.00	B 1				Brown slightly sandy gravelly CLAY with occasional rootlets and plant material. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			(1.00)		
1.00-1.45 1.00-2.00	SPT S B 3	N=11 (2,3/4,1,2,4)		1.25	Firm brown becoming slightly mottled orange slightly sandy gravelly CLAY with rare cobbles rootlets and plant material. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular of sandstone. (GLACIAL DEPOSITS)			1.00 +15.22 (1.00)		
2.00-3.00	B 4			2.10	Medium dense brown slightly clayey sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse Cobbles are subangular to subrounded of sandstone and limestone. (GLACIAL DEPOSITS)			2.00 +14.22		
3.00-3.45 3.00-4.00	SPT C B 5	N=17 (3,2/3,6,5,3)		2.50				(3.10)		
4.00-4.45	SPT C	N=18 (6,7/4,5,3,6)								
5.10	KFH	k=4.1E-8 m/s	06/01/2006 1800 09/01/2006 2.80 09/01/2006 0800		EXPLORATORY HOLE ENDS AT 5.10 m			5.10 +11.12		SP

Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)	Depth sealed (m)	Depth Related Remarks * From to (m)	Chiselling Depths (m) Time Tools used
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH56 Sheet 1 of 1
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Borehole Log



Drilled PM Logged DB Checked RC	Start 19/12/2005 End 19/12/2005	Equipment, Methods and Remarks Inspection Pit from 0.00m to 0.80m. Cable Percussion 200mm diameter from 0.00m to 4.45m. Backfilled with bentonite.	Depth from 0.00m	to 4.45m	Diameter 200mm	Casing Depth 3.20m	Ground Level Coordinates National Grid +18.96 mOD E 220303.54 N 122117.38
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Samples and Tests				Strata			Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description				
0.37-1.50	B 1				MADE GROUND: Concrete.	(0.37)			
					MADE GROUND: Brown mottled black and grey sandy gravelly CLAY with occasional cobbles, brick and wood.	0.37 +18.59			
						(1.13)			
1.50-1.95 1.50-2.50	SPT S B 3	N=16 (5,6/3,2,7,4)		dry	Firm to stiff brown red sandy slightly gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of sandstone. (GLACIAL DEPOSITS)	1.50 +17.46			
2.50-2.95	SPT S	N=13 (3,2/2,3,4,4)		dry					
3.20-4.45	KFH	k=1.3E-8 m/s							
			19/12/2005	1800					
			3.20	dry					
					2.50-2.95 m Slightly mottled black	(2.95)			
					EXPLORATORY HOLE ENDS AT 4.45 m	4.45 +14.51			

Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)	Depth sealed (m) 	Depth Related Remarks * From to (m)	Chiselling Depths (m) 2.00-2.40 3.85-4.00 4.00-4.45	Time 10 mins 60 mins 60 mins	Tools used
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH57 Sheet 1 of 1
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Borehole Log



Drilled GW Logged DB Checked RC	Start 30/01/2006 End 30/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.20m. Cable Percussion 200mm diameter from 0.00m to 8.00m. Backfilled with bentonite.	Depth from 0.00m to 8.00m Diameter 200mm Casing Depth 7.00m	Ground Level Coordinates National Grid +18.67 mOD E 221517.77 N 122408.03
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Samples and Tests				Strata			Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description				
0.00-0.28	D 1				TOPSOIL: Brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to medium.	(0.28)			
0.28-1.10	B 2					0.28-1.10 m Driller Reports: Bricks	0.28 +18.39		
1.10	D 3				Brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is subangular to subrounded fine to medium. (GLACIAL DEPOSITS)	(0.82)			
1.20-1.65	SPT S	N=23 (4,5/6,6,6,5)	0.00				1.10 +17.57		
1.20-1.65	B 5								
2.00-2.45	SPT C	N=30 (6,6/6,6,8,8)	2.00		Medium dense brown clayey very sandy GRAVEL. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)	(0.90)			
2.00-2.45	B 7						2.00 +16.67		
3.00-3.45	SPT C	N=24 (6,7/7,6,5,6)	3.00		Medium dense to dense SAND and GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of limestone. (GLACIAL DEPOSITS)	(4.00)			
3.00-3.45	B 9								
4.00-4.45	SPT C	N=28 (7,6/6,6,8,8)	4.00			4.00-4.45 m Becoming more gravelly with depth			
4.00-4.45	B 11								
5.00-5.45	SPT C	N=18 (4,3/4,4,5,5)	5.00		Medium dense to very dense sandy GRAVEL with occasional cobbles. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded of limestone. (GLACIAL DEPOSITS)	(2.00)			
5.00-5.45	B 13					5.00-5.45 m Slightly clayey SAND and GRAVEL, becoming more sandy with depth.	6.00 +12.67		
6.00-6.45	SPT C	N=22 (5,5/5,5,6,6)	6.00						
6.00-6.45	B 15								
7.00-7.32	SPT C	50 (10,10/19,22,9 for 16mm)	7.00		EXPLORATORY HOLE ENDS AT 8.00 m	(2.00)			
7.00-7.45	B 17					7.00-7.32 m Very dense			
7.50-8.00	B 18								
8.00	KFH		30/01/2006 7.00	1800		8.00 +10.67			

Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)	Depth sealed (m) (m)	Depth Related Remarks * From to (m) 1.10 8.00 Water added to assist drilling.	Chiselling Depths (m) 2.80 -2.85 7.50 -7.60 Time 30 mins 25 mins Tools used
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BH58 Sheet 1 of 1
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Borehole Log



Drilled RM Logged SC Checked RC		Start 30/01/2006 End 30/01/2006	Equipment, Methods and Remarks Inspection Pit from 0.00m to 1.30m. Cable Percussion 200mm diameter from 0.00m to 5.00m. Backfilled with bentonite.		Depth from 0.00m	to 5.00m	Diameter 200mm	Casing Depth 5.00m	Ground Level Coordinates National Grid	+18.51 mOD E 221568.43 N 122424.96	
Samples and Tests					Strata						
Depth	Type & No	Records	Date Casing	Time Water	Description				Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
0.00-1.00	B 1				TOPSOIL: Dark brown clayey sandy GRAVEL with cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded.				(1.00)		
1.00-1.45 1.00-2.00	SPT C B 2	N=22 (3,4/5,5,6,6)	1.00		Medium dense to dense brown slightly clayey very sandy GRAVEL with cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular to subrounded. (GLACIAL DEPOSITS)				1.00 +17.51		
2.00-2.45 2.00-3.00	SPT C B 3	N=30 (4,6/9,8,6,7)	2.00						(3.00)		
3.00-3.45 3.00-4.00	SPT C B 4	N=38 (6,8/8,9,10,11)	3.00								
4.00-4.45 4.00-5.00	SPT C B 5	N=41 (7,8/10,10,11,10)	4.00		Medium dense brown sandy GRAVEL with cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded. (GLACIAL DEPOSITS)				4.00 +14.51 (1.00)		
5.00	KFH	k=1.1E-6 m/s	30/01/2006 5.00	1800 3.00	EXPLORATORY HOLE ENDS AT 5.00 m				5.00 +13.51		
Depth	Type & No	Records	Date Casing	Time Water	Groundwater Entries				Depth Related Remarks *		
No. Struck Post strike behaviour (m)			Depth sealed (m)		From to (m)				Chiselling Depths (m) Time Tools used		
None observed (see Key Sheet)					1.00 5.00 Water added to assist drilling.				3.70-4.00 30 mins		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project River Suir Clonmel Drainage Scheme					Borehole	
Scale 1:50					Project No. KC5218					BH59	
(c) ESGL www.esgl.co.uk 402.24 20/12/2006 10:59:44					Carried out for G. Pettit & Company					Sheet 1 of 1	

Borehole Log



Drilled MN Logged Checked RC	Start 22/03/2006 End 22/03/2006	Equipment, Methods and Remarks Rotary Open Hole 150mm diameter from 0.00m to 10.00m. Backfilled with grout.	Depth from 0.00m to 10.00m Diameter 150mm Casing Depth 10.00m	Ground Level +18.58 mOD Coordinates E 220317.90 National Grid N 122019.85
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Samples and Tests					Strata			
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
1.50-1.95 1.50	SPT S D 1	N=15 (3,6/5,4,3,3)	1.50		Driller Reports: MADE GROUND.	(1.80)		
3.00-3.45 3.00	SPT S D 2	N=28 (4,19/10,4,4,10)	3.00		Driller Reports: CLAY / GRAVEL. (GLACIAL DEPOSITS)	1.80 +16.78		
4.50-4.85 4.50	SPT S D 3	50 (10,13/8,23,19 for 45mm)	4.50					
6.00-6.17 6.00	SPT S D 4	50 (4,8/50 for 20mm)	6.00			(8.20)		
7.50-7.88 7.50	SPT S D 5	50 (9,5/7,16,27, for 0mm)	7.50					
9.00-9.45 9.00	SPT S D 6	N=39 (8,15/15,9,7,8)	9.00					
			22/03/2006 10.00	1800 2.80	EXPLORATORY HOLE ENDS AT 10.00 m			

Groundwater Entries No. Struck Post strike behaviour 1 2.50 -	Depth sealed (m) -	Depth Related Remarks * From to (m) 0.00 10.00 Flush type: Air.	Chiselling Depths (m) Time Tools used
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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402.24 2012/2006 10.53.15

Project River Suir Clonmel Drainage Scheme
Project No. KC5218
Carried out for G. Pettit & Company

Borehole
BHR60
Sheet 1 of 1

Borehole Log



Drilled MN Logged Checked RC	Start 22/03/2006 End 22/03/2006	Equipment, Methods and Remarks Rotary Open Hole 150mm diameter from 0.00m to 10.00m. Backfilled with grout.	Depth from 0.00m to 10.00m Diameter 150mm Casing Depth 10.00m	Ground Level +18.57 mOD Coordinates E 220318.66 National Grid N 122077.52
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Samples and Tests				Strata			Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No	Records	Date Casing	Time Water	Description				
1.50-1.95 1.50	SPT S D 1	N=20 (2,2/3,4,6,7)	1.50		Driller Reports: CLAY. (GLACIAL DEPOSITS)	(1.50)			
3.00-3.45 3.00	SPT S D 2	N=18 (1,1/1,3,7,7)	3.00		Driller Reports: SAND. (GLACIAL DEPOSITS)	1.50 +17.07 (2.00)			
4.50-4.95 4.50	SPT S D 3	N=34 (3,5/11,10,6,7)	4.50		Driller Reports: CLAY / GRAVEL bands. (GLACIAL DEPOSITS)	3.50 +15.07 (2.50)			
6.00-6.37 6.00	SPT S D 4	50 (2,4/7,14,29 for 70mm)	6.00		Driller Reports: Light brown CLAY / GRAVEL. (GLACIAL DEPOSITS)	6.00 +12.57 (4.00)			
7.50-7.95 7.50	SPT S D 5	N=26 (3,4/6,9,4,7)	7.50						
9.00-9.45 9.00	SPT S D 6	N=37 (4,7/6,9,12,10)	9.00						
			22/03/2006 10.00	1800 2.80	EXPLORATORY HOLE ENDS AT 10.00 m				

Groundwater Entries No. 1 Struck (m) 2.50 Post strike behaviour -	Depth sealed (m) -	Depth Related Remarks * From 0.00 to 10.00 Flush type: Air.	Chiselling Depths (m) - Time - Tools used -
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Borehole BHR61 Sheet 1 of 1
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Trial Pit Log





Logged ROD Checked RC	Start 24/11/2005 End 24/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB 3CX	Dimensions and Orientation Width 0.87 m Length 2.10 m 	Ground Level +18.08 mOD Coordinates E 220340.63 National Grid N 122131.61		
Samples and Tests			Strata	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description			
0.40 0.40	B 1 D 2		1 MADE GROUND: Slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse 0.40 m Slightly clayey very sandy GRAVEL.	(1.00)		
			EXPLORATORY HOLE ENDS AT 1.00 m	1.00 +17.08		
Depth	Type & No.	Records Date				
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)	Stability Good Shoring Weather		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402.24 20/12/2006 11:10:31			Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Trial Pit TP16 Sheet 1 of 1		

Trial Pit Log



Logged ROD Checked RC	Start 25/11/2005 End 25/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB 3CX	Dimensions and Orientation Width 0.65 m Length 2.70 m 	Ground Level Coordinates National Grid	+16.90 mOD E 221154.48 N 122465.41
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Samples and Tests			Strata		Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description				
			1 TOPSOIL: Light brown slightly sandy slightly gravelly CLAY with frequent rootlets.		0.20 +16.70		
0.80 0.80	B 1 D 2		2 MADE GROUND: Firm dark brown slightly sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to medium. Gravel is subrounded to rounded fine to coarse.	0.80 m CLAY / SILT.	(0.80)		
1.70 1.70	B 3 D 4		3 MADE GROUND: Soft to firm slightly clayey slightly gravelly SAND with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular to subrounded.	1.70 m Clayey SAND and GRAVEL.	1.00 +15.90	(1.00)	
2.50 2.50	B 5 D 6		4 Brown SAND and GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse. (GLACIAL DEPOSITS)		2.00 +14.90	(0.50)	
			EXPLORATORY HOLE ENDS AT 2.50 m		2.50 +14.40		

Groundwater Entries No. Struck Post Strike Behaviour (m) 1 2.40 -	Depth Related Remarks * From to (m) 2.50 Pit terminated due to poor stability and groundwater inflow.	Stability Shoring Weather	Pool below 2.00m None
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25	Project Project No. Carried out for	River Suir Clonmel Drainage Scheme KC5218 G. Pettit & Company	Trial Pit TP20 Sheet 1 of 1
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Trial Pit Log



Logged ROD Checked RC		Start 25/11/2005 End 25/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB 3CX	Dimensions and Orientation Width 0.68 m Length 3.10 m	Ground Level Coordinates National Grid	+16.47 mOD E 221332.32 N 122448.10
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
			1 TOPSOIL: Soft to firm brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine to medium.	(0.50)		
1.00 1.00	B 1 D 2		2 Firm brown slightly sandy CLAY. Sand is fine. (ALLUVIUM)	0.50 +15.97		
			1.00 m Sandy SILT / CLAY.	(1.10)		
1.90 1.90	B 3 D 4		3 Soft brown slightly silty SAND. Sand is fine to medium. (ALLUVIUM)	1.60 +14.87		
			1.90 m Very silty very gravelly	(0.70)		
2.50 2.50	B 5 D 6		4 Grey SAND and GRAVEL with occasional cobbles. Sand is medium to coarse. Gravel is subrounded to rounded fine to coarse. Cobbles are subrounded to rounded. (GLACIAL DEPOSITS)	2.30 +14.17		
			(0.40)			
			EXPLORATORY HOLE ENDS AT 2.70 m	2.70 +13.77		
Depth	Type & No.	Records Date				
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 2.40 -			Depth Related Remarks * From to (m) 2.70 Pit terminated due to poor stability and groundwater inflow.		Stability Becoming Poor Shoring None Weather	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G. Pettit & Company		Trial Pit TP21 Sheet 1 of 1	
Scale 1:25 (c) ESGL www.esgl.co.uk 402.24 20/12/2006 11.10.40						

Trial Pit Log



Logged ROD Checked RC	Start 25/11/2005 End 25/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB 3CX	Dimensions and Orientation Width 0.50 m Length 2.70 m 039 (Deg)	Ground Level Coordinates National Grid	+16.25 mOD E 221664.82 N 122606.55
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Samples and Tests			Strata		Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description				
			1 TOPSOIL: Firm dark brown slightly sandy slightly gravelly CLAY and many rootlets. Sand is fine to coarse. Gravel is angular to subangular fine to coarse.		(0.30)		
1.00 1.00	B 1 D 2		2 MADE GROUND: Firm dark brown slightly sandy gravelly CLAY with bricks, building waste and occasional cobbles. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular of sandstone.		0.30 +15.95 (0.90)		
1.50 1.50	B 3 D 4		3 Stiff brown slightly sandy CLAY. Sand is fine to coarse. (ALLUVIUM)		1.20 +15.05 (0.50)		
2.10 2.10	B 5 D 6		4 SAND and GRAVEL. Sand is medium to coarse. Gravel is subrounded to rounded fine to coarse. (GLACIAL DEPOSITS)		1.70 +14.55 (0.50)		
			EXPLORATORY HOLE ENDS AT 2.20 m	2.10 m Slightly clayey very sandy GRAVEL with cobbles.	2.20 +14.05		

Groundwater Entries No. Struck Post Strike Behaviour (m) 1 1.80 Inflow 2 2.20 Inflow	Depth Related Remarks * From to (m) 2.20 Pit terminated due to groundwater inflow.	Stability Poor below 1.7m. Shoring None Weather
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G. Pettit & Company	Trial Pit TP23 Sheet 1 of 1

Trial Pit Log



Logged ROD Checked RC	Start 28/11/2005 End 28/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB CX	Dimensions and Orientation Width 0.67 m Length 2.80 m 053 (Deg)	Ground Level Coordinates National Grid +16.08 mOD E 221858.01 N 122582.21
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Samples and Tests			Strata		Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description				
0.80 0.80	B 1 D 2		1 TOPSOIL: Soft dark brown slightly sandy CLAY. Sand is fine.		0.00-0.10 m Occasional rootlets.	(1.20)	
1.60 1.60	B 3 D 4		2 Firm brown slightly sandy CLAY. Sand is fine. (ALLUVIUM)			1.20 +14.88 (1.00)	
2.50 2.50	B 5 D 6		3 Grey slightly clayey gravelly SAND with occasional cobbles. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse. Cobbles are subrounded. (GLACIAL DEPOSITS)		2.50 m Very clayey very sandy GRAVEL with cobbles.	2.20 +13.88 (0.70)	
			EXPLORATORY HOLE ENDS AT 2.90 m			2.90 +13.18	

Groundwater Entries No. Struck Post Strike Behaviour (m) 1 2.90 Strong inflow	Depth Related Remarks * From to (m) 2.90 Pit terminated due to poor stability and groundwater inflow.	Stability Excellent above 2.2m poor below 2.20m. Shoring None Weather
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402.24 20/12/2006 11:10:53	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Trial Pit TP24 Sheet 1 of 1
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Trial Pit Log



Logged ROD Checked RC		Start 28/11/2005 End 28/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB 3CX	Dimensions and Orientation Width 0.68 m Length 2.90 m		Ground Level Coordinates National Grid	+16.66 mOD E 222120.81 N 122672.97	
Samples and Tests			Strata					
Depth	Type & No.	Date Records	Description			Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.50 0.50	B 1 D 2		1 MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse. Cobbles are subrounded to rounded.			(0.95)		
1.10 1.10	B 3 D 4		2 MADE GROUND: Stiff dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.			0.95 +15.71 (0.55)		
1.60 1.60	B 5 D 6		3 MADE GROUND: Slightly sandy slightly gravelly CLAY with bricks, plastic and bones. Sand is fine to coarse. Gravel is subangular fine to coarse.			1.50 +15.16 (0.30)		
2.80 2.80	B 7 D 8		4 Firm to stiff black mottled brown slightly peaty SILT. (ALLUVIUM)			1.80 +14.86 (1.70)		
3.60 3.60	D 10 B 9		5 Dark grey silty very sandy GRAVEL. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse. (GLACIAL DEPOSITS)			3.50 +13.16 3.70 +12.96		
			EXPLORATORY HOLE ENDS AT 3.70 m					
Depth	Type & No.	Records Date						
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 3.70 Inflow			Depth Related Remarks * From to (m) 3.70 Pit terminated due to poor stability and rapid groundwater inflow.			Stability Poor below 3.50m. Shoring None Weather		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402 24 20/12/2006 11:10:56 			Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company			Trial Pit TP25 Sheet 1 of 1		

Trial Pit Log



Logged ROD Checked RC	Start 28/11/2005 End 28/11/2005	Equipment, Methods and Remarks EXcavated Pit with a JCB 3CX	Dimensions and Orientation Width 0.62 m Length 2.10 m 	Ground Level Coordinates National Grid	+16.81 mOD E 222189.72 N 122637.56
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Samples and Tests			Strata	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description			
0.15			1 TOPSOIL: Soft to firm brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.	+16.66		
0.40	B 1		2 Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium. (GLACIAL DEPOSITS)	(0.45)		
0.40	D 2					
0.60			3 Grey slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse. (GLACIAL DEPOSITS)	+16.21		
0.80	B 3			(1.40)		
0.80	D 4					
1.90	B 5		EXPLORATORY HOLE ENDS AT 2.00 m			
1.90	D 6					
2.00				+14.81		

Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)	Depth Related Remarks * From to (m) 2.00 Pit terminated due to side wall instability	Stability Poor Shoring None Weather
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402.24 20/12/2006 11.11.03	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Trial Pit TP26 Sheet 1 of 1
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Trial Pit Log



Logged ROD Checked RC	Start 28/11/2005 End 28/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB CX	Dimensions and Orientation Width 0.67 m Length 3.10 m 	Ground Level +16.40 mOD Coordinates E 222184.11 National Grid N 122535.18
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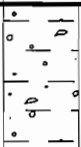

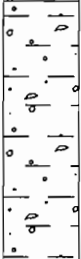
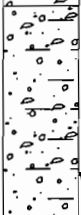

Samples and Tests			Strata		Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description				
0.50 0.50	B 1 D 2		1 TOPSOIL: Firm dark brown slightly sandy slightly gravelly CLAY with many rootlets. Sand is fine to medium. Gravel is subangular fine to medium.		(0.35)		
1.70 1.70	B 3 D 4		2 Soft light grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)		0.35 +16.05 (0.65)		
			3 Light grey slightly clayey becoming clayey very sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse. Cobbles are subrounded. (GLACIAL DEPOSITS)		1.00 +15.40 (1.00)		
			1.70-2.00 m Becoming clayey				
			EXPLORATORY HOLE ENDS AT 2.00 m		2.00 +14.40		

Groundwater Entries No. Struck Post Strike Behaviour (m) 1 2.00 Slight inflow	Depth Related Remarks * From to (m) 2.00 Pit terminated due to poor side wall instability	Stability Very poor below 1.00m Shoring None Weather
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402 24 20/12/2006 11:11.07	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Trial Pit TP27 Sheet 1 of 1
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Trial Pit Log



Logged ROD Checked RC		Start 29/11/2005 End 29/11/2005	Equipment, Methods and Remarks EXcavated Pit with a JCB 3CX	Dimensions and Orientation Width 1.00 m Length 2.70 m 		Ground Level Coordinates National Grid	+15.99 mOD E 222795.98 N 122743.56
Samples and Tests			Strata				
Depth	Type & No.	Date Records	Description		Depth, Level (Thickness)	Legend	Backfill/ Instruments
			1 Soft dark brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine. (GLACIAL DEPOSITS)		(0.50)		
0.80 0.80	B 1 D 2		2 Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine to coarse. (GLACIAL DEPOSITS)		0.50 +15.49 (0.90)		
1.40 1.40	B 3 D 4		3 Slightly clayey sandy to very sandy GRAVEL. Sand is fine to medium. Gravel is angular fine to coarse. (GLACIAL DEPOSITS)		1.40 +14.59 (0.70)		
			EXPLORATORY HOLE ENDS AT 2.10 m			2.10 +13.89	
Depth	Type & No.	Records Date					
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 2.00 Slight inflow			Depth Related Remarks * From to (m) 2.10 Pit terminated due to groundwater inflow and side walls collapsing.		Stability Poor below 1.4m. Shoring None Weather		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402.24 20/12/2006 11.11.12 			Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company		Trial Pit TP28 Sheet 1 of 1		

Trial Pit Log



Logged ROD Checked RC	Start 28/11/2005 End 28/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB 3CX	Dimensions and Orientation Width 0.68 m Length 3.00 m 	Ground Level Coordinates National Grid +15.32 mOD E 222930.50 N 122852.66
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Samples and Tests			Strata		Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description				
0.30 0.30	B 1 D 2		1 TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to medium. Gravel is subangular fine to medium.		(0.70)		
1.50 1.50	B 3 D 4		2 Grey brown slightly clayey SAND and GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)		0.70 +14.62 (1.20)		
			1.50 m Slightly clayey sandy GRAVEL with cobbles.				
			EXPLORATORY HOLE ENDS AT 1.90 m		1.90 +13.42		

Groundwater Entries No. Struck Post Strike Behaviour (m) 1 1.40 Strong inflow	Depth Related Remarks * From to (m) 1.90 Pit terminated due to side walls collapsing and poor instability	Stability Poor Shoring None Weather
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Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402.24 20/12/2006 11:11:16	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Trial Pit TP29 Sheet 1 of 1
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Trial Pit Log



Logged ROD Checked RC		Start 29/11/2005 End 29/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB 3CX	Dimensions and Orientation Width 1.00 m Length 3.00 m 185 (Deg)	Ground Level Coordinates National Grid	+15.56 mOD E 222945.76 N 122809.58	
Samples and Tests			Strata		Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description				
			1 TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine to medium.		(0.40)		
1.00 1.00	B 1 D 2		2 Soft to firm brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine to medium. (GLACIAL DEPOSITS)		0.40 +15.16 (1.00)		
			3 Light brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)		1.40 +14.16 (0.40)		
1.80 1.80	B 3 D 4		EXPLORATORY HOLE ENDS AT 1.80 m		1.80 +13.76		
Depth	Type & No.	Records Date	Depth Related Remarks *		Stability	Poor below 1.4m.	
Groundwater Entries No. Struck Post Strike Behaviour (m)			From to (m)		Shoring Weather		
1 1.80 Moderate inflow			1.80 Pit terminated due to pit flooding with water and side wall collapsing.				
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project River Suir Clonmel Drainage Scheme		Trial Pit		
Scale 1:25 <small>(c) ESGL www.esgl.co.uk 402.24 20/12/2005 11:11 21</small>			Project No. KC5218 Carried out for G.Pettit & Company		TP30 Sheet 1 of 1		

Trial Pit Log



Logged ROD Checked RC	Start 29/11/2005 End 29/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB 3X	Dimensions and Orientation Width 0.90 m Length 2.70 m 030 (Deg)	Ground Level Coordinates National Grid	+14.91 mOD E 223129.76 N 122841.06
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Samples and Tests			Strata	Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description			
0.20 0.20	B 1 D 2		1 Soft dark brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine to medium. (GLACIAL DEPOSITS)	(0.46)		
			2 Slightly clayey SAND and GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)	0.46 +14.45 (0.34)		
0.80 0.80	B 3 D 4		3 Clayey sandy GRAVEL with cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)	0.80 +14.11 0.90 +14.01		
			EXPLORATORY HOLE ENDS AT 0.90 m			

Groundwater Entries No. Struck Post Strike Behaviour (m) 1 0.87 Moderate inflow	Depth Related Remarks * From to (m) 0.90 Pit terminated due to very poor instability and groundwater inflow	Stability Very poor below 0.46m Shoring None Weather
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402.24 20/12/2005 11:11:25	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Trial Pit TP31 Sheet 1 of 1

Trial Pit Log



Logged DB Checked RC		Start 26/01/2006 End 26/01/2006	Equipment, Methods and Remarks Excavated Pit with a JCB 3CX	Dimensions and Orientation Width 0.67 m Length 2.84 m	Ground Level Coordinates National Grid		+14.73 mOD E 223783.44 N 122706.11	
Samples and Tests			Strata					
Depth	Type & No.	Date Records	Description			Depth, Level (Thickness)	Legend	Backfill/ Instruments
			1 TOPSOIL: Grass over rootlets.			(0.30)		
0.50-0.60 0.50-0.60	B 1 D 2		2 Compact (soft) brown slightly mottled grey slightly sandy slightly gravelly SILT with rare rootlets. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse. (GLACIAL DEPOSITS)			0.30 +14.43 (0.90)		
1.10-1.20 1.10-1.20	B 3 D 4		1.00-1.20 m Becoming more gravelly.					
			EXPLORATORY HOLE ENDS AT 1.20 m			1.20 +13.53		
Depth	Type & No.	Records Date						
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 1.00 Moderate Inflow			Depth Related Remarks * From to (m) 1.20 Pit terminated due to groundwater inflow and side wall collapsing.			Stability Poor Shoring None Weather		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402.24 20/12/2006 11.11.43			Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G. Pettit & Company			Trial Pit TP35 Sheet 1 of 1		

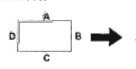








Trial Pit Log



Logged ROD Checked RC		Start 29/11/2005 End 29/11/2005	Equipment, Methods and Remarks Excavated Pit with a JCB CX	Dimensions and Orientation Width 1.00 m Length 3.20 m 178 (Deg)		Ground Level Coordinates National Grid	+16.72 mOD E 223632.56 N 122622.54
Samples and Tests			Strata				
Depth	Type & No.	Date Records	Description		Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.70 0.70	B 1 D 2		1 TOPSOIL: Soft slightly sandy CLAY. Sand is fine. 0.00-0.10 m Frequent rootlets.		(1.40)		
1.65 1.65	B 3 D 4		2 Soft to firm brown slightly sandy CLAY. Sand is fine. (ALLUVIUM) 1.65 m Sandy slightly gravelly CLAY.		1.40 +15.32 (0.80)		
2.20 2.20	B 5 D 6		3 Firm brown mottled orange slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium. (ALLUVIUM)		2.20 +14.52 2.40 +14.32		
2.60 2.60	B 7 D 8		4 Brown silty very sandy GRAVEL with cobbles. Sand is fine to coarse. Gravel is subangular fine to coarse. (GLACIAL DEPOSITS)		(0.40)		
			EXPLORATORY HOLE ENDS AT 2.80 m			2.80 +13.92	
Depth	Type & No.	Records Date					
Groundwater Entries No. Struck Post Strike Behaviour (m) 1 2.70 -			Depth Related Remarks * From to (m) 2.80 Pit terminated due to groundwater inflow and poor stability.			Stability Poor below 2.4m Shoring None Weather	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402.24 20/12/2006 11.11:46			Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company			Trial Pit TP36 Sheet 1 of 1	

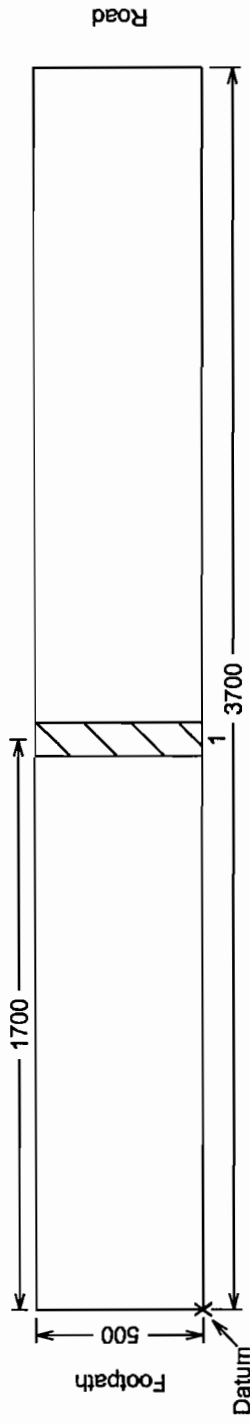
Trial Pit Log



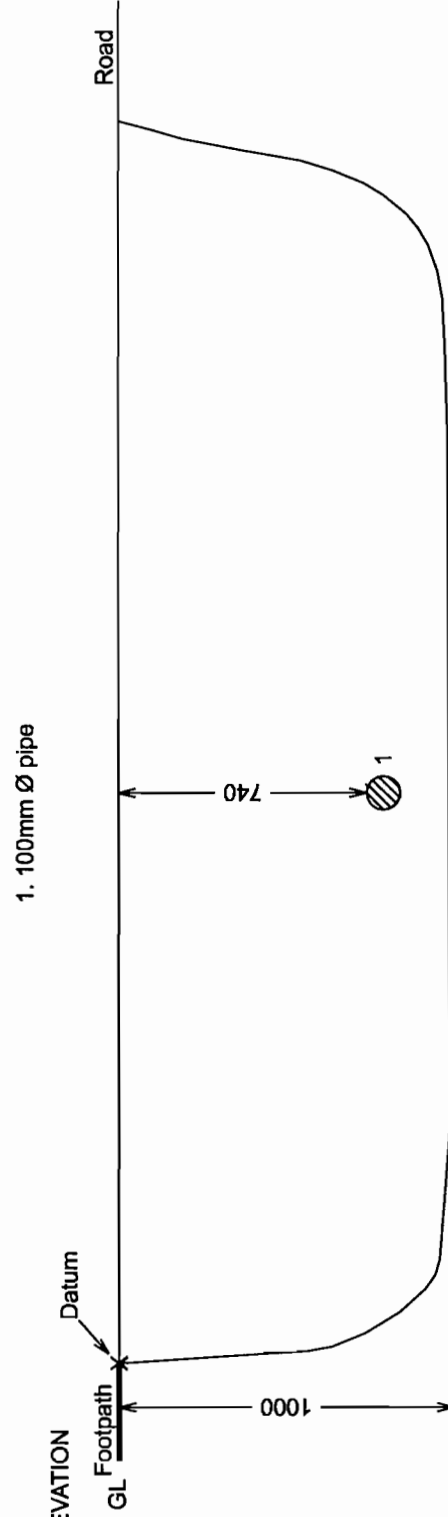
Logged COK Checked SC	Start 09/01/2006 End 09/01/2006	Equipment, Methods and Remarks	Dimensions and Orientation Width 0.50 m Length 3.70 m 	Ground Level +16.96 mOD Coordinates E 220644.03 National Grid N 122289.58		
Samples and Tests		Strata				
Depth	Type & No.	Date Records	Description	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
			1 MADE GROUND: Reinforced concrete			
0.40-0.50	B 1		2 Brown mottled green clayey very gravelly SAND with occasional cobbles. (ALLUVIUM)	0.20 +16.76		
0.40-0.50	D 2		3 Black brown SILT. (ALLUVIUM)	0.32 +16.64		
				(0.68)		
0.90-1.00	B 3					
0.90-1.00	D 4					
			EXPLORATORY HOLE ENDS AT 1.00 m	1.00 +15.96		
Depth	Type & No.	Records Date				
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)	Stability	Shoring	Weather
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column			Project River Suir Clonmel Drainage Scheme	Trial Pit		
Scale 1:25			Project No. KC5218	ST07		
(c) ESGL www.esgl.co.uk 402.24 20/12/2006 11:25 47 			Carried out for G.Pettit & Company	Sheet 1 of 1		

DC13281

ST07
PLAN



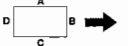
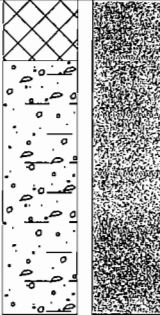

ELEVATION

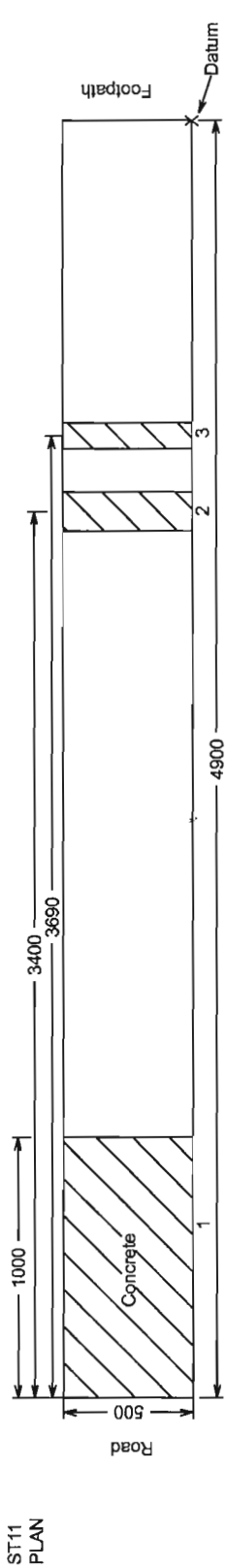


Key ∅ Pipes — Ground Level 220 → Dimensions in mm	ST Details Depth: 1000mm Width: 1700mm Length: 3700mm Trench structure shown on detailed log		Co-ordinates Easting Northing	
	Drawn by AC Chkd Silt Trench No: ST07	Date JAN 2006 Appd	Scale Not to Scale Status DRAFT Rev:	
RIVER SUIR (CLONMEL) KC5218				

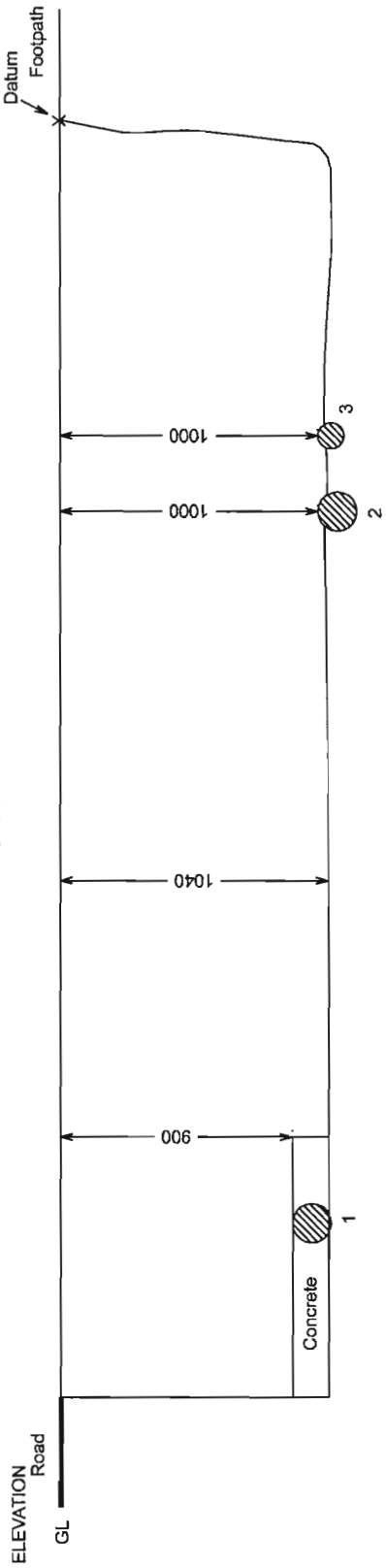
Trial Pit Log



Logged COK Checked SC	Start 09/01/2006 End 09/01/2006	Equipment, Methods and Remarks	Dimensions and Orientation Width 0.50 m Length 4.90 m 	Ground Level +18.20 mOD Coordinates E 220260.67 National Grid N 122266.13		
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
0.40-0.50 0.40-0.50	B 1 D 2		1 MADE GROUND: Tarmac and concrete. 2 Brown slightly clayey very sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is subangular to rounded, fine to coarse. Cobbles are subangular to rounded. (GLACIAL DEPOSITS)	0.20 +18.00 (0.84) 1.04 +17.16		
			EXPLORATORY HOLE ENDS AT 1.04 m			
Depth	Type & No.	Records Date				
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)		Stability Shoring Weather	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 <small>(c) ESGL www.esgl.co.uk 402.24 20/12/2006 11:26:28</small>			Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company		Trial Pit ST11 Sheet 1 of 1	



- 1. CAT signal indicating pipe, but covered in concrete
- 2. 150mm Ø yellow gas pipe
- 3. 100mm Ø grey plastic water pipe


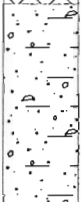



Key ○ Pipes — Ground Level ← 220 → Dimensions in mm	ST Details Depth: 1040mm Width: 500mm Length: 4900mm Trench string shown on detailed log	Co-ordinates Easting Northing
	Drawn by AC Chkd Date JAN 2006 Appd	Scale Not to Scale Status DRAFT Rev:
RIVER SUJR (CLONMEL) KC5218	Sitt Trench No: ST11	

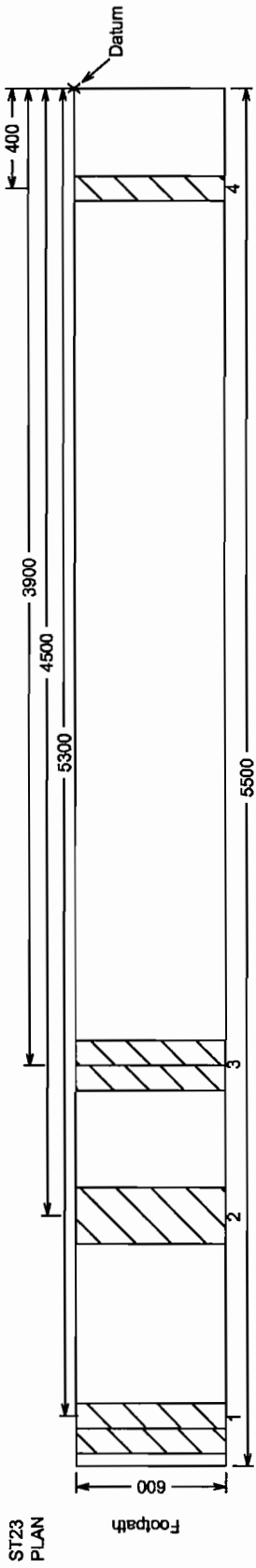
Trial Pit Log



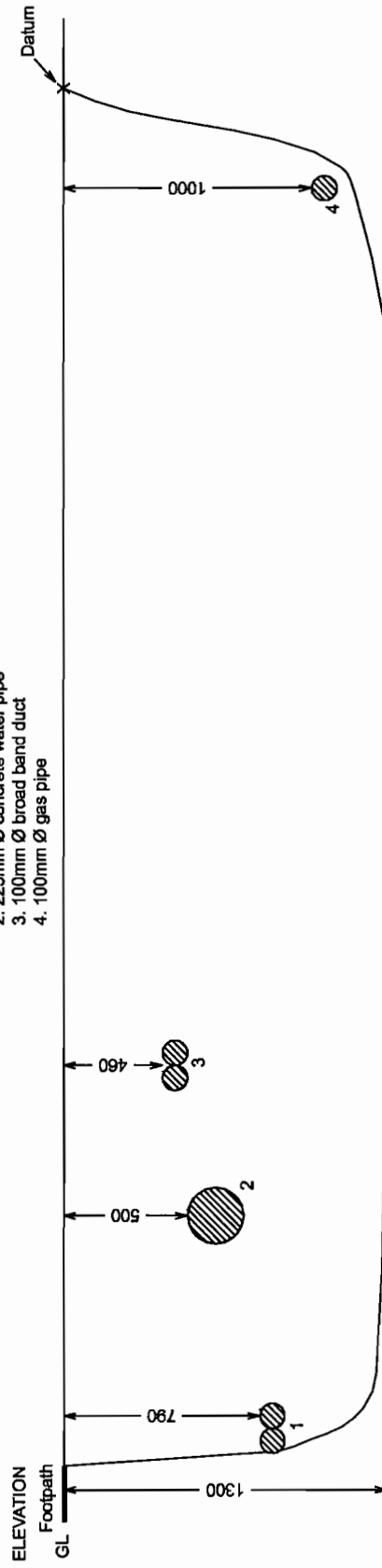
Logged COK Checked SC	Start 05/01/2006 End 05/01/2006	Equipment, Methods and Remarks	Dimensions and Orientation Width 0.60 m Length 5.50 m 	Ground Level Coordinates National Grid	+17.72 mOD E 220838.14 N 122359.56
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Samples and Tests			Strata		Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description				
			1 MADE GROUND: Tarmac.				
			2 MADE GROUND: Reinforced Concrete.		0.20 +17.52 (0.42)		
0.80-0.90 0.80-0.90	B 1 D 2		3 Brown red clayey very gravelly SAND with occasional cobbles. Sand is fine to coarse. Gravel subangular to subrounded, fine to coarse. Cobbles are subangular to subrounded. (GLACIAL DEPOSITS)		0.62 +17.10 (0.68)		
			EXPLORATORY HOLE ENDS AT 1.30 m		1.30 +16.42		

Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)	Depth Related Remarks * From to (m)	Stability Shoring Weather
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESGL www.esgl.co.uk 402 24 20/12/2006 11 26 36 	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Trial Pit ST23 Sheet 1 of 1



- 1. 2x 100mm Ø black plastic pipes
- 2. 225mm Ø concrete water pipe
- 3. 100mm Ø broad band duct
- 4. 100mm Ø gas pipe



Key ○ Pipes — Ground Level ← 220 → Dimensions in mm	ST Details Depth: 1300mm Width: 600mm Length: 5300mm Trench strata shown on detailed log		Co-ordinates Easting Northing	
	Drawn by AC Chkd Sitt Trench No:	Date JAN 2006 Appd	Scale Not to Scale	Status DRAFT
RIVER SUIR (CLONMEL) KC5218		ST23		



Trial Pit Log



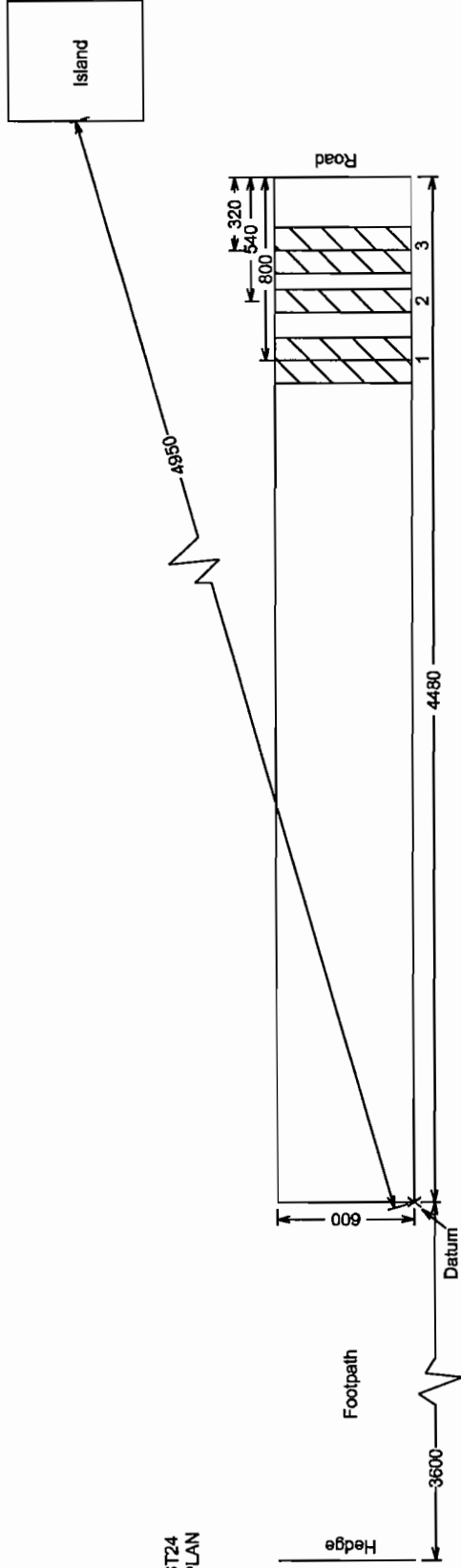
Logged COK Checked SC	Start 05/01/2006 End 05/01/2006	Equipment, Methods and Remarks	Dimensions and Orientation Width 0.60 m Length 4.48 m 	Ground Level +18.10 mOD Coordinates E 221017.24 National Grid N 122627.81
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Samples and Tests			Strata		Depth, Level (Thickness)	Legend	Backfill/ Instruments
Depth	Type & No.	Date Records	Description				
			1 MADE GROUND: Tarmac and Concrete.				
0.80-0.90 0.80-0.90	B 1 D 2		2 Brown red clayey slightly gravelly SAND with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded. Cobbles are subangular to rounded. (GLACIAL DEPOSITS)		0.20 +17.90 (0.90)		
			EXPLORATORY HOLE ENDS AT 1.10 m		1.10 +17.00		

Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)	Depth Related Remarks * From to (m)	Stability Shoring Weather
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25	Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company	Trial Pit ST24 Sheet 1 of 1

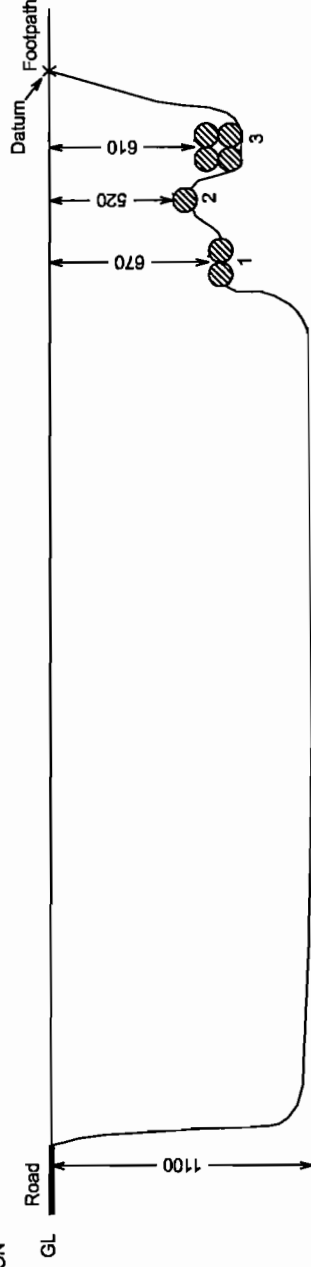


ST24
PLAN



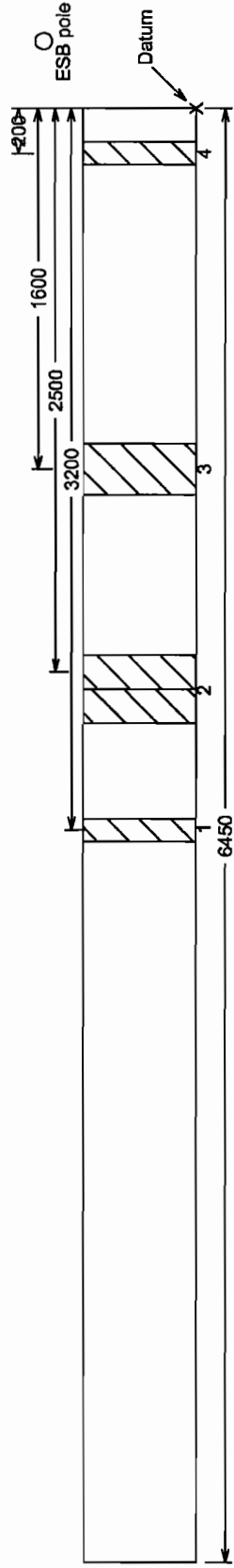
- 1. 2x 100mm Ø grey plastic pipes
- 2. 100mm Ø water pipe
- 3. 4x 100mm Ø broad band ducts

ELEVATION



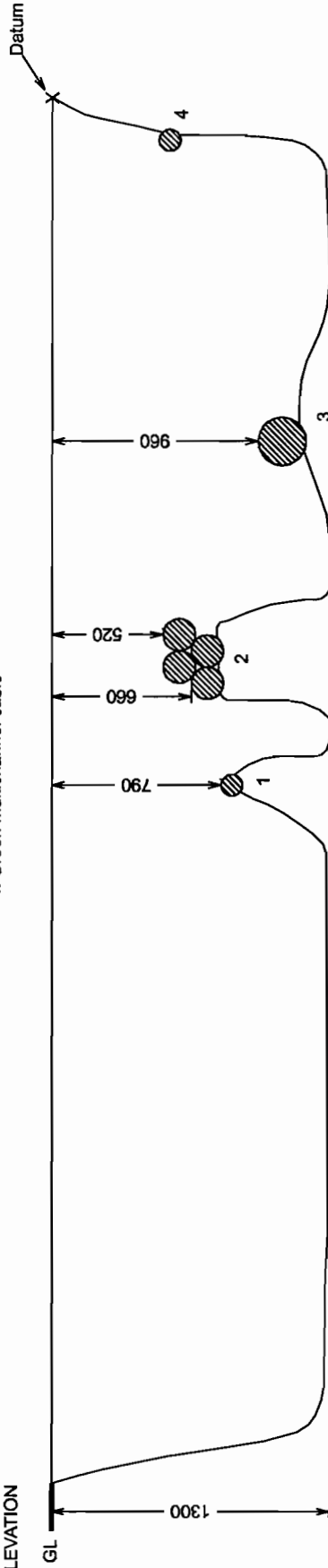
Key ∅ Pipes — Ground Level 220 Dimensions in mm X Datum point	ST Details Depth: 1100mm Width: 600mm Length: 4480mm Trench strata shown on detailed log		Co-ordinates Easting Northing Orientation	
	Drawn by AC Chkd Silt Trench No: ST24	Date FEB 2006 Appd	Scale Not to Scale Status DRAFT Rev:	
RIVER SUJR (CLONMEL)		KC5218		


ST25
PLAN



- 1. 100mm Ø yellow gas pipe
- 2. 4x 150mm Ø green broad band pipes
- 3. 225mm Ø concrete pipe
- 4. Green multichannel cable

ELEVATION



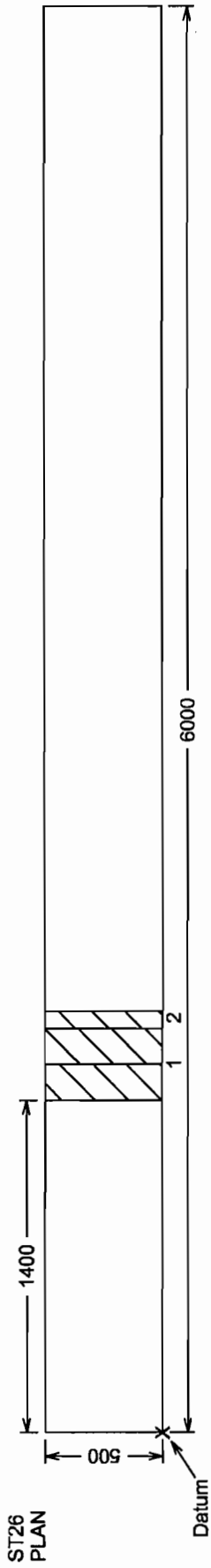
Key Ø Pipes — Ground Level ← 220 → Dimensions in mm	ST Details Depth: 1300mm Width: 200mm Length: 6450mm Trench stratq shown on detailed log		Co-ordinates Easting Northing	
	Drawn by AC Chkd Sliit Trench No:	Date JAN 2006 Appd ST25	Scale Not to Scale	Status DRAFT
RIVER SUJR (CLONMEL)				
KC5218				

Trial Pit Log

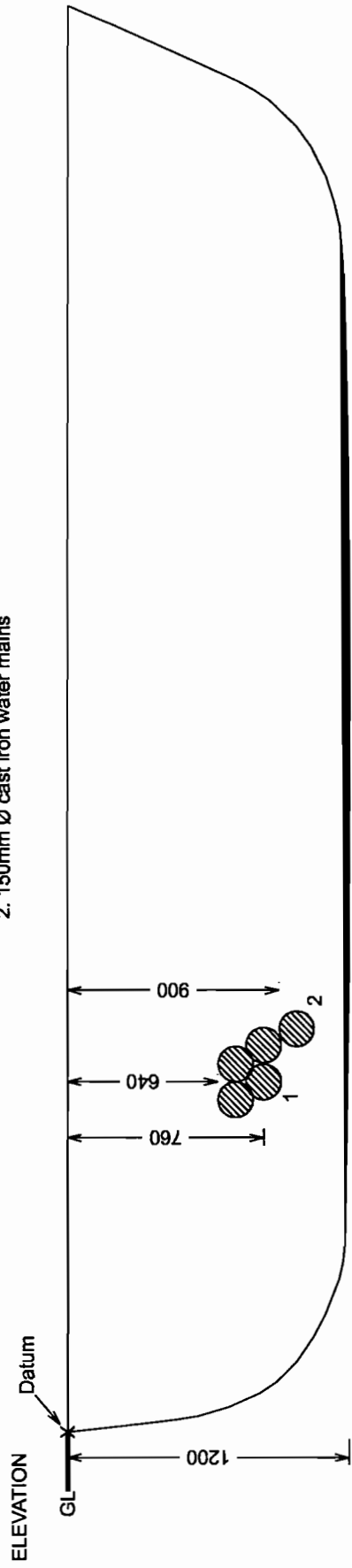



Logged COK Checked SC		Start 04/01/2006 End 04/01/2006	Equipment, Methods and Remarks	Dimensions and Orientation Width 0.50 m Length 6.00 m	Ground Level Coordinates National Grid
					+17.49 mOD E 221270.50 N 122711.42
Samples and Tests			Strata		
Depth	Type & No.	Date Records	Description		Depth, Level/ (Thickness)
			1 MADE GROUND: Tarmac.		(0.30)
0.80-0.90 0.80-0.90	B 1 D 2		2 Brown red clayey sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded. Cobbles are subangular to subrounded. (GLACIAL DEPOSITS)		0.30 +17.19 (0.90)
			EXPLORATORY HOLE ENDS AT 1.20 m		1.20 +16.29
Depth	Type & No.	Records Date			
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks * From to (m)		Stability Shoring Weather
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.			Project River Suir Clonmel Drainage Scheme Project No. KC5218 Carried out for G.Pettit & Company		Trial Pit ST26 Sheet 1 of 1





- 1. 4x 150mm Ø green plastic broad band ducts
- 2. 150mm Ø cast iron water mains



Key Ø Pipes — Ground Level ← 220 → Dimensions in mm	ST Details Depth: 1200mm Width: 1500mm Length: 6000mm Trench strata shown on detailed log		Co-ordinates Easting Northing	
	Drawn by AC	Date JAN 2006	Scale Not to Scale	
Chkd	Appd	Status DRAFT	Rev:	
RIVER SUJR (CLONMEL) KC5218	Silt Trench No: ST26			

Project Number: 20_071

Project: Suir Island Infrastructure Links

Title: Chapter 6 Land and Soils

Appendix 6.3 Site Investigation Limited Investigation Logs (Sil, 2022)

Appendix 1
Rotary Corehole Logs and Photographs

Contract No: 5931	<h1>Rotary Corehole Log</h1>				Corehole No: BH01
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Contract:	Suir Island Infrastructure Links	Easting:	620348.904	Date Started:	28/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622310.159	Date Completed:	28/03/2022
Client:	Tipperary County Council	Elevation:	17.61	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m	
		Open hole drilling - driller reports returns of brown sandy gravelly silty CLAY with medium cobbles and boulders.		5.5		N=39 (4,5/6,10,11,12) 50 (5,7/50 for 25mm)					
12.5				5.0							
13.0				4.5							
13.5				4.0							
14.0				3.5							
14.5				3.0							
15.0				2.5							
15.5				2.0							
16.0				1.5							
16.5	16.40	Strong grey muddy LIMESTONE with frequent fossils. Fresh to slightly weathered. <i>Discontinuities - rough, planar to slightly undulating, occasionally stepped, tight to open, sub-horizontal and 45° to 60° dip, occasionally sub-vertical, clean with occasional brown staining.</i>		1.21							
17.0				1.0		16.40 - 17.40	97	80	54	9	
17.5				0.5							
18.0				0.0		17.40 - 18.40	96	87	53		
18.5	18.40	Corehole terminated due to drill rods jamming in hole. End of Corehole at 18.40m		-0.79							
19.0				-1.0							
19.5				-1.5							
20.0				-2.0							
20.5				-2.5							
21.0				-3.0							
21.5				-3.5							
22.0				-4.0							
22.5				-4.5							
23.0				-5.0							
23.5				-5.5							
				-6.0							

	Installation:			Backfill:			Remarks: Drilling rods getting jammed in corehole - corehole terminated after 2m recovered.
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	18.40	Bentonite	

Contract No: 5931	<h1>Rotary Corehole Log</h1>				Corehole No: BH02
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Contract:	Suir Island Infrastructure Links	Easting:	620331.092	Date Started:	24/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622255.482	Date Completed:	24/03/2022
Client:	Tipperary County Council	Elevation:	19.98	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill	
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m		
		Open hole drilling - driller reports returns of brown grey sandy gravelly silty CLAY.										
0.5				19.5								
1.0				19.0								
1.5				18.5								
2.0				18.0								
2.5				17.5								
3.0				17.0			N=23 (4,5/5,5,6,7)					
3.5				16.5								
4.0				16.0								
4.5				15.5			N=25 (5,5/5,7,6,7)					
5.0				15.0								
5.5				14.5								
6.0				14.0			50 (7,10/50 for 185mm)					
6.5				13.5								
7.0				13.0								
7.5				12.5			N=36 (6,6/7,9,9,11)					
8.0		12.0										
8.5		11.5										
9.0		11.0			N=29 (3,3/6,7,7,9)							
9.5		10.5										
10.0		10.0										
10.5		9.5			N=36 (5,6/8,9,9,10)							
11.0		9.0										
11.5		8.5										

Continued on next page

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	21.00	Bentonite	-

Contract No: 5931	Rotary Corehole Log				Corehole No: BH02
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Contract:	Suir Island Infrastructure Links	Easting:	620331.092	Date Started:	24/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622255.482	Date Completed:	24/03/2022
Client:	Tipperary County Council	Elevation:	19.98	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m	
		Open hole drilling - driller reports returns of brown grey sandy gravelly silty CLAY.				N=50 (4,6/50 for 235mm)					
12.5				7.5							
13.0				7.0							
13.5				6.5			N=44 (7,9/10,11,12,11)				
14.0				6.0							
14.5		5.5									
15.0		5.0			N=36 (3,4/6,8,10,12)						
15.5		4.5									
16.0		4.0									
16.5		3.5			N=43 (5,7/9,11,11,12)						
17.0		3.0									
17.5		2.5									
18.0		2.0			N=44 (4,5/8,9,12,15)						
18.5	18.50	Core runs attempted - COBBLES and BOULDERS of limestone and sandstone.		1.5	1.48						
19.0				1.0		18.50 - 19.50	69	69	49	N/A	
19.5				0.5							
20.0		0.0		19.50 - 20.50	88	88	88				
20.5		-0.5									
21.0	21.00	End of Corehole at 21.00m		-1.0	-1.02	20.50 - 21.00	44	16	0		
21.5				-1.5							
22.0				-2.0							
22.5				-2.5							
23.0				-3.0							
23.5		-3.5									

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
			0.00	21.00	Bentonite		-

Contract No: 5931	<h1>Rotary Corehole Log</h1>				Corehole No: BH03
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Contract:	Suir Island Infrastructure Links	Easting:	620343.114	Date Started:	25/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622241.437	Date Completed:	25/03/2022
Client:	Tipperary County Council	Elevation:	19.90	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	Fl/m	
		Open hole drilling - driller reports returns of brown sandy gravelly silty CLAY with medium cobbles and boulders.		19.5							
0.5				19.0							
1.0				18.5							
1.5				18.0							
2.0				17.5							
2.5				17.0			N=26 (4,5/5,6,7,8)				
3.0				16.5							
3.5				16.0							
4.0				15.5			N=33 (5,6/6,7,9,11)				
4.5				15.0							
5.0				14.5							
5.5				14.0			N=35 (5,5/6,8,10,11)				
6.0		13.5									
6.5		13.0									
7.0		12.5			N=40 (7,7/8,9,12,11)						
7.5		12.0									
8.0		11.5									
8.5		11.0			N=38 (4,6/7,9,11,11)						
9.0		10.5									
9.5		10.0									
10.0		9.5			N=34 (5,5/8,8,9,9)						
10.5		9.0									
11.0		8.5									
11.5		8.0			N=35 (3,5/8,8,9,10)						

Continued on next page

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	22.30	Bentonite	-

Contract No: 5931	<h1>Rotary Corehole Log</h1>				Corehole No: BH03
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Contract:	Suir Island Infrastructure Links	Easting:	620343.114	Date Started:	25/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622241.437	Date Completed:	25/03/2022
Client:	Tipperary County Council	Elevation:	19.90	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill	
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	Fl/m		
		Open hole drilling - driller reports returns of brown sandy gravelly silty CLAY with medium cobbles and boulders.										
12.5				7.5								
13.0				7.0								
13.5				6.5		N=42 (4,6/8,8,12,14)						
14.0				6.0								
14.5				5.5								
15.0				5.0		N=50 (5,6/50 for 245mm)						
15.5				4.5								
16.0				4.0								
16.5				3.5		50 (8,9/50 for 225mm)						
17.0				3.0								
17.5				2.5								
18.0				2.0		50 (5,7/50 for 180mm)						
18.5				1.5								
19.0				1.0								
19.5	19.30	Moderately strong light grey muddy LIMESTONE interbedded with moderately weak dark grey calcareous MUDSTONE with occasional fossils and thin calcite veins (<1mm). <i>Discontinuities - non-intact.</i>		0.60								
20.0				0.0		19.30 - 20.30	98	42	0			Ni
20.5				-0.5								
21.0	21.00	Moderately strong to strong grey muddy LIMESTONE with frequent fossils and calcite veins (<8mm). Fresh to slightly weathered. <i>Discontinuities - rough, planar to slightly undulating, occasionally stepped, tight to open, sub-horizontal, 60° to 80° and sub-vertical dip, clean with occasional grey and brown staining.</i>		-1.10								
21.5				-1.5		20.30 - 21.30	96	39	15			
22.0				-2.0								
22.5	22.30	End of Corehole at 22.30m		-2.40		21.30 - 22.30	95	86	78			7
23.0				-3.0								
23.5				-3.5								
				-4.0								

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	22.30	Bentonite	-

Contract No: 5931	Rotary Corehole Log				Corehole No: BH04
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Contract:	Suir Island Infrastructure Links	Easting:	620354.853	Date Started:	23/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622206.521	Date Completed:	23/03/2022
Client:	Tipperary County Council	Elevation:	19.68	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill	
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m		
0.5		Open hole drilling - driller reports returns of brown sandy gravelly silty CLAY with medium cobbles.		19.5								
1.0				19.0								
1.5				18.5								
2.0				18.0								
2.5				17.5								
3.0				17.0			N=12 (2,2/2,3,4,3)					
3.5				16.5								
4.0				16.0								
4.5				15.5								
5.0				15.0			N=17 (3,3/4,4,4,5)					
5.5				14.5								
6.0				14.0								
6.5				13.5			N=28 (6,7/8,7,7,6)					
7.0				13.0								
7.5				12.5								
8.0				12.0			N=30 (6,7/7,7,8,8)					
8.5				11.5								
9.0				11.0								
9.5		10.5			N=32 (6,6/7,8,8,9)							
10.0		10.0										
10.5		9.5										
11.0		9.0			N=37 (7,7/8,9,9,11)							
11.5		8.5										
		8.0										
		Continued on next page				N=26 (3,3/4,6,8,8)						

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	20.70	Bentonite	-

Contract No: 5931	Rotary Corehole Log				Corehole No: BH05
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Contract:	Suir Island Infrastructure Links	Easting:	620373.715	Date Started:	21/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622170.532	Date Completed:	21/03/2022
Client:	Tipperary County Council	Elevation:	17.84	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill	
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	Fl/m		
0.5		Open hole drilling - driller reports returns of brown sandy gravelly silty CLAY with medium cobbles and boulders.		17.5								
1.0				17.0								
1.5				16.5								
2.0				16.0								
2.5				15.5								
3.0				15.0			N=7 (2,2/2,1,2,2)					
3.5				14.5								
4.0				14.0								
4.5				13.5			N=13 (3,3/3,3,4,3)					
5.0				13.0								
5.5				12.5								
6.0				12.0			N=18 (3,4/4,5,5,4)					
6.5				11.5								
7.0				11.0								
7.5				10.5			N=27 (5,5/6,6,7,8)					
8.0				10.0								
8.5				9.5								
9.0				9.0			N=33 (4,5/5,8,9,11)					
9.5		8.5										
10.0		8.0										
10.5		7.5			N=34 (5,7/8,9,9,8)							
11.0		7.0										
11.5		6.5										
		6.0			N=40 (5,6/7,10,11,12)							

Continued on next page

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	18.50	Bentonite	-

Contract No: 5931	Rotary Corehole Log				Corehole No: BH05
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Contract:	Suir Island Infrastructure Links	Easting:	620373.715	Date Started:	21/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622170.532	Date Completed:	21/03/2022
Client:	Tipperary County Council	Elevation:	17.84	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill	
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	Fl/m		
		Open hole drilling - driller reports returns of brown sandy gravelly silty CLAY with medium cobbles and boulders.										
12.5					5.5							
13.0					5.0							
13.5					4.5		N=41 (6,6/8,10,12,11)					
14.0					4.0							
14.5					3.5							
15.0					3.0		50 (5,5/50 for 95mm)					
15.5					2.5							
16.0					2.0							
16.5					1.5		N=50 (6,8/50 for 275mm)					
17.0					1.0							
17.5					0.5							
18.0					0.0		N=50 (4,6/50 for 235mm)					
18.5	18.50			End of Corehole at 18.50m		-0.66						
19.0												
19.5												
20.0												
20.5												
21.0												
21.5												
22.0												
22.5												
23.0												
23.5												

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
			0.00	18.50	Bentonite		-

Contract No: 5931	Rotary Corehole Log				Corehole No: BH06
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Contract:	Suir Island Infrastructure Links	Easting:	620388.365	Date Started:	22/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622170.456	Date Completed:	22/03/2022
Client:	Tipperary County Council	Elevation:	17.62	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill			
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m				
0.5		Open hole drilling - driller reports returns of brown sandy gravelly silty CLAY with medium cobbles and boulders.		17.5										
1.0					17.0									
1.5					16.5									
2.0					16.0									
2.5					15.5									
3.0					15.0			N=4 (2,1/1,1,1,1)						
3.5					14.5									
4.0					14.0									
4.5					13.5									
5.0					13.0			N=15 (3,3/4,3,4,4)						
5.5					12.5									
6.0					12.0									
6.5					11.5			N=27 (4,4/5,6,7,9)						
7.0					11.0									
7.5					10.5									
8.0					10.0			N=36 (5,6/7,8,10,11)						
8.5					9.5									
9.0			9.0											
9.5			8.5			N=49 (5,6/7,12,14,16)								
10.0			8.0											
10.5			7.5											
11.0			7.0			N=50 (7,9/50 for 275mm)								
11.5			6.5											
			6.0											
		Continued on next page				50 (5,15/50 for 20mm)								

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	16.00	Bentonite	-

Contract No: 5931	<h1>Rotary Corehole Log</h1>				Corehole No: BH06
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Contract:	Suir Island Infrastructure Links	Easting:	620388.365	Date Started:	22/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622170.456	Date Completed:	22/03/2022
Client:	Tipperary County Council	Elevation:	17.62	Drilled By:	MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m	
		Open hole drilling - driller reports returns of brown sandy gravelly silty CLAY with medium cobbles and boulders.		5.5							
12.5				5.0							
13.0	13.00	Moderately strong to strong grey muddy LIMESTONE with frequent fossils and calcite veins (<1mm). Fresh to slightly weathered.		4.5	4.62					8	
13.5		<i>Discontinuities - rough, planar to slightly undulating, tight to open, sub-horizontal and sub-vertical dip with clay infilling.</i>		4.0		13.00 - 14.00	96	88	70		
14.0		<i>Discontinuities - rough, planar, occasional stepped, tight to open, 50° to 70° and occasional sub-vertical dip, brown staining of surfaces.</i>		3.5						2	
14.5				3.0		14.00 - 15.00	99	84	79		
15.0		<i>Discontinuities - rough, planar to slightly undulating, tight to open, 40° to 60° and occasional sub-horizontal and sub-vertical dip, clean with some brown staining.</i>		2.5							8
15.5				2.0		15.00 - 16.00	97	95	68		
16.0	16.00	End of Corehole at 16.00m		1.5	1.62						
16.5				1.0							
17.0				0.5							
17.5				0.0							
18.0				-0.5							
18.5				-1.0							
19.0				-1.5							
19.5				-2.0							
20.0				-2.5							
20.5				-3.0							
21.0				-3.5							
21.5				-4.0							
22.0				-4.5							
22.5				-5.0							
23.0				-5.5							
23.5				-6.0							

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	16.00	Bentonite	-

5931 – Suir Island Infrastructure Links, Clonmel
Rock Core Photographs

BH01 Box01



BH02 Box01



BH03 Box01



5931 – Suir Island Infrastructure Links, Clonmel
Rock Core Photographs

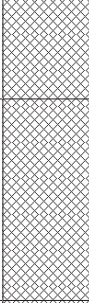

BH04 Box01

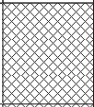
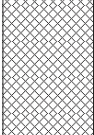
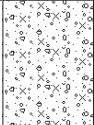




BH06 Box01



Appendix 2
Trial Pit Logs and Photographs

Contract No: 5931		Trial Pit Log				Trial Pit No: TP01					
Contract:		Suir Island Infrastructure Links		Easting:	620311.152	Date:	14/03/2022				
Location:		Clonmel, Co. Tipperary		Northing:	622316.280	Excavator:	6T Tracked Excavator				
Client:		Tipperary County Council		Elevation:	17.67	Logged By:	P. McGonagle				
Engineer:		Clifton Scannell Emerson Associates		Dimensions (LxWxD) (m):	3.00 x 0.60 x 1.30	Status:	FINAL				
Level (mbgl)		Stratum Description			Legend	Level (mOD)		Samples / Field Tests			Water Strike
Scale:	Depth					Scale:	Depth:	Depth	Type	Result	
	0.20	MADE GROUND: tarmacadam.				17.5	17.47				
	0.50	MADE GROUND: grey silty sandy gravel.						0.50	ES	PM03	
	0.60	MADE GROUND: grey brown silty very sandy gravel with much red brick fragments.					17.0	17.07			
	1.30	Pit terminated due to water ingress. Pit terminated at 1.30m				16.5	16.37	1.20	B	PM04	▼
	1.50					16.0					
	2.00					15.5					
	2.50					15.0					
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:			Key:			
		Water ingress.	Pit walls stable.	1.20 Rapid	-			B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental			

Contract No: 5931		Trial Pit Log				Trial Pit No: TP02					
Contract:		Suir Island Infrastructure Links		Easting:	620347.113	Date:	14/03/2022				
Location:		Clonmel, Co. Tipperary		Northing:	622314.802	Excavator:	6T Tracked Excavator				
Client:		Tipperary County Council		Elevation:	17.64	Logged By:	P. McGonagle				
Engineer:		Clifton Scannell Emerson Associates		Dimensions (LxWxD) (m):	3.00 x 0.60 x 1.30	Status:	FINAL				
Level (mbgl)		Stratum Description			Legend	Level (mOD)		Samples / Field Tests		Water Strike	
Scale:	Depth					Scale:	Depth:	Depth	Type		Result
	0.20	MADE GROUND: tarmacadam.					17.5				
		MADE GROUND: grey silty sandy gravel.					17.44				
	0.5							0.50	ES	PM01	
	1.05	Grey silty very sandy fine to coarse, angular to subangular GRAVEL of limestone with medium cobble content. Sand is fine to coarse. Cobbles are angular to subrounded of limestone.					16.59				
	1.30	Pit terminated due to water ingress. Pit terminated at 1.30m					16.34	1.20	B	PM02	▼
	1.5										
	2.0										
	2.5										
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:		Key:				
		Water ingress.	Pit walls stable.	1.20 Rapid	-		B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental				

Contract No: 5931		Trial Pit Log				Trial Pit No: TP04						
Contract:		Suir Island Infrastructure Links		Easting:	620382.326	Date:	14/03/2022					
Location:		Clonmel, Co. Tipperary		Northing:	622179.090	Excavator:	6T Tracked Excavator					
Client:		Tipperary County Council		Elevation:	17.57	Logged By:	P. McGonagle					
Engineer:		Clifton Scannell Emerson Associates		Dimensions (LxWxD) (m):	2.10 x 0.60 x 1.40	Status:	FINAL					
Level (mbgl)		Stratum Description			Legend	Level (mOD)		Samples / Field Tests		Water Strike		
Scale:	Depth					Scale:	Depth:	Depth	Type	Result		
		MADE GROUND: brown sandy slightly gravelly silty clay with much concrete, timber, red brick and glass fragments.			[Cross-hatched pattern]	17.5						
0.5						17.0		0.50	ES	PM05		
0.80		MADE GROUND: brown sandy slightly gravelly silty clay with medium cobble content and occasional red brick fragments.			[Cross-hatched pattern]	16.77						
1.0						16.5		1.00	B	PM06		▼
1.40		Pit terminated due to water ingress.			[Cross-hatched pattern]	16.17						
1.5		Pit terminated at 1.40m				16.0						
2.0												
2.5												
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:		Key:					
		Water ingress.	Major pit wall collapse.	1.20 Rapid	-		B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental					

TP01 Sidewall



TP01 Spoil



TP02 Sidewall



TP02 Spoil



TP04 Sidewall



TP04 Spoil



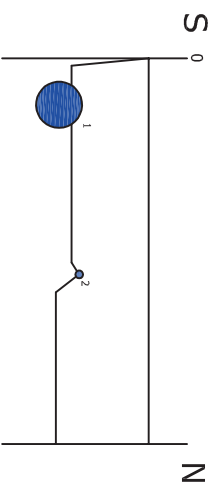
Appendix 3
Slit Trench Logs

STO1

Plan



Cross Section



Point:	Eastings:	Northings:	Level:
Start	620294.093	622305.497	17.62
End	620294.812	622310.410	17.60

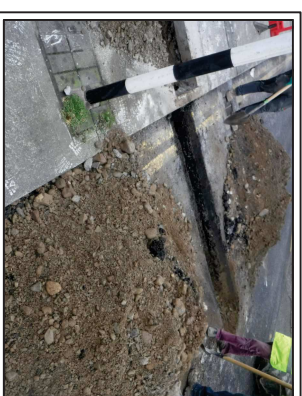
Services

No:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
1	600mm	Black	Storm Water	0.60m	0.86m	90°
2	100mm	Grey	Watermain	2.80m	0.85m	90°

Ground Conditions

From:	To:	Description:
0.0m	0.23m	MADE GROUND: tarmacadam.
0.23m	0.33m	MADE GROUND: grey silty sandy gravel (Cl. 80+).
0.33m	1.20m	MADE GROUND: brown silty sandy gravel with medium cobble content.
Heavy water ingress at 1.00mbgl. Environmental sample at 0.5mbgl.		

Photographs



Length:	Width:	Depth:
5.00m	0.60m	1.20m



SITE INVESTIGATIONS LTD

Project:

Suir Island Infrastructure Links

Client:

Tipperary County Council

Engineer:

Clifton Scannell Emerson Associates

Logged by:
P.McGonagle

Excavation Started:
15/03/2022

Excavation Finished:
15/03/2022

CONTRACT
NUMBER

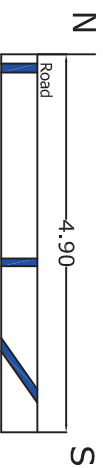
Scale:
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DEPTH ARE TO THE TOP OF SERVICES

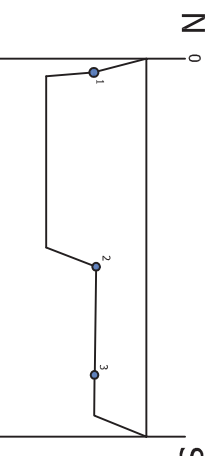
5931

STO2

Plan



Cross Section



Point:	Eastings:	Northings:	Level:
Start	620349.702	622310.402	17.53
End	620349.040	622305.541	17.38

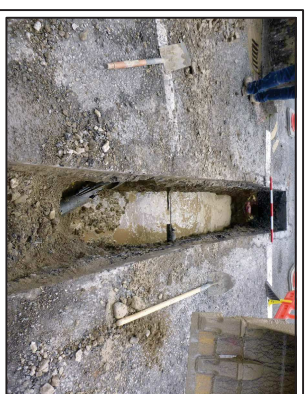
Services

No:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
1	120mm	Red	ESB	0.18m	0.62m	90°
2	100mm	Grey	Telecom	2.70m	0.60m	90°
3	100mm	Grey	Telecom	4.10m	0.62m	145°

Ground Conditions

From:	To:	Description:
0.0m	0.14m	MADE GROUND: tarmacadam.
0.14m	0.25m	MADE GROUND: grey sandy gravel with pockets of lean mix concrete.
0.25m	0.70m	MADE GROUND: grey brown sandy gravel with high cobble content.
0.70m	1.30m	MADE GROUND: grey brown silty sandy gravel with high cobble content.
Environmental sample at 0.80mbgl.		

Photographs



Length:	Width:	Depth:
4.90m	0.68m	1.30m



SITE INVESTIGATIONS LTD

Project:

Suir Island Infrastructure Links

Client:

Tipperary County Council

Engineer:

Clifton Scannell Emerson Associates

Logged by:

M.Kaliski

Excavation Started:

14/03/2022

Excavation Finished:

14/03/2022

CONTRACT NUMBER

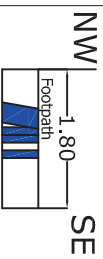
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NOT TO SCALE, ALL DISTANCES IN m

DEPTH ARE TO THE TOP OF SERVICES

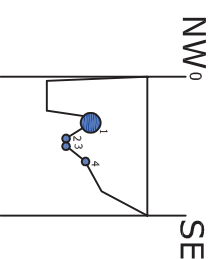
5931

ST03

Plan



Cross Section



Point:	Eastings:	Northings:	Level:
Start	620403.508	622136.222	18.58
End	620404.260	622136.857	18.53

Services

No.:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
1	250mm	Black	Drainage	0.60m	0.60m	100°
2	100mm	Black	Telecom	0.80m	1.00m	90°
3	100mm	Black	Telecom	0.90m	1.00m	90°
4	100mm	Black	Telecom	1.10m	0.75m	90°

Photographs



Length:	Width:	Depth:
1.80m	0.60m	1.30m

Ground Conditions

From:	To:	Description:
0.0m	0.15m	MADE GROUND: concrete.
0.15m	0.33m	MADE GROUND: grey silty sandy gravel (Cl. 80+).
0.33m	1.20m	MADE GROUND: brown sand.

Environmental sample at 0.50mbgl.



SITE INVESTIGATIONS LTD

Project: **Suir Island Infrastructure Links**

Client: **Tipperary County Council**

Engineer: **Clifton Scannell Emerson Associates**

Logged by: **P.McGonagle**

Excavation Started: **14/03/2022**

Excavation Finished: **14/03/2022**

CONTRACT NUMBER

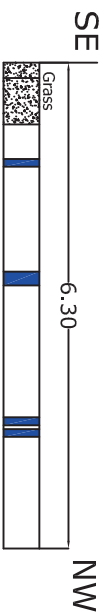
Scale: **NOT TO SCALE, ALL DISTANCES IN m**

DEPTH ARE TO THE TOP OF SERVICES

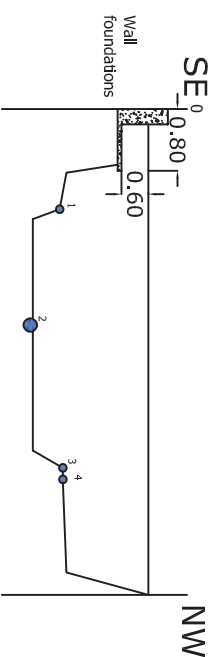
5931

STO4

Plan



Cross Section



Point:	Eastings:	Northing:	Level:
Start	620440.000	622155.705	17.89
End	620437.445	622161.057	17.66

Services

No.:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
1	100mm	Yellow	Gas	1.30m	1.10m	90°
2	180mm	Yellow	Gas	2.80m	1.44m	90°
3	100mm	Grey	Telecom	4.65m	1.06m	90°
4	100mm	Grey	Telecom	4.80m	1.06m	90°

Ground Conditions

From:	To:	Description:
0.0m	0.10m	TOPSOIL.
0.10m	0.60m	MADE GROUND: grey brown slightly sandy gravelly silty clay with high cobble and medium boulder content and some plastic bag and metal rod fragments.
0.60m	1.20m	MADE GROUND: grey silty sandy gravelly cobbles and boulders with some red brick fragments.
1.20m	1.50m	Firm grey sandy slightly gravelly clayey SILT with low cobble content, frequent rootlets and some silty sand laminae.

Environmental sample at 0.50mbgl.

Photographs



Length:	Width:	Depth:
6.30m	0.90m	1.50m



SITE INVESTIGATIONS LTD

Project:

Suir Island Infrastructure Links

Logged by:

M.Kaliski

Excavation Started:

14/03/2022

Excavation Finished:

14/03/2022

CONTRACT NUMBER

Client:

Tipperary County Council

Scale:

NOT TO SCALE, ALL DISTANCES IN m

Engineer:

Clifton Scannell Emerson Associates

DEPTH ARE TO THE TOP OF SERVICES

5931

Appendix 4
Road Core Details and Photographs

Window Sample Pavement logs

Client	Tipperary County Council
Site	Suir Island, Clonmel
SI File No.	5931 / 22
Test lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	16/03/2022

Core No	Sample No.	Total Length (mm)	Diameter (mm)	Layer 1 Thickness (mm) / Material Type	Layer 2 Thickness (mm) / Material Type	Layer 3 Thickness (mm) / Material Type	Layer 4 Thickness (mm) / Material Type	Comments
RC01	PM01	180	100	30 / 14mm SMA w/c macadam	45 / 30% 14mm HRA macadam	65 / 20mm Basecourse macadam	40 / 28mm Roadbase macadam	1-2% air voids in macadam layers 3 & 4. Pavement in good condition.
RC02	PM02	250	100	20 / 14mm SMA w/c macadam	40 / 30% 14mm HRA macadam	95 / 20mm Basecourse macadam	95 / 28mm Roadbase macadam	1-2% air voids in macadam layers 3 & 4. Pavement in good condition.

RC01



RC02

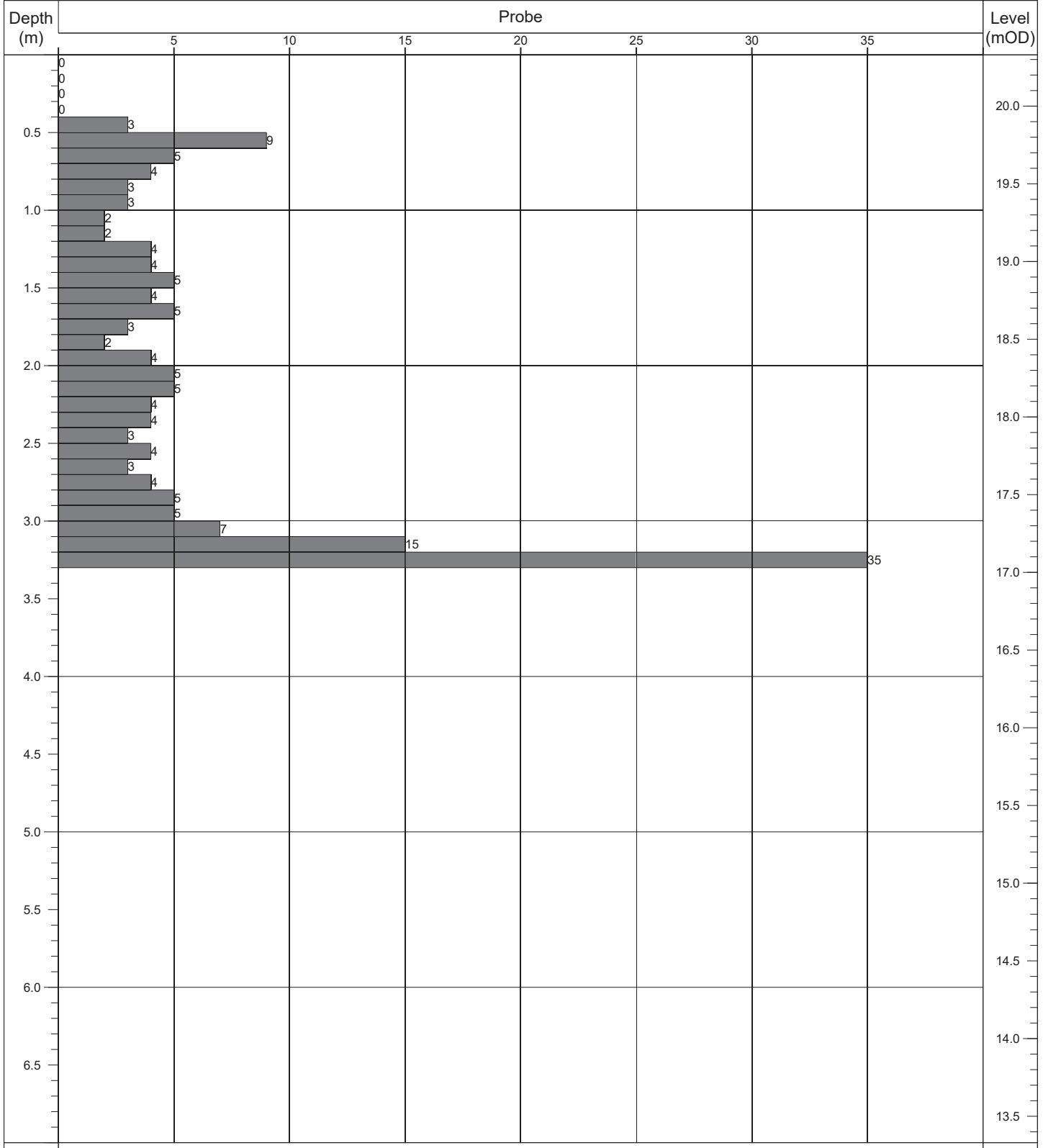


Appendix 5

Dynamic Probe Logs

Contract No: 5931	Dynamic Probe Log				Probe No: DP01
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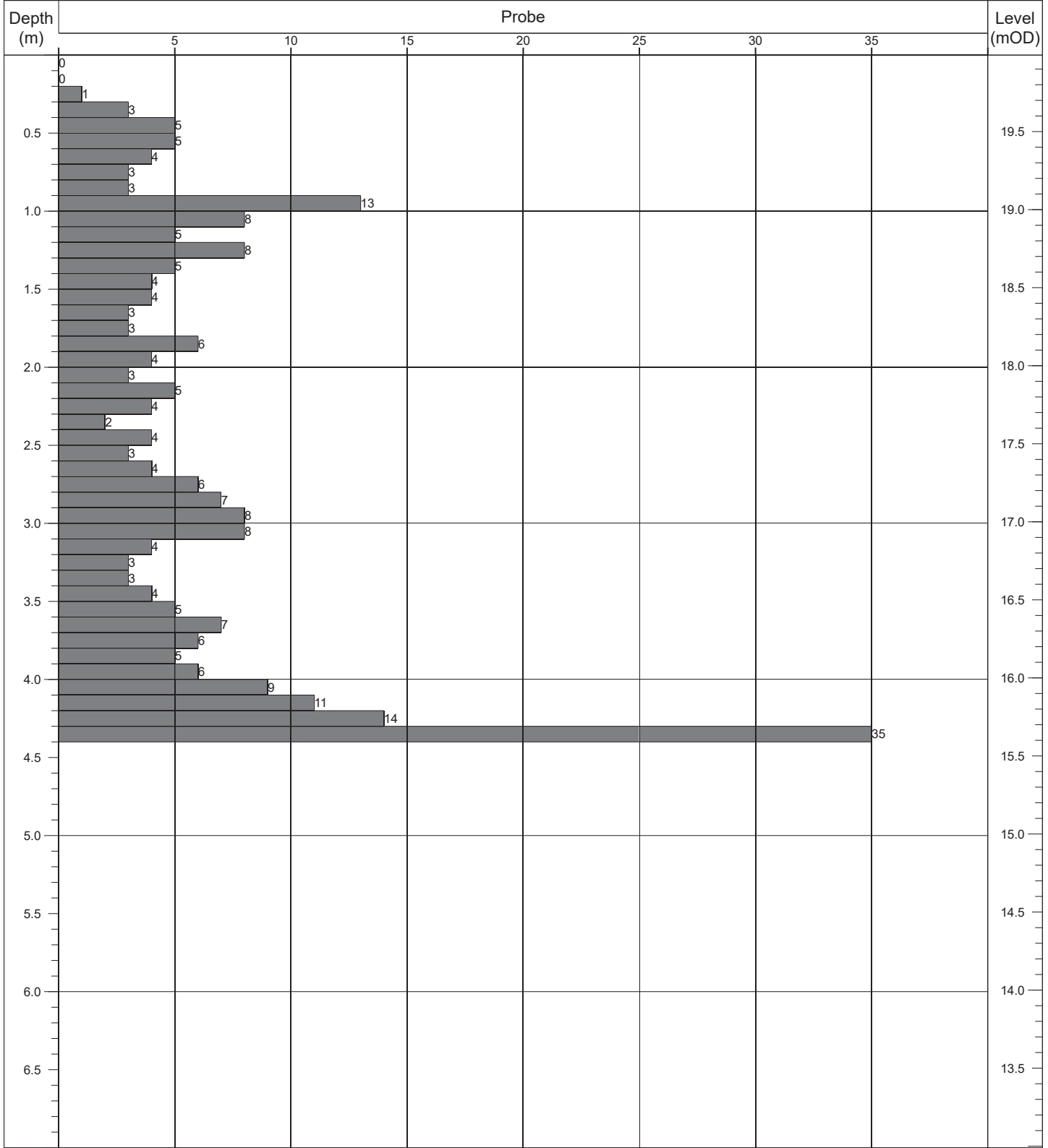
Contract:	Suir Island Infrastructure Links	Easting:	620306.854	Date Started:	21/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622190.005	Logged By:	D. Monaghan
Client:	Tipperary County Council	Elevation:	20.33	Scale:	1:35
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Competitor 130	Sheet No:	Sheet 1 of 1




	Termination:		Probe Details:			Remarks:
	Depth:	Reason:	Type:	Mass:	Drop:	-
	3.30m	Obstruction.	DPH	50kg	500mm	

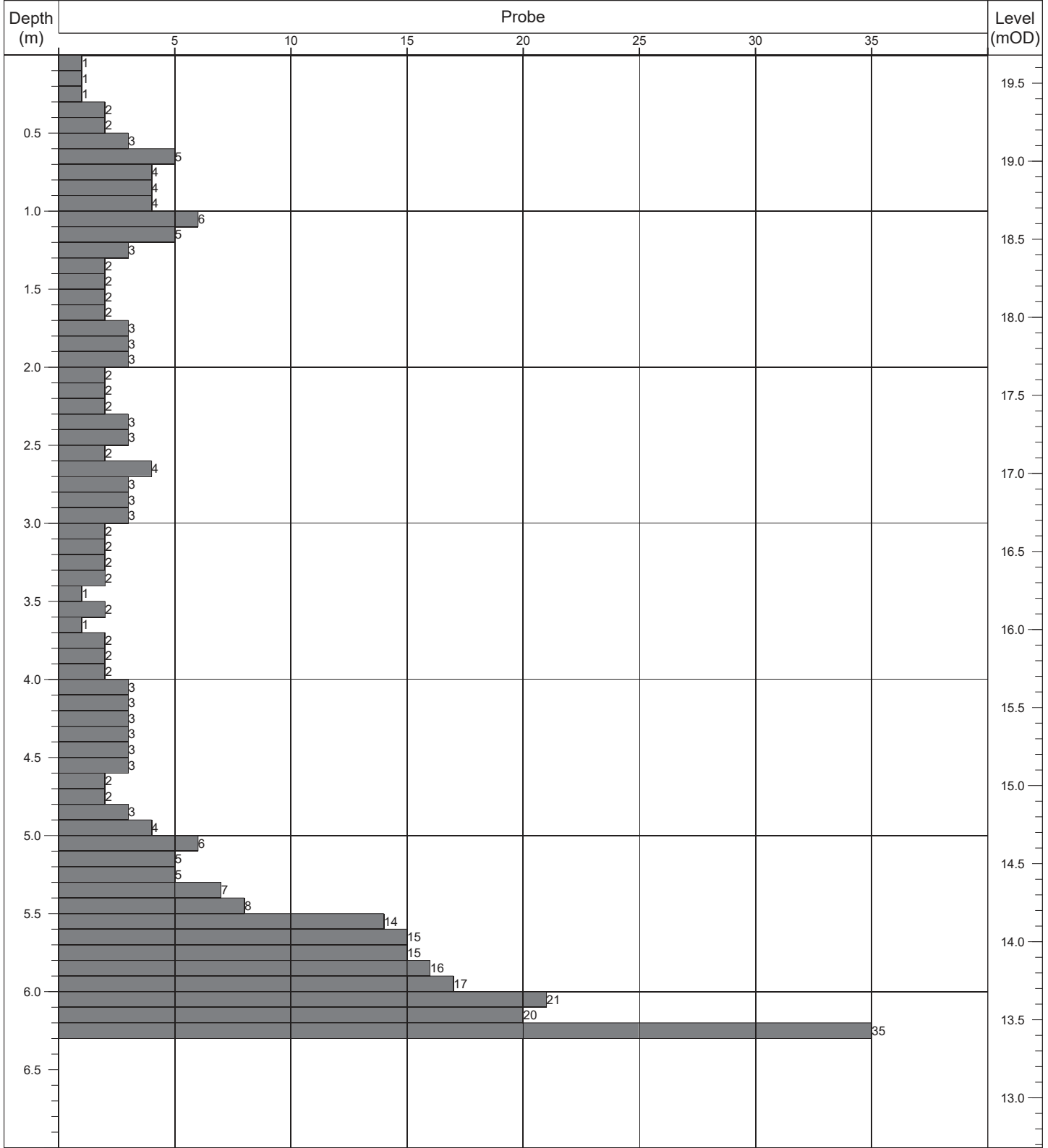
Contract No: 5931	Dynamic Probe Log				Probe No: DP02
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Contract:	Suir Island Infrastructure Links	Easting:	620342.873	Date Started:	21/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622196.197	Logged By:	D. Monaghan
Client:	Tipperary County Council	Elevation:	19.99	Scale:	1:35
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Competitor 130	Sheet No:	Sheet 1 of 1



	Termination:		Probe Details:			Remarks:
	Depth:	Reason:	Type:	Mass:	Drop:	-
	4.40m	Obstruction.	DPH	50kg	500mm	

Contract No: 5931	Dynamic Probe Log				Probe No: DP03
Contract:	Suir Island Infrastructure Links	Easting:	620347.050	Date Started:	21/03/2022
Location:	Clonmel, Co. Tipperary	Northing:	622226.342	Logged By:	D. Monaghan
Client:	Tipperary County Council	Elevation:	19.68	Scale:	1:35
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Competitor 130	Sheet No:	Sheet 1 of 1



	Termination:		Probe Details:			Remarks: -
	Depth:	Reason:	Type:	Mass:	Drop:	
	6.30m	Obstruction.	DPH	50kg	500mm	

Appendix 6
Geotechnical Soil Laboratory Test Results

Classification Tests
In accordance with BS 1377: Part 2

Client	Tipperary County Council
Site	Suir Island, Clonmel
S.I. File No	5931 / 22
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	25th March 2022

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	Bulk 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
TP01	1.20	PM05	22/380	B	17.4	24	NP				26.3		
TP02	1.20	PM03	22/381	B	5.4	21	NP				20.8		
TP04	1.00	PM09	22/382	B	20.2	31	23	8			68.7		CL/ML
ST01	1.00	PM07	22/383	B	6.2	22	NP				28.5		
ST04	1.20	MK02	22/384	B	22.4	34	21	13			67.1		CL

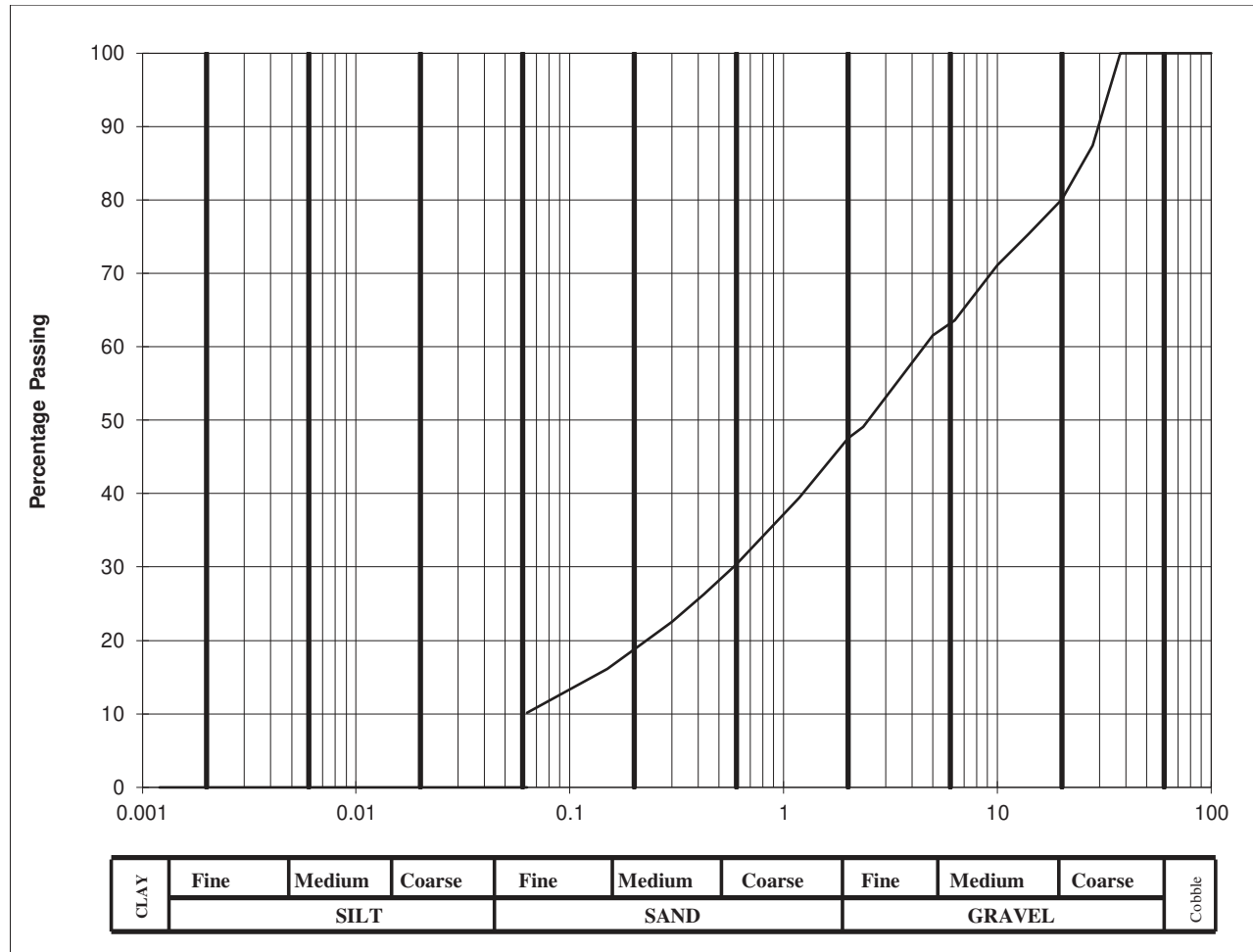
Determination of Linear Shrinkage BS 1377: Part 2: Method 6.5

Client	Tipperary County Council
Site	Suir Island, Clonmel
S.I. File No	5931 / 22
Test Lab	Site Investigations Ltd., The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Test date	25th March 2022

Hole Id	Depth (m)	Sample No.	Lab Ref.	Sample Type	Natural Moisture Content %	Initial Wet Length (mm)	Dried Length (mm)	Linear Shrinkage (%)	% passing 425U	Remarks
TP01	1.20	PM05	22/380	B	17.4	139.5	139.0	0.4	26.3	
TP02	1.20	PM03	22/381	B	5.4	139.0	138.8	0.1	20.8	
TP04	1.00	PM09	22/382	B	20.2	139.0	136.0	2.2	68.7	
ST01	1.00	PM07	22/383	B	6.2	139.5	139.3	0.1	28.5	
ST04	1.20	MK02	22/384	B	22.4	138.5	136.0	1.8	67.1	

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	87.4		
20	80.1		
14	75.4		
10	71.1		
6.3	63.6		
5.0	61.5		
2.36	49.1		
2.00	47.5		
1.18	39.4		
0.600	30.3		
0.425	26.3		
0.300	22.5		
0.212	19.3		
0.150	16.1		
0.063	10		

Cobbles, %	0
Gravel, %	53
Sand, %	38
Clay / Silt, %	10



Client :	Tipperary County Council
Project :	Suir Island, Clonmel

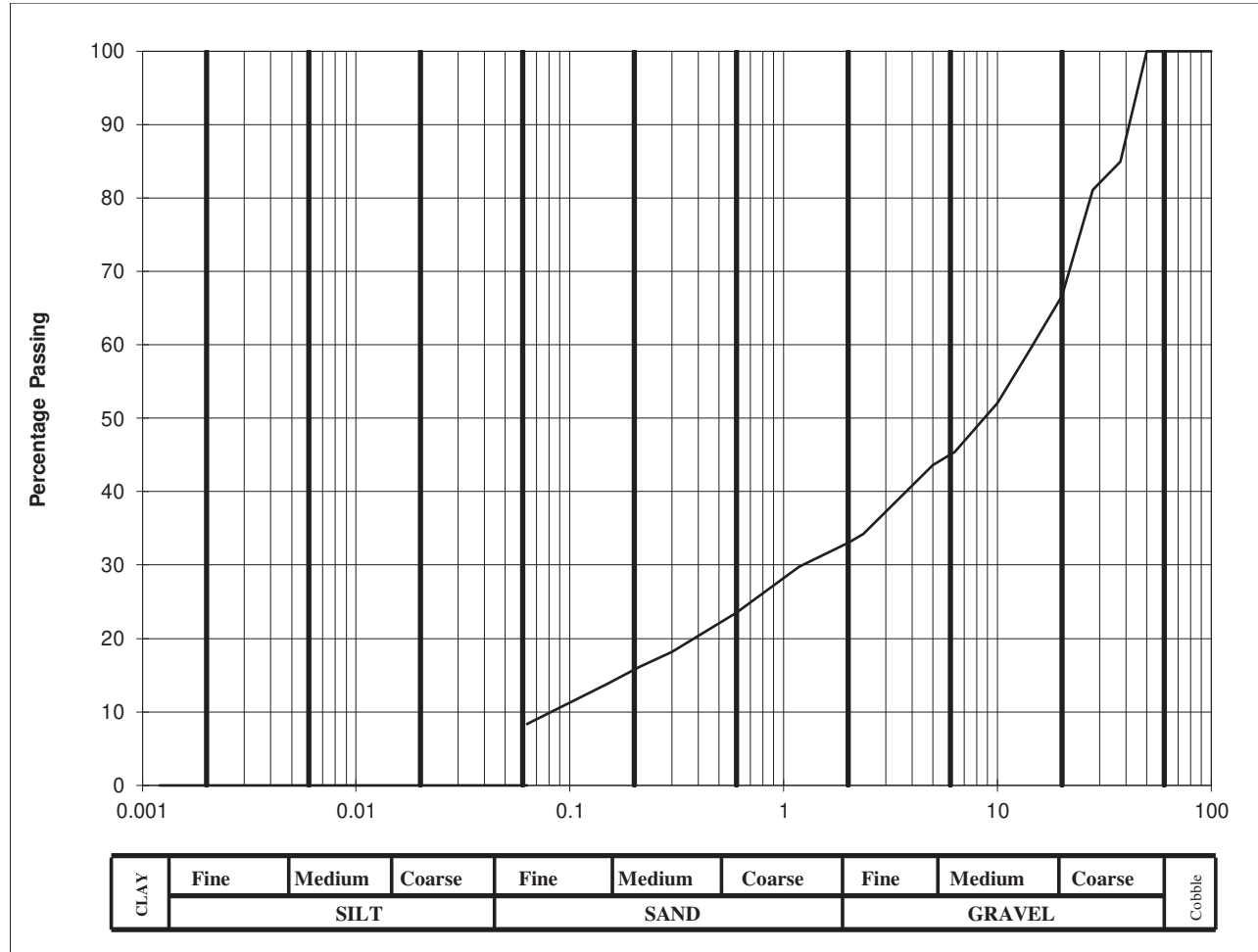
Lab. No :	22/380
Sample No :	PM05

Hole ID :	TP 01
Depth, m :	1.20

Material description :	silty very sandy GRAVEL
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

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	84.9		
28	81.1		
20	66.7		
14	59.1		
10	52.1		
6.3	45.4		
5.0	43.6		
2.36	34.2		
2.00	33		
1.18	29.8		
0.600	23.5		
0.425	20.8		
0.300	18.2		
0.212	16.1		
0.150	13.8		
0.063	8		

Cobbles, %	0
Gravel, %	67
Sand, %	25
Clay / Silt, %	8



Client :	Tipperary County Council
Project :	Suir Island, Clonmel

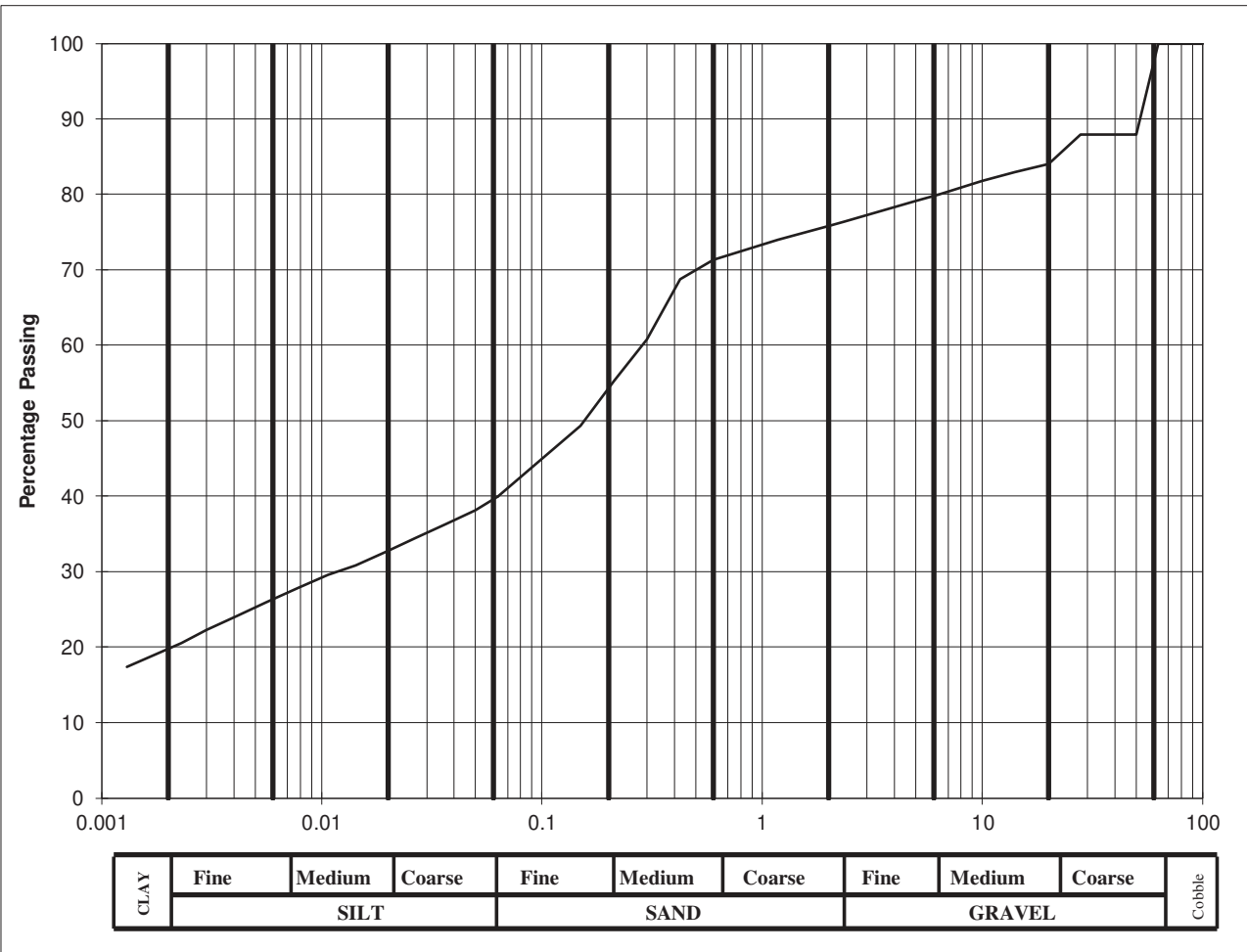
Lab. No :	22/381
Sample No :	PM03

Hole ID :	TP 02
Depth, m :	1.20

Material description :	silty very sandy GRAVEL
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

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	0.0630	40
90	100	0.0200	32
75	100	0.0060	26
63	100	0.0020	20
50	87.9		
37.5	87.9		
28	87.9		
20	84		
14	82.9		
10	81.8		
6.3	79.9		
5.0	79.1		
2.36	76.4		
2.00	75.8		
1.18	74		
0.600	71.3		
0.425	68.7		
0.300	60.8		
0.212	55.2		
0.150	49.3		
0.063	40		

Cobbles, %	0
Gravel, %	24
Sand, %	36
Silt, %	20
Clay, %	20



Client :	Tipperary County Council
Project :	Suir Island, Clonmel

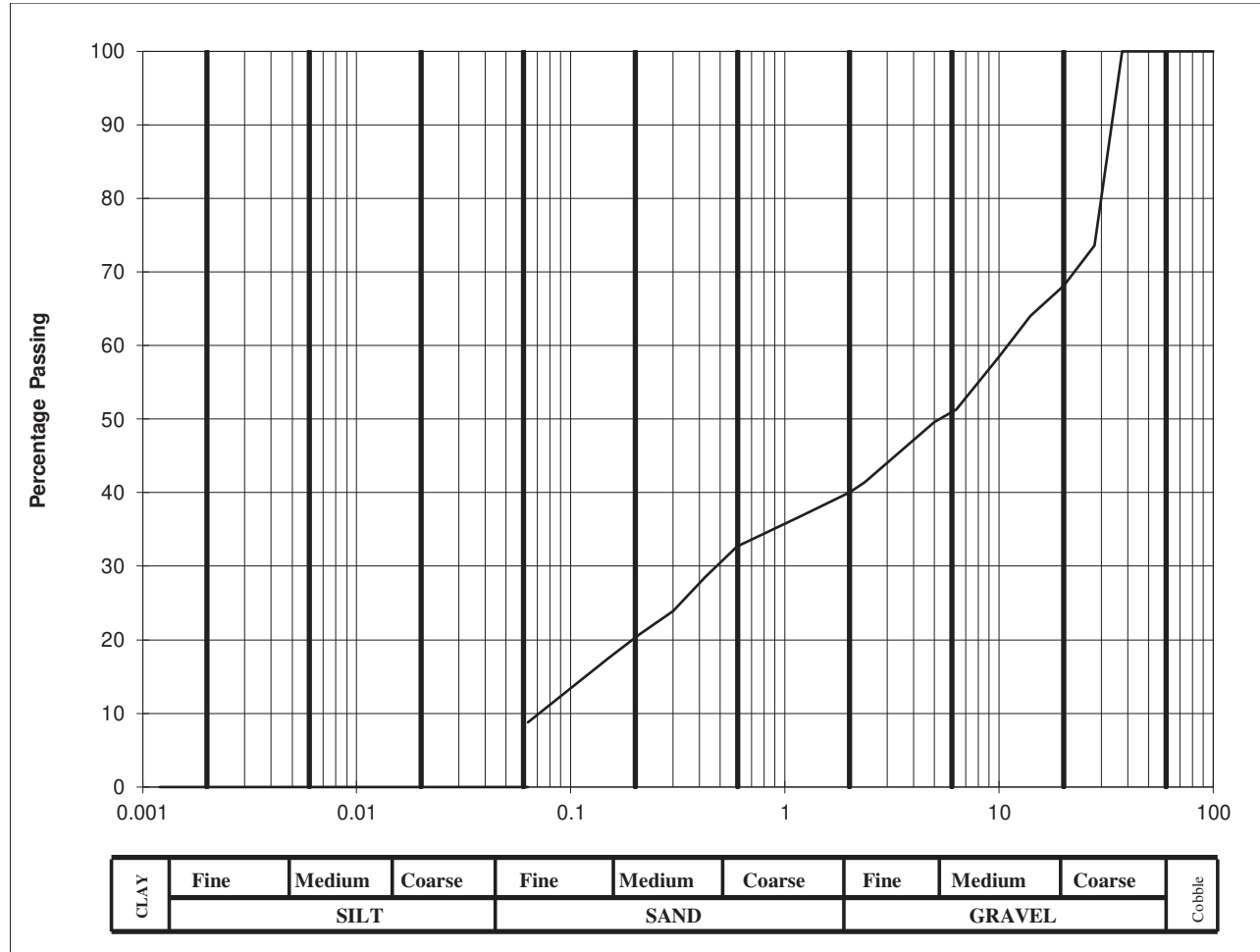
Lab. No :	22/382
Sample No :	PM09

Hole ID :	TP 04
Depth, m :	1.00

Material description :	sandy slightly gravelly SILT/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

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	73.6		
20	68.1		
14	64		
10	58.5		
6.3	51.3		
5.0	49.6		
2.36	41.4		
2.00	40		
1.18	36.8		
0.600	32.7		
0.425	28.5		
0.300	23.9		
0.212	20.8		
0.150	17.5		
0.063	9		

Cobbles, %	0
Gravel, %	60
Sand, %	31
Clay / Silt, %	9



Client :	Tipperary County Council
Project :	Suir Island, Clonmel

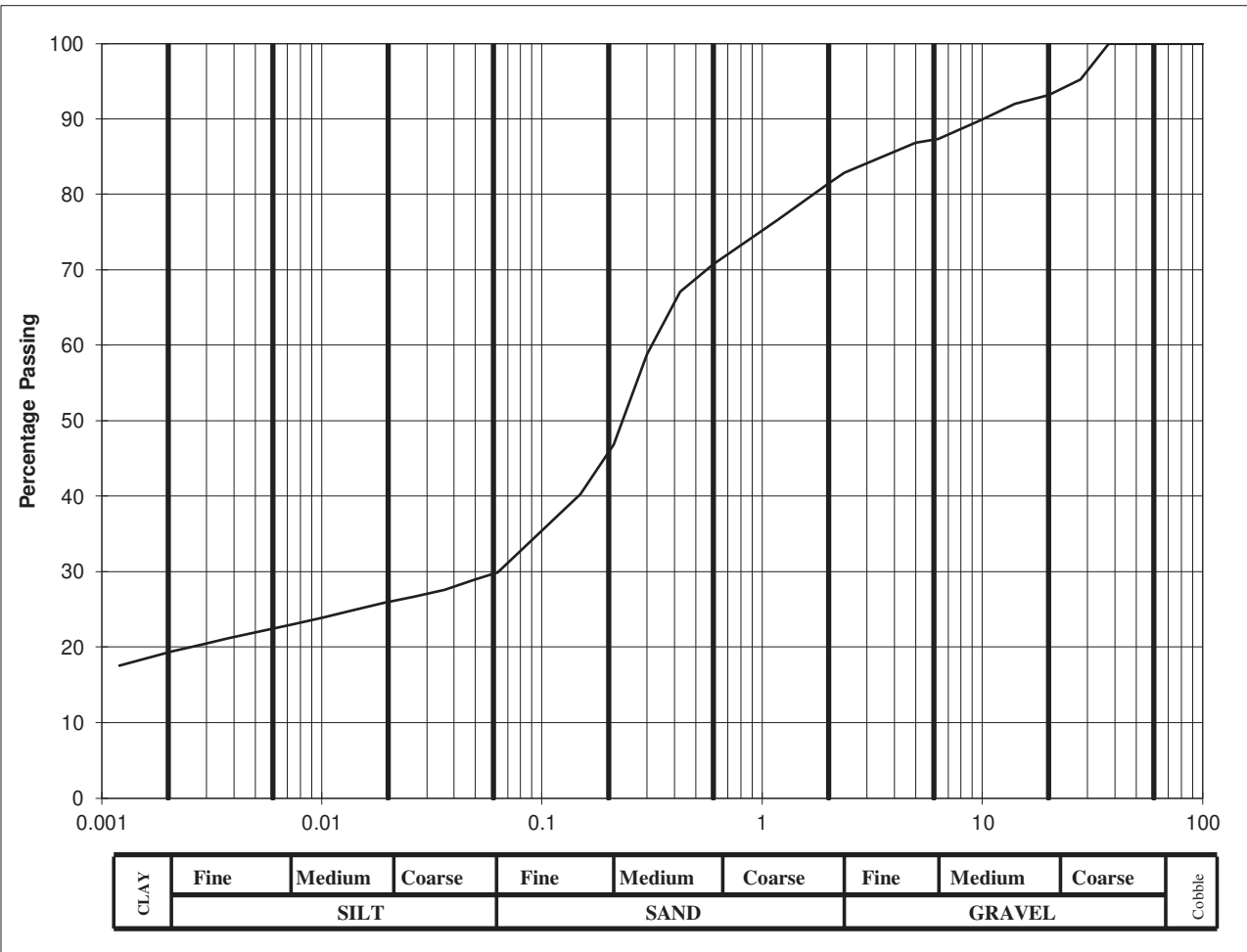
Lab. No :	22/383
Sample No :	PM07

Hole ID :	ST 01
Depth, m :	1.00

Material description :	silty very sandy GRAVEL
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

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	0.0630	30
90	100	0.0200	26
75	100	0.0060	22
63	100	0.0020	19
50	100		
37.5	100		
28	95.2		
20	93.1		
14	92		
10	89.9		
6.3	87.3		
5.0	86.8		
2.36	82.8		
2.00	81.4		
1.18	76.6		
0.600	70.7		
0.425	67.1		
0.300	58.8		
0.212	46.8		
0.150	40.3		
0.063	30		

Cobbles, %	0
Gravel, %	19
Sand, %	51
Silt, %	11
Clay, %	19



Client :	Tipperary County Council
Project :	Suir Island, Clonmel

Lab. No :	22/384
Sample No :	MK02

Hole ID :	ST 04
Depth, m :	1.20

Material description :	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

Dry Density / Moisture Content relationship in accordance with BS 1377 : Part 4

Client	Tipperary County Council
Site	Suir Island, Clonmel
S.I.File No	5602 / 22
Test Lab	Site Investigations Ltd., Carhugar, The Grange, 12th Lock Rd., Lucan, Co. Dublin Tel 01 6108768
Report Date	25th March 2022

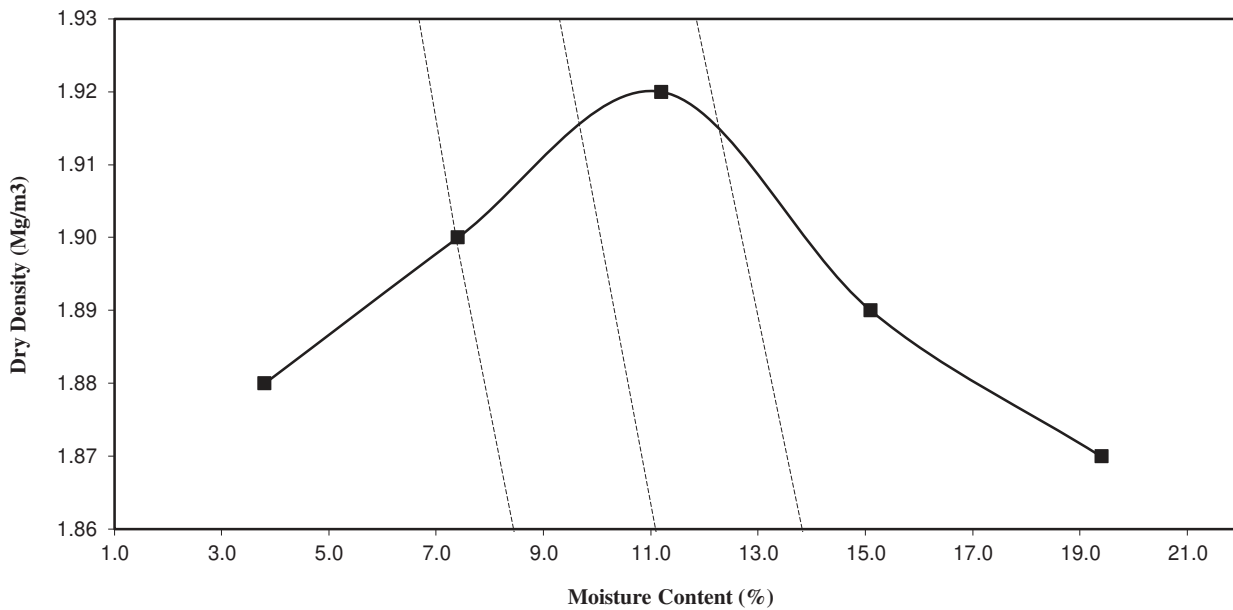
Hole Id:	ST04
Depth (mBGL):	1.20
Lab Ref:	22/384
Sample No	MK02

Particle Density
2.5
Assumed

Natural Moisture Content (%)	22.4
Rammer Used	2.5Kg
Maximum Dry Density (Mg/m ³)	1.92
Optimum Moisture Content (%)	11.0

Point Number	1	2	3	4	5
Moisture content	3.8	7.4	11.2	15.1	19.4
Dry Density (Mg/m ³)	1.88	1.90	1.92	1.89	1.87

Material Description
sandy slightly gravelly silty CLAY



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

Client	Tipperary County Council
Site	Suir Island, Clonmel
S.I. File No	5931 / 22
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email info@siteinvestigations.ie
Report Date	25th March 2022

CBR No	Depth (mBGL)	Sample No	Sample Type	Lab Ref	Moisture Content (%)	CBR Value (%)	Location / Remarks
ST04	1.20	PM05	B	22/384	22.4	3.1	

Chemical Testing
In accordance with BS 1377: Part 3

Client	Tipperary County Council
Site	Suir Island, Clonmel
S.I. File No	5931 / 22
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	25th March 2022

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
TP02	1.00	PM03	22/381	8.78	0.117	0.039			33.0	
TP04	1.00	PM09	22/382	8.74	0.123	0.093			75.8	

Appendix 7
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	Tipperary County Council
Site	Suir Island Infrastructure Links
S.I. File No	5931 / 22
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	14th April 2022

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	16.60	22/486	C	65 /120	UCS		42.5	Moderately Strong		Tested Axially
BH01	17.06	22/487	C	65	PL	2.01		Strong	51.0	Tested Diametrically
BH01	17.40	22/488	C	65	PL	1.09		Moderately Strong	27.5	Tested Diametrically
BH01	18.20	22/489	C	65 /120	UCS		31.5	Moderately Strong		Tested Axially
BH03	19.55	22/490	C	65	PL	0.45		Moderately Weak	11.5	Tested Diametrically
BH03	19.75	22/491	C	65	PL	0.90		Moderately Weak	22.5	Tested Diametrically
BH03	21.80	22/492	C	65 /120	UCS		36.0	Moderately Strong		Tested Axially
BH03	22.05	22/493	C	65 /120	UCS		20.0	Moderately Weak		Tested Axially
BH04	13.30	22/494	C	65 /120	UCS		70.0	Moderately Strong		Tested Axially
BH04	13.85	22/495	C	65	PL	3.08		Strong	78.0	Tested Diametrically
BH04	14.50	22/496	C	65	PL	4.97		Very Strong	125.5	Tested Diametrically
BH04	15.55	22/497	C	65 /120	UCS		104.5	Very Strong		Tested Axially
BH06	17.77	22/498	C	65	PL	1.42		Moderately Strong	36.0	Tested Diametrically
BH06	20.30	22/499	C	65	PL	0.83		Moderately Weak	21.0	Tested Diametrically
BH06	19.85	22/500	C	65 /120	UCS		48.0	Moderately Strong		Tested Axially
BH06	20.05	22/501	C	65 /120	UCS		60.0	Strong		Tested Axially

Appendix 8
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:	30 March 2022
Customer:	Site Investigations Ltd
Sample Delivery Group (SDG):	220319-39
Your Reference:	5931
Location:	Suir Island, Clonmel
Report No:	640020
Order Number:	15/A/22

We received 6 samples on Friday March 18, 2022 and 6 of these samples were scheduled for analysis which was completed on Wednesday March 30, 2022. 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

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
25997108	ST 01		0.50 - 0.50	16/03/2022
25997109	ST 03		0.50 - 0.50	16/03/2022
25997110	ST 04		0.50 - 0.50	16/03/2022
25997111	TP 01		0.50 - 0.50	16/03/2022
25997112	TP 02		0.50 - 0.50	16/03/2022
25997113	TP 04		0.50 - 0.50	16/03/2022

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type
	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			25997108	ST 01		0.50 - 0.50	250g Amber Jar (ALE210)	S			S
			25997109	ST 03		0.50 - 0.50	1kg TUB with Handle (ALE260)	S			S
		25997110	ST 04		0.50 - 0.50	250g Amber Jar (ALE210)	S			S	
		25997111	TP 01		0.50 - 0.50	1kg TUB with Handle (ALE260)	S			S	
		25997112	TP 02		0.50 - 0.50	250g Amber Jar (ALE210)	S			S	
		25997113	TP 04		0.50 - 0.50	60g VOC (ALE215)	S			S	
Anions by Kone (w)	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
CEN Readings	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
Chromium III	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
Coronene	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
EPH by GCxGC-FID	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
EPH CWG GC (S)	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
Fluoride	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
GRO by GC-FID (S)	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
Loss on Ignition in soils	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
Mercury Dissolved	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
Metals in solid samples by OES	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		
PAH 16 & 17 Calc	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X		



CERTIFICATE OF ANALYSIS

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

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
					250g Amber Jar (ALE210)	1kg TUB with Handle (ALE260)	60g VOC (ALE215)	250g Amber Jar (ALE210)	1kg TUB with Handle (ALE260)	60g VOC (ALE215)	
	25997108	ST 01		0.50 - 0.50	S	S	S	S	S	S	S
	25997109	ST 03		0.50 - 0.50	S	S	S	S	S	S	S
	25997110	ST 04		0.50 - 0.50	S	S	S	S	S	S	S
	25997111	TP 01		0.50 - 0.50	S	S	S	S	S	S	S
	25997112	TP 02		0.50 - 0.50	S	S	S	S	S	S	S
	25997113	TP 04		0.50 - 0.50	S	S	S	S	S	S	S
PAH by GCMS	All	NDPs: 0 Tests: 6			X	X	X	X	X	X	X
PCBs by GCMS	All	NDPs: 0 Tests: 6			X	X	X	X	X	X	X
pH	All	NDPs: 0 Tests: 6			X	X	X	X	X	X	X
Phenols by HPLC (W)	All	NDPs: 0 Tests: 6			X	X	X	X	X	X	X
Sample description	All	NDPs: 0 Tests: 6			X	X	X	X	X	X	X
Total Dissolved Solids on Leachates	All	NDPs: 0 Tests: 6			X	X	X	X	X	X	X
Total Organic Carbon	All	NDPs: 0 Tests: 6			X	X	X	X	X	X	X
TPH CWG GC (S)	All	NDPs: 0 Tests: 6			X	X	X	X	X	X	X
VOC MS (S)	All	NDPs: 0 Tests: 6			X	X	X	X	X	X	X



CERTIFICATE OF ANALYSIS

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
25997108	ST 01	0.50 - 0.50	Dark Brown	Loamy Sand	Stones	Vegetation
25997109	ST 03	0.50 - 0.50	Dark Brown	Loamy Sand	Stones	None
25997110	ST 04	0.50 - 0.50	Dark Brown	Sandy Loam	Stones	Vegetation
25997111	TP 01	0.50 - 0.50	Grey	Loamy Sand	Stones	None
25997112	TP 02	0.50 - 0.50	Light Brown	Sand	Stones	None
25997113	TP 04	0.50 - 0.50	Dark Brown	Sandy Silt Loam	Stones	Vegetation

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 occurring 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

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

Results Legend		Customer Sample Ref.	ST 01	ST 03	ST 04	TP 01	TP 02	TP 04
#	ISO17025 accredited.		0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50
M	mCERTS accredited.	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
aq	Aqueous / settled sample.	16/03/2022	16/03/2022	16/03/2022	16/03/2022	16/03/2022	16/03/2022	
diss.filt	Dissolved / filtered sample.	Date Sampled	Date Sampled	Date Sampled	Date Sampled	Date Sampled	Date Sampled	
tot.unfilt	Total / unfiltered sample.	18/03/2022	18/03/2022	18/03/2022	18/03/2022	18/03/2022	18/03/2022	
* 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)		Depth (m)	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)	
		Date Received	220319-39	220319-39	220319-39	220319-39	220319-39	
		SDG Ref	25997108	25997109	25997110	25997111	25997113	
		Lab Sample No.(s)						
		AGS Reference						
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	0.2	8.6	9.5	3.7	2.3	16
Loss on ignition	<0.7 %	TM018	1.01	3.13	3.13	1.69	<0.7	4.54
			M	M	M	M	M	M
Organic Carbon, Total	<0.2 %	TM132	<0.2	0.879	0.577	0.258	<0.2	1.6
			M	M	M	M	M	M
pH	1 pH Units	TM133	8.99	8.88	8.21	8.99	8.78	8.49
			M	M	M	M	M	M
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	1.08	<0.6	<0.6	<0.6	<0.6
			#	#	#	#	#	#
PCB congener 28	<3 µg/kg	TM168	<3	<3	<3	<3	<3	<3
			M	M	M	M	M	M
PCB congener 52	<3 µg/kg	TM168	<3	<3	<3	<3	<3	<3
			M	M	M	M	M	M
PCB congener 101	<3 µg/kg	TM168	<3	<3	<3	<3	<3	<3
			M	M	M	M	M	M
PCB congener 118	<3 µg/kg	TM168	<3	<3	<3	<3	<3	<3
			M	M	M	M	M	M
PCB congener 138	<3 µg/kg	TM168	<3	<3	<3	<3	<3	<3
			M	M	M	M	M	M
PCB congener 153	<3 µg/kg	TM168	<3	<3	<3	<3	<3	<3
			M	M	M	M	M	M
PCB congener 180	<3 µg/kg	TM168	<3	<3	<3	<3	<3	<3
			M	M	M	M	M	M
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21	<21	<21	<21	<21	<21
Chromium, Trivalent	<0.9 mg/kg	TM181	3.78	2.43	4.13	3.49	2.06	6.65
			M	M	M	M	M	M
Antimony	<0.6 mg/kg	TM181	0.685	2.1	<0.6	1.21	1.47	1.53
			#	#	#	#	#	#
Arsenic	<0.6 mg/kg	TM181	4.24	16.7	8.92	4.9	2.42	12.6
			M	M	M	M	M	M
Barium	<0.6 mg/kg	TM181	39.6	264	53.6	70.1	9.65	89.7
			#	#	#	#	#	#
Cadmium	<0.02 mg/kg	TM181	0.245	0.455	0.449	0.266	0.431	0.423
			M	M	M	M	M	M
Chromium	<0.9 mg/kg	TM181	3.78	3.51	4.13	3.49	2.06	6.65
			M	M	M	M	M	M
Copper	<1.4 mg/kg	TM181	8.31	27.2	17.7	6.83	5.58	22.5
			M	M	M	M	M	M
Lead	<0.7 mg/kg	TM181	6.54	610	18.5	66.7	<0.7	50.2
			M	M	M	M	M	M
Mercury	<0.1 mg/kg	TM181	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			M	M	M	M	M	M
Molybdenum	<0.1 mg/kg	TM181	0.545	8.51	0.744	0.69	1	0.889
			#	#	#	#	#	#
Nickel	<0.2 mg/kg	TM181	12.1	24.2	28.7	9.29	7.81	23.5
			M	M	M	M	M	M
Selenium	<1 mg/kg	TM181	1.12	3.58	1.13	1.2	1.77	1.48
			#	#	#	#	#	#
Zinc	<1.9 mg/kg	TM181	26.1	202	99.6	30.1	17.7	56
			M	M	M	M	M	M
PAH Total 17 (inc Coronene) Moisture Corrected	<10 mg/kg	TM410	<10	<10	<10	<10	<10	<10
Coronene	<200 µg/kg	TM410	<200	<200	<200	<200	<200	<200
Mineral Oil >C10-C40 (EH_2D_AL)	<5 mg/kg	TM415	12.8	15.1	<5	<5	<5	<5



CERTIFICATE OF ANALYSIS

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	ST 01	ST 03	ST 04	TP 01	TP 02	TP 04
# 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)		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.50 - 0.50 Soil/Solid (S) 16/03/2022	0.50 - 0.50 Soil/Solid (S) 16/03/2022	0.50 - 0.50 Soil/Solid (S) 16/03/2022	0.50 - 0.50 Soil/Solid (S) 16/03/2022	0.50 - 0.50 Soil/Solid (S) 16/03/2022	0.50 - 0.50 Soil/Solid (S) 16/03/2022
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	93	92.9	88	109	97	105
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/kg	TM089	<10	<10	<10	<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	<10	<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	7980	<1000	<1000	<1000	<1000
Aliphatics >C21-C35 (EH_2D_AL_#1)	<1000 µg/kg	TM414	12700	19800	1990	<1000	<1000	5570
Aliphatics >C35-C44 (EH_2D_AL_#1)	<1000 µg/kg	TM414	12400	<1000	<1000	<1000	<1000	<1000
Total Aliphatics >C10-C44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	25100	27900	<5000	<5000	<5000	5880
Total Aliphatics & Aromatics >C10-C44 (EH_2D_Total_#1)	<10000 µg/kg	TM414	51400	53200	<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	1040	<1000	<1000	<1000	<1000
Aromatics > EC21-EC35 (EH_2D_AR_#1)	<1000 µg/kg	TM414	17200	22900	2290	2300	1370	1760
Aromatics >EC35-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	8940	1350	<1000	<1000	<1000	<1000
Aromatics > EC40-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	3330	<1000	<1000	<1000	<1000	<1000
Total Aromatics > EC10-EC44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	26300	25300	<5000	<5000	<5000	<5000
Total Aliphatics & Aromatics >C5-C44 (EH_2D_Total_#1+HS_1D_Total)	<10000 µg/kg	TM414	51400	53200	<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	<50	<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	<20	<20	<20	<20



CERTIFICATE OF ANALYSIS

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.097
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Suir Island, Clonmel
Natural Moisture Content (%)	7.64
Dry Matter Content (%)	92.9

Case	
SDG	220319-39
Lab Sample Number(s)	25997108
Sampled Date	16-Mar-2022
Customer Sample Ref.	ST 01
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	<0.2
Loss on Ignition (%)	1.01
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	12.8
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.99
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ 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	0.00113	<0.0005	0.0113	<0.005	0.5	2	25
Barium	0.00355	<0.0002	0.0355	<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	<0.0003	<0.0003	<0.003	<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	0.00101	<0.001	0.0101	<0.01	0.1	0.5	7
Zinc	0.00124	<0.001	0.0124	<0.01	4	50	200
Chloride	3.2	<2	32	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	2.6	<2	26	<20	1000	20000	50000
Total Dissolved Solids	64.6	<10	646	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	500	800	1000

Leach Test Information

Date Prepared	21-Mar-2022
pH (pH Units)	8.24
Conductivity (µS/cm)	76.20
Temperature (°C)	21.10
Volume Leachant (Litres)	0.893

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

30/03/2022 08:21:54

08:21:42 30/03/2022



CERTIFICATE OF ANALYSIS

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.109
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Suir Island, Clonmel
Natural Moisture Content (%)	22.5
Dry Matter Content (%)	81.6

Case	
SDG	220319-39
Lab Sample Number(s)	25997109
Sampled Date	16-Mar-2022
Customer Sample Ref.	ST 03
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	0.879
Loss on Ignition (%)	3.13
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	15.1
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.88
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ 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	0.00346	<0.0005	0.0346	<0.005	0.5	2	25
Barium	0.0426	<0.0002	0.426	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.0373	<0.001	0.373	<0.01	0.5	10	70
Copper	0.00315	<0.0003	0.0315	<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	0.000541	<0.0004	0.00541	<0.004	0.4	10	40
Lead	0.00627	<0.0002	0.0627	<0.002	0.5	10	50
Antimony	0.00202	<0.001	0.0202	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00376	<0.001	0.0376	<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)	9.6	<2	96	<20	1000	20000	50000
Total Dissolved Solids	98.7	<10	987	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	3.53	<3	35.3	<30	500	800	1000

Leach Test Information

Date Prepared	21-Mar-2022
pH (pH Units)	8.12
Conductivity (µS/cm)	121.00
Temperature (°C)	22.20
Volume Leachant (Litres)	0.880

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

30/03/2022 08:21:54

08:21:42 30/03/2022



CERTIFICATE OF ANALYSIS

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.105
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Suir Island, Clonmel
Natural Moisture Content (%)	16.1
Dry Matter Content (%)	86.2

Case	
SDG	220319-39
Lab Sample Number(s)	25997110
Sampled Date	16-Mar-2022
Customer Sample Ref.	ST 04
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	0.577
Loss on Ignition (%)	3.13
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	<5
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.21
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ 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	0.0012	<0.0005	0.012	<0.005	0.5	2	25
Barium	0.0132	<0.0002	0.132	<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	0.0025	<0.0003	0.025	<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	0.000589	<0.0004	0.00589	<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	0.0404	<0.001	0.404	<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	110	<10	1100	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	6.93	<3	69.3	<30	500	800	1000

Leach Test Information

Date Prepared	21-Mar-2022
pH (pH Units)	8.04
Conductivity (µS/cm)	137.00
Temperature (°C)	20.30
Volume Leachant (Litres)	0.885

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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08:21:42 30/03/2022



CERTIFICATE OF ANALYSIS

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.099
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Suir Island, Clonmel
Natural Moisture Content (%)	9.41
Dry Matter Content (%)	91.4

Case	
SDG	220319-39
Lab Sample Number(s)	25997111
Sampled Date	16-Mar-2022
Customer Sample Ref.	TP 01
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	0.258
Loss on Ignition (%)	1.69
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	<5
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.99
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ 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	0.00236	<0.0005	0.0236	<0.005	0.5	2	25
Barium	0.0313	<0.0002	0.313	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.00219	<0.001	0.0219	<0.01	0.5	10	70
Copper	0.00265	<0.0003	0.0265	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00786	<0.003	0.0786	<0.03	0.5	10	30
Nickel	0.000547	<0.0004	0.00547	<0.004	0.4	10	40
Lead	0.000469	<0.0002	0.00469	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	0.0019	<0.001	0.019	<0.01	0.1	0.5	7
Zinc	0.00186	<0.001	0.0186	<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)	8.7	<2	87	<20	1000	20000	50000
Total Dissolved Solids	70.5	<10	705	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	3.42	<3	34.2	<30	500	800	1000

Leach Test Information

Date Prepared	21-Mar-2022
pH (pH Units)	8.28
Conductivity (µS/cm)	84.50
Temperature (°C)	21.80
Volume Leachant (Litres)	0.892

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

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		Site Location	Suir Island, Clonmel
Mass Sample taken (kg)	0.094	Natural Moisture Content (%)	5.07
Mass of dry sample (kg)	0.090	Dry Matter Content (%)	95.2
Particle Size <4mm	>95%		

Case	
SDG	220319-39
Lab Sample Number(s)	25997112
Sampled Date	16-Mar-2022
Customer Sample Ref.	TP 02
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	<0.2
Loss on Ignition (%)	<0.7
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	<5
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.78
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ 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	3	5	6
Arsenic	0.000543	<0.0005	0.00543	<0.005	0.5	2	25
Barium	0.00427	<0.0002	0.0427	<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	0.000504	<0.0003	0.00504	<0.003	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00781	<0.003	0.0781	<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	0.00145	<0.001	0.0145	<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	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	8	<2	80	<20	1000	20000	50000
Total Dissolved Solids	52.3	<10	523	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	500	800	1000

Leach Test Information

Date Prepared	21-Mar-2022
pH (pH Units)	7.84
Conductivity (µS/cm)	64.50
Temperature (°C)	21.60
Volume Leachant (Litres)	0.895

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

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		Site Location	Suir Island, Clonmel
Mass Sample taken (kg)	0.106	Natural Moisture Content (%)	17.7
Mass of dry sample (kg)	0.090	Dry Matter Content (%)	85
Particle Size <4mm	>95%		

Case	
SDG	220319-39
Lab Sample Number(s)	25997113
Sampled Date	16-Mar-2022
Customer Sample Ref.	TP 04
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	1.6
Loss on Ignition (%)	4.54
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	<5
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.49
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ 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	3	5	6
Arsenic	0.0037	<0.0005	0.037	<0.005	0.5	2	25
Barium	0.0164	<0.0002	0.164	<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	0.0044	<0.0003	0.044	<0.003	2	50	100
Mercury Dissolved (CVAf)	0.0000189	<0.00001	0.000189	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.000696	<0.0004	0.00696	<0.004	0.4	10	40
Lead	0.00152	<0.0002	0.0152	<0.002	0.5	10	50
Antimony	0.0018	<0.001	0.018	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00192	<0.001	0.0192	<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	118	<10	1180	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	5.93	<3	59.3	<30	500	800	1000

Leach Test Information

Date Prepared	21-Mar-2022
pH (pH Units)	7.78
Conductivity (µS/cm)	130.00
Temperature (°C)	21.40
Volume Leachant (Litres)	0.884

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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SDG: 220319-39
Client Ref.: 5931

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Location: Suir Island, Clonmel

Superseded Report:

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
TM133	BS 1377: Part 3 1990:BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	ISO 17294-2:2016 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)	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

Validated

SDG: 220319-39
Client Ref.: 5931

Report Number: 640020
Location: Suir Island, Clonmel

Superseded Report:

Test Completion Dates

Lab Sample No(s)	25997108	25997109	25997110	25997111	25997112	25997113
Customer Sample Ref.	ST 01	ST 03	ST 04	TP 01	TP 02	TP 04
AGS Ref.						
Depth	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)

Anions by Kone (w)	25-Mar-2022	25-Mar-2022	28-Mar-2022	28-Mar-2022	28-Mar-2022	28-Mar-2022
CEN 10:1 Leachate (1 Stage)	22-Mar-2022	22-Mar-2022	22-Mar-2022	22-Mar-2022	23-Mar-2022	23-Mar-2022
CEN Readings	24-Mar-2022	26-Mar-2022	24-Mar-2022	26-Mar-2022	26-Mar-2022	26-Mar-2022
Chromium III	28-Mar-2022	28-Mar-2022	28-Mar-2022	28-Mar-2022	25-Mar-2022	25-Mar-2022
Coronene	23-Mar-2022	23-Mar-2022	23-Mar-2022	23-Mar-2022	24-Mar-2022	24-Mar-2022
Dissolved Metals by ICP-MS	24-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022	28-Mar-2022	28-Mar-2022
Dissolved Organic/Inorganic Carbon	24-Mar-2022	24-Mar-2022	24-Mar-2022	24-Mar-2022	25-Mar-2022	25-Mar-2022
EPH by GCxGC-FID	23-Mar-2022	23-Mar-2022	23-Mar-2022	23-Mar-2022	25-Mar-2022	25-Mar-2022
EPH CWG GC (S)	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022
Fluoride	28-Mar-2022	28-Mar-2022	24-Mar-2022	24-Mar-2022	28-Mar-2022	28-Mar-2022
GRO by GC-FID (S)	30-Mar-2022	30-Mar-2022	30-Mar-2022	28-Mar-2022	30-Mar-2022	28-Mar-2022
Hexavalent Chromium (s)	24-Mar-2022	24-Mar-2022	24-Mar-2022	24-Mar-2022	24-Mar-2022	24-Mar-2022
Loss on Ignition in soils	28-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022	28-Mar-2022	28-Mar-2022
Mercury Dissolved	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022
Metals in solid samples by OES	28-Mar-2022	28-Mar-2022	28-Mar-2022	28-Mar-2022	25-Mar-2022	25-Mar-2022
Moisture at 105C	21-Mar-2022	21-Mar-2022	21-Mar-2022	21-Mar-2022	21-Mar-2022	21-Mar-2022
PAH 16 & 17 Calc	23-Mar-2022	23-Mar-2022	23-Mar-2022	23-Mar-2022	24-Mar-2022	24-Mar-2022
PAH by GCMS	23-Mar-2022	23-Mar-2022	23-Mar-2022	23-Mar-2022	24-Mar-2022	24-Mar-2022
PCBs by GCMS	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022	24-Mar-2022	24-Mar-2022
pH	29-Mar-2022	29-Mar-2022	29-Mar-2022	29-Mar-2022	29-Mar-2022	29-Mar-2022
Phenols by HPLC (W)	25-Mar-2022	25-Mar-2022	24-Mar-2022	24-Mar-2022	28-Mar-2022	28-Mar-2022
Sample description	22-Mar-2022	22-Mar-2022	22-Mar-2022	22-Mar-2022	23-Mar-2022	23-Mar-2022
Total Dissolved Solids on Leachates	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022	25-Mar-2022
Total Organic Carbon	29-Mar-2022	25-Mar-2022	29-Mar-2022	29-Mar-2022	29-Mar-2022	29-Mar-2022
TPH CWG GC (S)	30-Mar-2022	30-Mar-2022	30-Mar-2022	28-Mar-2022	30-Mar-2022	28-Mar-2022
VOC MS (S)	28-Mar-2022	28-Mar-2022	28-Mar-2022	25-Mar-2022	28-Mar-2022	25-Mar-2022



CERTIFICATE OF ANALYSIS

SDG: 220319-39 Client Reference: 5931 Report Number: 640020
 Location: Suir Island, Clonmel Order Number: 15/A/22 Superseded Report:

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) 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 (2021), 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 and soils are obtained from supplied bulk materials and soils 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 (2021).

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

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Coquindole	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 9
Waste Classification Report



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:

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



ACW71-KMSY0-6G00U

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

Job name

5931

Description/Comments

Client: Tipperary County Council
Engineer: Clifton Scannell Emerson Associates

Project

Suir Island Infrastructure Links

Site

Clonmel, Co. Tipperary

Classified by

Name: **Stephen Letch**
Company: **Site Investigations Ltd**
Date: **13 Apr 2022 09:45 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

Hazardous Waste Classification

Date

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	ST01-0.50m	0.50	Non Hazardous		Pass	Pass	3
2	ST03-0.50m	0.50	Non Hazardous		Pass	Pass	7
3	ST04-0.50m	0.50	Non Hazardous		Pass	Pass	11
4	TP01-0.50m	0.50	Non Hazardous		Pass	Pass	15
5	TP02-0.50m	0.50	Non Hazardous		Pass	Pass	19
6	TP04-0.50m	0.50	Non Hazardous		Pass	Pass	23

Related documents

#	Name	Description
1	220319-39.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

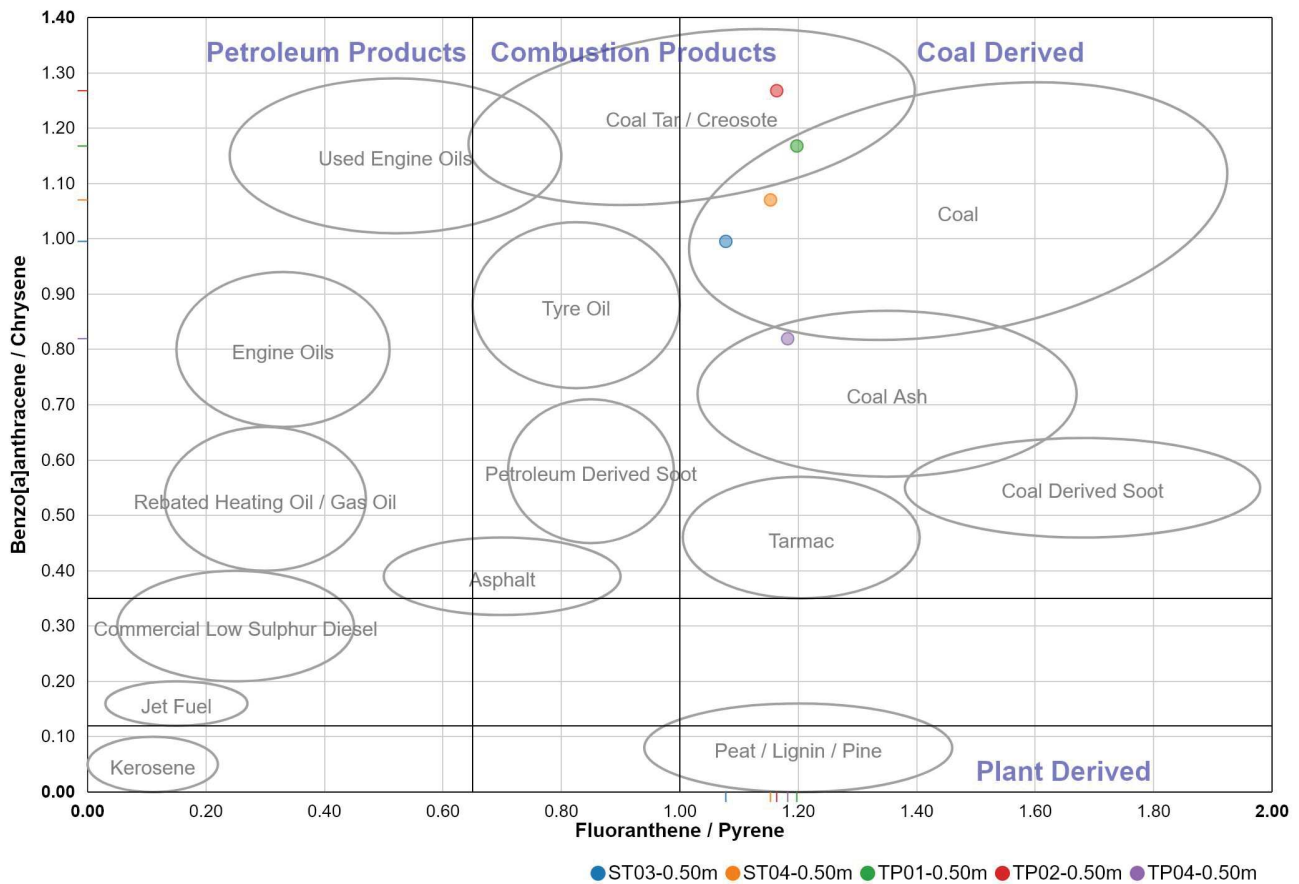
Created date: 13 Apr 2022 09:45 GMT

Appendices

	Page
Appendix A: Classifier defined and non EU CLP determinands	27
Appendix B: Rationale for selection of metal species	28
Appendix C: Version	29



Double Ratio PAH Plot



Disclaimer

The domains, oval areas and the plotted points are **indicators only** and must be combined with other lines of evidence to form conclusions. Samples marked with an empty circle are not plotted as they fall outside of the graph's boundaries.

Credits

The domains and the horizontal and vertical lines are derived from Yunker et al. 2002 (Organic Geochemistry 33, 489-515)
The oval areas and their labels are with kind permission of Jones Environmental Forensics Limited (now Element Materials Technology)



Classification of sample: ST01-0.50m

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

Sample details

Sample name:	LoW Code:
ST01-0.50m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
0.2% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 0.2% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	TPH (C6 to C40) petroleum group				51.4	mg/kg		51.297	mg/kg	0.00513 %	✓	
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>							
3	antimony { antimony trioxide }				0.685	mg/kg	1.197	0.818	mg/kg	0.0000818 %	✓	
	051-005-00-X	215-175-0	1309-64-4									
4	arsenic { arsenic pentoxide }				4.24	mg/kg	1.534	6.491	mg/kg	0.000649 %	✓	
	033-004-00-6	215-116-9	1303-28-2									
5	barium { barium sulphide }				39.6	mg/kg	1.233	48.749	mg/kg	0.00487 %	✓	
	016-002-00-X	244-214-4	21109-95-5									
6	cadmium { cadmium sulfate }				0.245	mg/kg	1.855	0.453	mg/kg	0.0000453 %	✓	
	048-009-00-9	233-331-6	10124-36-4									
7	copper { dicopper oxide; copper (I) oxide }				8.31	mg/kg	1.126	9.337	mg/kg	0.000934 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	6.54	mg/kg		6.527	mg/kg	0.000653 %	✓	
	082-001-00-6											
9	mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
10	molybdenum { molybdenum(VI) oxide }				0.545	mg/kg	1.5	0.816	mg/kg	0.0000816 %	✓	
	042-001-00-9	215-204-7	1313-27-5									
11	nickel { nickel sulfate }				12.1	mg/kg	2.637	31.84	mg/kg	0.00318 %	✓	
	028-009-00-5	232-104-9	7786-81-4									
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.12	mg/kg	1.405	1.57	mg/kg	0.000157 %	✓	
	034-002-00-8											
13	zinc { zinc sulphate }				26.1	mg/kg	2.469	64.32	mg/kg	0.00643 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				3.78	mg/kg	1.462	5.514	mg/kg	0.000551 %	✓	
		215-160-9	1308-38-9									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
16	naphthalene				<0.09 mg/kg		<0.09 mg/kg	<0.000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
17	acenaphthylene				<0.12 mg/kg		<0.12 mg/kg	<0.000012 %		<LOD
		205-917-1	208-96-8							
18	acenaphthene				<0.08 mg/kg		<0.08 mg/kg	<0.000008 %		<LOD
		201-469-6	83-32-9							
19	fluorene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		201-695-5	86-73-7							
20	phenanthrene				<0.15 mg/kg		<0.15 mg/kg	<0.000015 %		<LOD
		201-581-5	85-01-8							
21	anthracene				<0.16 mg/kg		<0.16 mg/kg	<0.000016 %		<LOD
		204-371-1	120-12-7							
22	fluoranthene				<0.17 mg/kg		<0.17 mg/kg	<0.000017 %		<LOD
		205-912-4	206-44-0							
23	pyrene				<0.15 mg/kg		<0.15 mg/kg	<0.000015 %		<LOD
		204-927-3	129-00-0							
24	benzo[a]anthracene				<0.14 mg/kg		<0.14 mg/kg	<0.000014 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				<0.15 mg/kg		<0.15 mg/kg	<0.000015 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				<0.14 mg/kg		<0.14 mg/kg	<0.000014 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				<0.15 mg/kg		<0.15 mg/kg	<0.000015 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				<0.18 mg/kg		<0.18 mg/kg	<0.000018 %		<LOD
		205-893-2	193-39-5							
30	dibenz[a,h]anthracene				<0.23 mg/kg		<0.23 mg/kg	<0.000023 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
31	benzo[ghi]perylene				<0.24 mg/kg		<0.24 mg/kg	<0.000024 %		<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	pH				8.99 pH		8.99 pH	8.99 pH		
			PH							
39	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:								0.0232 %		



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 Determinand - 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. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00513%)



WAC results for sample: ST01-0.50m

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)	%	<0.2	3	5
2	LOI (loss on ignition)	%	1.01	-	-
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	12.8	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<10	100	-
7	pH	pH	8.99	-	>6
8	ANC (acid neutralisation capacity)	mol/kg	-	-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	0.0113	0.5	2
10	barium	mg/kg	0.0355	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	<0.003	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	0.0101	0.1	0.5
20	zinc	mg/kg	0.0124	4	50
21	chloride	mg/kg	32	800	15,000
22	fluoride	mg/kg	<5	10	150
23	sulphate	mg/kg	26	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	<30	500	800
26	TDS (total dissolved solids)	mg/kg	646	4,000	60,000

Key

User supplied data



Classification of sample: ST03-0.50m

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

Sample details

Sample name:	LoW Code:
ST03-0.50m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
8.6% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 8.6% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	TPH (C6 to C40) petroleum group				53.2	mg/kg		48.625	mg/kg	0.00486 %	✓	
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>							
3	antimony { antimony trioxide }				2.1	mg/kg	1.197	2.298	mg/kg	0.00023 %	✓	
	051-005-00-X	215-175-0	1309-64-4									
4	arsenic { arsenic pentoxide }				16.7	mg/kg	1.534	23.413	mg/kg	0.00234 %	✓	
	033-004-00-6	215-116-9	1303-28-2									
5	barium { barium sulphide }				264	mg/kg	1.233	297.637	mg/kg	0.0298 %	✓	
	016-002-00-X	244-214-4	21109-95-5									
6	cadmium { cadmium sulfate }				0.455	mg/kg	1.855	0.771	mg/kg	0.0000771 %	✓	
	048-009-00-9	233-331-6	10124-36-4									
7	copper { dicopper oxide; copper (I) oxide }				27.2	mg/kg	1.126	27.99	mg/kg	0.0028 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	610	mg/kg		557.54	mg/kg	0.0558 %	✓	
	082-001-00-6											
9	mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
10	molybdenum { molybdenum(VI) oxide }				8.51	mg/kg	1.5	11.669	mg/kg	0.00117 %	✓	
	042-001-00-9	215-204-7	1313-27-5									
11	nickel { nickel sulfate }				24.2	mg/kg	2.637	58.32	mg/kg	0.00583 %	✓	
	028-009-00-5	232-104-9	7786-81-4									
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				3.58	mg/kg	1.405	4.597	mg/kg	0.00046 %	✓	
	034-002-00-8											
13	zinc { zinc sulphate }				202	mg/kg	2.469	455.901	mg/kg	0.0456 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				2.43	mg/kg	1.462	3.246	mg/kg	0.000325 %	✓	
		215-160-9	1308-38-9									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				1.08 mg/kg	1.923	1.898 mg/kg	0.00019 %	✓	
	024-001-00-0	215-607-8	1333-82-0							
16	naphthalene				<0.009 mg/kg		<0.009 mg/kg	<0.000009 %		<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				0.0368 mg/kg		0.0336 mg/kg	0.00000336 %	✓	
		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				0.111 mg/kg		0.101 mg/kg	0.0000101 %	✓	
		205-912-4	206-44-0							
23	pyrene				0.103 mg/kg		0.0941 mg/kg	0.00000941 %	✓	
		204-927-3	129-00-0							
24	benzo[a]anthracene				0.0637 mg/kg		0.0582 mg/kg	0.00000582 %	✓	
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				0.064 mg/kg		0.0585 mg/kg	0.00000585 %	✓	
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				0.0913 mg/kg		0.0834 mg/kg	0.00000834 %	✓	
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				0.0307 mg/kg		0.0281 mg/kg	0.00000281 %	✓	
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				0.0651 mg/kg		0.0595 mg/kg	0.00000595 %	✓	
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				0.0577 mg/kg		0.0527 mg/kg	0.00000527 %	✓	
		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				0.061 mg/kg		0.0558 mg/kg	0.00000558 %	✓	
		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	pH				8.88 pH		8.88 pH	8.88 pH		
			PH							
39	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:								0.15 %		



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 Determinand - 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 2: Oxidizing "waste which may, generally by providing oxygen, cause or contribute to the combustion of other materials"

Force this Hazardous property to non hazardous because Too low to be oxidising

Hazard Statements hit:

Ox. Sol. 1; H271 "May cause fire or explosion; strong oxidiser."

Because of determinand:

chromium(VI) oxide: (compound conc.: 0.00019%)

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. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00486%)



WAC results for sample: ST03-0.50m

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)	% 0.879	3	5
2	LOI (loss on ignition)	% 3.13	-	-
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 15.1	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg <10	100	-
7	pH	pH 8.88	-	>6
8	ANC (acid neutralisation capacity)	mol/kg	-	-
Eluate Analysis 10:1				
9	arsenic	mg/kg 0.0346	0.5	2
10	barium	mg/kg 0.426	20	100
11	cadmium	mg/kg <0.0008	0.04	1
12	chromium	mg/kg 0.373	0.5	10
13	copper	mg/kg 0.0315	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 0.0054	0.4	10
17	lead	mg/kg 0.0627	0.5	10
18	antimony	mg/kg 0.0202	0.06	0.7
19	selenium	mg/kg <0.01	0.1	0.5
20	zinc	mg/kg 0.0376	4	50
21	chloride	mg/kg <20	800	15,000
22	fluoride	mg/kg <5	10	150
23	sulphate	mg/kg 96	1,000	20,000
24	phenol index	mg/kg <0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg 35.3	500	800
26	TDS (total dissolved solids)	mg/kg 987	4,000	60,000

Key

User supplied data



Classification of sample: ST04-0.50m

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

Sample details

Sample name:	LoW Code:
ST04-0.50m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
9.5% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 9.5% Wet Weight Moisture Correction applied (MC)

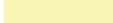
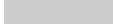


#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>					
3	antimony { antimony trioxide }				<0.6 mg/kg	1.197	<0.718 mg/kg	<0.0000718 %		<LOD
	051-005-00-X	215-175-0	1309-64-4							
4	arsenic { arsenic pentoxide }				8.92 mg/kg	1.534	12.382 mg/kg	0.00124 %	✓	
	033-004-00-6	215-116-9	1303-28-2							
5	barium { barium sulphide }				53.6 mg/kg	1.233	59.834 mg/kg	0.00598 %	✓	
	016-002-00-X	244-214-4	21109-95-5							
6	cadmium { cadmium sulfate }				0.449 mg/kg	1.855	0.754 mg/kg	0.0000754 %	✓	
	048-009-00-9	233-331-6	10124-36-4							
7	copper { dicopper oxide; copper (I) oxide }				17.7 mg/kg	1.126	18.035 mg/kg	0.0018 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	18.5 mg/kg		16.743 mg/kg	0.00167 %	✓	
	082-001-00-6									
9	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
10	molybdenum { molybdenum(VI) oxide }				0.744 mg/kg	1.5	1.01 mg/kg	0.000101 %	✓	
	042-001-00-9	215-204-7	1313-27-5							
11	nickel { nickel sulfate }				28.7 mg/kg	2.637	68.484 mg/kg	0.00685 %	✓	
	028-009-00-5	232-104-9	7786-81-4							
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.13 mg/kg	1.405	1.437 mg/kg	0.000144 %	✓	
	034-002-00-8									
13	zinc { zinc sulphate }				99.6 mg/kg	2.469	222.577 mg/kg	0.0223 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				4.13 mg/kg	1.462	5.463 mg/kg	0.000546 %	✓	
		215-160-9	1308-38-9							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
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				0.0345 mg/kg		0.0312 mg/kg	0.00000312 %	✓	
		201-581-5	85-01-8							
21	anthracene				0.0215 mg/kg		0.0195 mg/kg	0.00000195 %	✓	
		204-371-1	120-12-7							
22	fluoranthene				0.128 mg/kg		0.116 mg/kg	0.0000116 %	✓	
		205-912-4	206-44-0							
23	pyrene				0.111 mg/kg		0.1 mg/kg	0.00001 %	✓	
		204-927-3	129-00-0							
24	benzo[a]anthracene				0.0701 mg/kg		0.0634 mg/kg	0.00000634 %	✓	
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				0.0655 mg/kg		0.0593 mg/kg	0.00000593 %	✓	
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				0.0843 mg/kg		0.0763 mg/kg	0.00000763 %	✓	
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				0.0327 mg/kg		0.0296 mg/kg	0.00000296 %	✓	
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				0.0644 mg/kg		0.0583 mg/kg	0.00000583 %	✓	
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				0.0497 mg/kg		0.045 mg/kg	0.0000045 %	✓	
		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				0.0413 mg/kg		0.0374 mg/kg	0.00000374 %	✓	
		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	pH				8.21 pH		8.21 pH	8.21 pH		
			PH							
39	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:								0.042 %		



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 Determinand - 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: ST04-0.50m

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)	% 0.577	3	5
2	LOI (loss on ignition)	% 3.13	-	-
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 <10	100	-
7	pH	pH 8.21	-	>6
8	ANC (acid neutralisation capacity)	mol/kg	-	-
Eluate Analysis 10:1				
9	arsenic	mg/kg 0.012	0.5	2
10	barium	mg/kg 0.132	20	100
11	cadmium	mg/kg <0.0008	0.04	1
12	chromium	mg/kg <0.01	0.5	10
13	copper	mg/kg 0.025	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 0.0058	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 0.404	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 69.3	500	800
26	TDS (total dissolved solids)	mg/kg 1100	4,000	60,000

Key

User supplied data



Classification of sample: TP01-0.50m

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

Sample details

Sample name:	LoW Code:
TP01-0.50m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
3.7%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 3.7% Wet Weight Moisture Correction applied (MC)

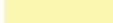
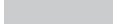


#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>					
3	antimony { antimony trioxide }				1.21 mg/kg	1.197	1.395 mg/kg	0.000139 %	✓	
	051-005-00-X	215-175-0	1309-64-4							
4	arsenic { arsenic pentoxide }				4.9 mg/kg	1.534	7.238 mg/kg	0.000724 %	✓	
	033-004-00-6	215-116-9	1303-28-2							
5	barium { barium sulphide }				70.1 mg/kg	1.233	83.269 mg/kg	0.00833 %	✓	
	016-002-00-X	244-214-4	21109-95-5							
6	cadmium { cadmium sulfate }				0.266 mg/kg	1.855	0.475 mg/kg	0.0000475 %	✓	
	048-009-00-9	233-331-6	10124-36-4							
7	copper { dicopper oxide; copper (I) oxide }				6.83 mg/kg	1.126	7.405 mg/kg	0.000741 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	66.7 mg/kg		64.232 mg/kg	0.00642 %	✓	
	082-001-00-6									
9	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
10	molybdenum { molybdenum(VI) oxide }				0.69 mg/kg	1.5	0.997 mg/kg	0.0000997 %	✓	
	042-001-00-9	215-204-7	1313-27-5							
11	nickel { nickel sulfate }				9.29 mg/kg	2.637	23.588 mg/kg	0.00236 %	✓	
	028-009-00-5	232-104-9	7786-81-4							
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.2 mg/kg	1.405	1.624 mg/kg	0.000162 %	✓	
	034-002-00-8									
13	zinc { zinc sulphate }				30.1 mg/kg	2.469	71.576 mg/kg	0.00716 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				3.49 mg/kg	1.462	4.912 mg/kg	0.000491 %	✓	
		215-160-9	1308-38-9							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
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				0.121 mg/kg		0.117 mg/kg	0.0000117 %	✓	
		201-581-5	85-01-8							
21	anthracene				0.0404 mg/kg		0.0389 mg/kg	0.00000389 %	✓	
		204-371-1	120-12-7							
22	fluoranthene				0.2 mg/kg		0.193 mg/kg	0.0000193 %	✓	
		205-912-4	206-44-0							
23	pyrene				0.167 mg/kg		0.161 mg/kg	0.0000161 %	✓	
		204-927-3	129-00-0							
24	benzo[a]anthracene				0.0933 mg/kg		0.0898 mg/kg	0.00000898 %	✓	
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				0.0799 mg/kg		0.0769 mg/kg	0.00000769 %	✓	
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				0.0925 mg/kg		0.0891 mg/kg	0.00000891 %	✓	
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				0.0381 mg/kg		0.0367 mg/kg	0.00000367 %	✓	
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				0.073 mg/kg		0.0703 mg/kg	0.00000703 %	✓	
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				0.0527 mg/kg		0.0508 mg/kg	0.00000508 %	✓	
		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				0.0445 mg/kg		0.0429 mg/kg	0.00000429 %	✓	
		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	pH				8.99 pH		8.99 pH	8.99 pH		
			PH							
39	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:								0.0279 %		



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 Determinand - 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: TP01-0.50m

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)	% 0.258	3	5
2	LOI (loss on ignition)	% 1.69	-	-
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 <10	100	-
7	pH	pH 8.99	-	>6
8	ANC (acid neutralisation capacity)	mol/kg	-	-
Eluate Analysis 10:1				
9	arsenic	mg/kg 0.0236	0.5	2
10	barium	mg/kg 0.313	20	100
11	cadmium	mg/kg <0.0008	0.04	1
12	chromium	mg/kg 0.0219	0.5	10
13	copper	mg/kg 0.0265	2	50
14	mercury	mg/kg <0.0001	0.01	0.2
15	molybdenum	mg/kg 0.0786	0.5	10
16	nickel	mg/kg 0.0054	0.4	10
17	lead	mg/kg 0.0046	0.5	10
18	antimony	mg/kg <0.01	0.06	0.7
19	selenium	mg/kg 0.019	0.1	0.5
20	zinc	mg/kg 0.0186	4	50
21	chloride	mg/kg <20	800	15,000
22	fluoride	mg/kg <5	10	150
23	sulphate	mg/kg 87	1,000	20,000
24	phenol index	mg/kg <0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg 34.2	500	800
26	TDS (total dissolved solids)	mg/kg 705	4,000	60,000

Key

User supplied data



Classification of sample: TP02-0.50m

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

Sample details

Sample name:	LoW Code:
TP02-0.50m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
2.3% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 2.3% Wet Weight Moisture Correction applied (MC)

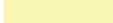
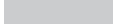


#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>					
3	antimony { antimony trioxide }				1.47 mg/kg	1.197	1.719 mg/kg	0.000172 %	✓	
	051-005-00-X	215-175-0	1309-64-4							
4	arsenic { arsenic pentoxide }				2.42 mg/kg	1.534	3.627 mg/kg	0.000363 %	✓	
	033-004-00-6	215-116-9	1303-28-2							
5	barium { barium sulphide }				9.65 mg/kg	1.233	11.629 mg/kg	0.00116 %	✓	
	016-002-00-X	244-214-4	21109-95-5							
6	cadmium { cadmium sulfate }				0.431 mg/kg	1.855	0.781 mg/kg	0.0000781 %	✓	
	048-009-00-9	233-331-6	10124-36-4							
7	copper { dicopper oxide; copper (I) oxide }				5.58 mg/kg	1.126	6.138 mg/kg	0.000614 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	<0.7 mg/kg		<0.7 mg/kg	<0.00007 %		<LOD
	082-001-00-6									
9	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
10	molybdenum { molybdenum(VI) oxide }				1 mg/kg	1.5	1.466 mg/kg	0.000147 %	✓	
	042-001-00-9	215-204-7	1313-27-5							
11	nickel { nickel sulfate }				7.81 mg/kg	2.637	20.119 mg/kg	0.00201 %	✓	
	028-009-00-5	232-104-9	7786-81-4							
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.77 mg/kg	1.405	2.43 mg/kg	0.000243 %	✓	
	034-002-00-8									
13	zinc { zinc sulphate }				17.7 mg/kg	2.469	42.701 mg/kg	0.00427 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				2.06 mg/kg	1.462	2.942 mg/kg	0.000294 %	✓	
		215-160-9	1308-38-9							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
16	naphthalene				<0.009 mg/kg		<0.009 mg/kg	<0.000009 %		<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				0.0522 mg/kg		0.051 mg/kg	0.0000051 %	✓	
		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				0.0704 mg/kg		0.0688 mg/kg	0.00000688 %	✓	
		205-912-4	206-44-0							
23	pyrene				0.0605 mg/kg		0.0591 mg/kg	0.00000591 %	✓	
		204-927-3	129-00-0							
24	benzo[a]anthracene				0.0341 mg/kg		0.0333 mg/kg	0.00000333 %	✓	
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				0.0269 mg/kg		0.0263 mg/kg	0.00000263 %	✓	
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				0.0493 mg/kg		0.0482 mg/kg	0.00000482 %	✓	
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				0.0173 mg/kg		0.0169 mg/kg	0.00000169 %	✓	
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				0.0358 mg/kg		0.035 mg/kg	0.0000035 %	✓	
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				0.0283 mg/kg		0.0276 mg/kg	0.00000276 %	✓	
		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				0.0264 mg/kg		0.0258 mg/kg	0.00000258 %	✓	
		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	pH				8.78 pH		8.78 pH	8.78 pH		
			PH							
39	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:								0.0106 %		



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 Determinand - 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: TP02-0.50m

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)	% <0.2	3	5
2	LOI (loss on ignition)	% <0.7	-	-
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 <10	100	-
7	pH	pH 8.78	-	>6
8	ANC (acid neutralisation capacity)	mol/kg	-	-
Eluate Analysis 10:1				
9	arsenic	mg/kg 0.0054	0.5	2
10	barium	mg/kg 0.0427	20	100
11	cadmium	mg/kg <0.0008	0.04	1
12	chromium	mg/kg <0.01	0.5	10
13	copper	mg/kg 0.005	2	50
14	mercury	mg/kg <0.0001	0.01	0.2
15	molybdenum	mg/kg 0.0781	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 0.0145	0.1	0.5
20	zinc	mg/kg <0.01	4	50
21	chloride	mg/kg <20	800	15,000
22	fluoride	mg/kg <5	10	150
23	sulphate	mg/kg 80	1,000	20,000
24	phenol index	mg/kg <0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg <30	500	800
26	TDS (total dissolved solids)	mg/kg 523	4,000	60,000

Key

User supplied data



Classification of sample: TP04-0.50m

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

Sample details

Sample name:	LoW Code:
TP04-0.50m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
16%	
(wet weight correction)	

Hazard properties

None identified

Determinands

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

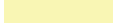
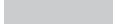


#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>					
3	antimony { antimony trioxide }				1.53 mg/kg	1.197	1.539 mg/kg	0.000154 %	✓	
	051-005-00-X	215-175-0	1309-64-4							
4	arsenic { arsenic pentoxide }				12.6 mg/kg	1.534	16.235 mg/kg	0.00162 %	✓	
	033-004-00-6	215-116-9	1303-28-2							
5	barium { barium sulphide }				89.7 mg/kg	1.233	92.941 mg/kg	0.00929 %	✓	
	016-002-00-X	244-214-4	21109-95-5							
6	cadmium { cadmium sulfate }				0.423 mg/kg	1.855	0.659 mg/kg	0.0000659 %	✓	
	048-009-00-9	233-331-6	10124-36-4							
7	copper { dicopper oxide; copper (I) oxide }				22.5 mg/kg	1.126	21.279 mg/kg	0.00213 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	50.2 mg/kg		42.168 mg/kg	0.00422 %	✓	
	082-001-00-6									
9	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
10	molybdenum { molybdenum(VI) oxide }				0.889 mg/kg	1.5	1.12 mg/kg	0.000112 %	✓	
	042-001-00-9	215-204-7	1313-27-5							
11	nickel { nickel sulfate }				23.5 mg/kg	2.637	52.048 mg/kg	0.0052 %	✓	
	028-009-00-5	232-104-9	7786-81-4							
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.48 mg/kg	1.405	1.747 mg/kg	0.000175 %	✓	
	034-002-00-8									
13	zinc { zinc sulphate }				56 mg/kg	2.469	116.156 mg/kg	0.0116 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				6.65 mg/kg	1.462	8.164 mg/kg	0.000816 %	✓	
		215-160-9	1308-38-9							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
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				0.0296 mg/kg		0.0249 mg/kg	0.00000249 %	✓	
		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				0.0727 mg/kg		0.0611 mg/kg	0.00000611 %	✓	
		205-912-4	206-44-0							
23	pyrene				0.0615 mg/kg		0.0517 mg/kg	0.00000517 %	✓	
		204-927-3	129-00-0							
24	benzo[a]anthracene				0.0413 mg/kg		0.0347 mg/kg	0.00000347 %	✓	
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				0.0504 mg/kg		0.0423 mg/kg	0.00000423 %	✓	
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				0.0679 mg/kg		0.057 mg/kg	0.0000057 %	✓	
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				0.0245 mg/kg		0.0206 mg/kg	0.00000206 %	✓	
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				0.043 mg/kg		0.0361 mg/kg	0.00000361 %	✓	
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				0.0343 mg/kg		0.0288 mg/kg	0.00000288 %	✓	
		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				0.0339 mg/kg		0.0285 mg/kg	0.00000285 %	✓	
		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	pH				8.49 pH		8.49 pH	8.49 pH		
			PH							
39	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:								0.0366 %		



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 Determinand - 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: TP04-0.50m

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)	%	1.6	3	5
2	LOI (loss on ignition)	%	4.54	-	-
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	<10	100	-
7	pH	pH	8.49	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	0.037	0.5	2
10	barium	mg/kg	0.164	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.044	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	0.0069	0.4	10
17	lead	mg/kg	0.0152	0.5	10
18	antimony	mg/kg	0.018	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	0.0192	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	59.3	500	800
26	TDS (total dissolved solids)	mg/kg	1180	4,000	60,000

Key

User supplied data



Appendix A: Classifier defined and non EU 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)

EU CLP index number: 016-002-00-X

Description/Comments:

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)

EU 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

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)

EU 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.
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)

EU CLP index number: 601-023-00-4
Description/Comments:
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

• **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

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.NI - Jan 2021

HazWasteOnline Classification Engine Version: 2017.202.300.300 (23 Mar 2022)

HazWasteOnline Database: 2022.81.5064.9565 (22 Mar 2022)

This classification utilises the following guidance and legislation:

WM3 v1.1.NI - Waste Classification - 1st Edition v1.1.NI - Jan 2021

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 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

17th ATP - Regulation (EU) 2021/849 of 11 March 2021

Appendix 10
Survey Data

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