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INTRODUCTION

5.1 This Chapter of the Environmental Impact Statement evaluates the regional and local geological conditions of the proposed increase in the current rate of waste intake at the licensed inert soil waste recovery facility at Huntstown and assesses the impact that the intensification of backfilling activity will have on the soils and geology of the area.

5.2 In the short to medium term future, the intensification of backfilling and waste recovery activities will be confined to the North Quarry and West Quarry at Huntstown. The extent of the application site to which this planning application applies is shown in Figure 5-1

5.3 The information presented in this chapter is based on a detailed examination of the existing quarries at Huntstown and the surrounding area and was prepared by EurGeol Tom Moore PGeo in accordance with the publication *Geology in Environmental Impact Statements* issued by the Institute of Geologists of Ireland.

RECEIVING ENVIRONMENT

Study Methodology

5.4 Existing information on the regional solid and drift geology of the Huntstown area and its surrounds was collated and evaluated. Subsequent to this data compilation and review, site visits and inspections were undertaken to review the solid and drift geology in each of the existing quarries (active and inactive) at the Huntstown quarry complex and in the surrounding area.

5.5 A drilling program was undertaken to install six groundwater monitoring wells across the Huntstown Quarry complex in July 2010. Rock chip samples from the open-hole drilling were collected at that time were examined to assist in assessing the geology of the Huntstown area. Well locations and borehole logs are presented in Section 6 of this EIS.

5.6 In June and July 2015 and additional twelve boreholes were cored in the West Quarry and a geophysical survey was undertaken by APEX Geoservices to assess the likely lithological distribution and structure in that area of the Huntstown quarry complex.

5.7 In June 2016 two trial pit excavations were excavated to the rear of a residential property beyond the western limit of the North Quarry. The purpose of these excavations was to establish the nature of the soils and subsoils in an area to be removed from the waste licensed area following a recent property transfer. In order to confirm that there had been no adverse impact in soil quality as a result of ongoing waste recovery activities at the adjoining North Quarry, a suite of chemical tests was undertaken on two soil samples taken at various depths from each excavation.

5.8 The following activities were undertaken as part of this geological assessment:

- Examination of GSI 1:100,000 geology map sheets 13 and 16
- Review of available geological information and literature
- Review of groundwater monitoring well installation records
- Review of 2015 rotary core borehole records
- Site / quarry face inspections

Regional Geology

Soil

5.9 Teagasc soil mapping, reproduced in Figure 5-1, indicates that the Huntstown site was originally underlain by renzinas and lithosols and grey-brown podzolics and brown earths. Site inspections indicate that there is a significant amount of Made Ground (soil disturbed or placed by human activity) across the Huntstown Quarry complex other than that identified by Teagasc soil mapping. Most of the Made Ground arises from historical and ongoing extractive activity, principally overburden removal and stockpiling or installation of fixed plant and infrastructure. As a result, few areas of original, undisturbed soil remain across the Huntstown Quarry complex.

5.10 The Teagasc soil mapping also indicates that the undeveloped or undisturbed lands immediately beyond the Huntstown Quarry complex are underlain by well-drained calcareous soils (derived from limestone) which are suitable for a wide range of agricultural activity, generally grassland or tillage. There are also some poorly drained calcareous soils which have more restricted uses, principally as seasonal grassland.

Quaternary Geology

5.11 Teagasc sub-soil (parent material) mapping, reproduced in Figure 5-2, shows that the Huntstown Quarry complex is underlain by bedrock at, or close to, surface and glacial tills derived from Carboniferous limestones.

Bedrock Geology

5.12 The GSI 1:100,000 geology maps (Sheets 13 and 16) show a complex geology around Huntstown, refer to Figure 5-3. The Huntstown Quarry complex straddles a number of geological formations. It is underlain by the Malahide Formation in the southern part of the site. This is overlain to the northwest by Waulsortian Limestones of the Feltrim Limestone Formation which is, in turn, overlain to the northwest by the Tober Colleen. The Tober Colleen is in faulted contact with the Malahide Formation to the northwest, the Malahide Formation in this area having reverse faulted to the south over the Tober Colleen Formation.

Local Geology

Introduction

5.13 There are currently three main areas at the Huntstown Quarry complex where extraction is taking place, or has taken place in the recent past (refer to Figure 5-4). These are referred to in turn as the North, Central and South Quarries. The extensive rock exposures in these working areas, in conjunction with information from the recent groundwater well and resource drilling, allows a reasonable assessment of the distribution of different lithological formations and the structure of the geology around the application site to be made.

Soil and Subsoil Deposits

5.14 Soils and superficial deposits have been entirely stripped from the footprint of the current and previous extraction areas and only minimal future excavation or disturbance of in-situ soil and/or subsoil deposit materials is anticipated.

5.15 Inert soil and stone material has been imported to and recovered at the licensed waste recovery facility at the North Quarry since November 2015. The inert soil material generally comprises excess subsoil from excavations at construction and development sites across the Greater Dublin Area. These subsoils generally comprise glacial till materials (typically described as gravelly silty clay with cobbles and boulders).

5.16 The soils and subsoils at the West Quarry had previously been removed to facilitate future extraction of underlying rock (which never ultimately proceeded). Exposures indicate that approximately 2.5m to 3m of overburden material was removed and that it comprised a thin layer of topsoil overlying a stiff to very stiff sandy gravelly CLAY with numerous cobbles (Glacial Till).

5.17 As previously noted, two trial pits were excavated at the rear of the residential property to the west of the North Quarry (at locations indicated in Figure 5-4). The trial pits confirmed the presence of natural ground. Trial pit 16-TP1 encountered topsoil over firm brown mottled grey to orange sandy gravelly CLAY with occasional cobbles (Glacial Till) to 1.8m depth. Trial pit 16-TP2 encountered topsoil over firm to stiff mid brown minor orange mottled sandy gravelly CLAY with occasional cobbles (Glacial Till) before being terminated on weathered rock at 1.6m. Photographs of the trial pit excavations are provided in Plates 5-1 to 5-3. Trial pit logs are presented in Appendix 5-A.

5.18 Geochemical tests were undertaken on two soil samples, one taken from 0.5m depth in 16-TP1 and the other from 1.0m depth in 16-TP2, in order to establish if any contaminants were present and to classify it according to *Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills*. This testing was undertaken in order to demonstrate that a small area of land to the west of the application site not been impacted by waste activities and could be removed from the waste licence area.

5.19 Test results indicate that the level of soil contamination in the tested samples is very low, considerably below the threshold values for inert soil set by Council Decision 2003/33. The concentration of metals in leachate samples is relatively low and there is little or no anthropogenic contamination present, with only trace quantities (above detection limits) of mineral oil, polyaromatic hydrocarbons (PAHs), phenols or polychlorinated biphenyls (PCBs) present in either of the test samples. A copy of the laboratory test results is provided in Appendix 5-B.

Bedrock Geology

5.20 The geological sequence at Huntstown was investigated in detail by *Jones et al*. (1988), although at that time development the current South Quarry had not commenced. The bedrock sequence in the Huntstown area, as determined by *Jones et al*. is presented in Table 5-1 overleaf.

Table 5-1
Lithological Sequence of Formations Present In Huntstown Quarry Area
(Partly Based On Jones *et al.* 1988)

FORMATION	MEMBERS	Estimated thickness	Description
LUCAN FORMATION		250m at Huntstown? 1000m+ Regionally	Dark fine-grained limestone and thin shales
TOBER COLLEEN FORMATION		100 – 200m?	Shales and dark limestones
FELTRIM LIMESTONE FORMATION (WAULSORTIAN)		200 – 250m	Pale-grey micritic sparry limestones
MALAHIDE LIMESTONE FORMATION	Barberstown Nodular Member	84m	Nodular limestones and shales
	Dunsoghley Massive Crinoidal Member	47m	Massive crinoidal limestones
	Huntstown Laminated Member	40m	Laminated coarse limestones
	St Margarets Banded Member	86m	Interbedded shales and limestones
	Swords Argillaceous Bioclastic Member	>860m	Variable. Massive clean limestone units interbedded with banded limestone/shale units and argillaceous bioclastic limestones. Mudstone-dominated units have also been recorded
	Turvey Micrite Member	40m	Micritic limestones and thin shales
	Lower Limestone Shale Unit	>30m	Limestone and shale

5.21 The South Quarry at Huntstown is developed within limestones of the Malahide Formation which dip steeply to the north in the eastern part of the quarry and to the north-west in the western part of the quarry. The limestones are dominated by well-bedded limestones.

5.22 The Central Quarry is not currently being worked and is currently in use as a construction and demolition waste recycling facility. The quarry is developed in pale micritic Waulsortian limestones of the Feltrim Limestone Formation. The contact between the Waulsortian limestones and the overlying Tober Colleen Formation is exposed in the sides of the roadway leading into the Central Quarry from the north

5.23 The North Quarry, where inert soil waste recovery is ongoing (at its northern end) is developed in a sequence of well-bedded limestones. Academic research on the fossil fauna of the bedrock sequence exposed at the quarry indicates that it is also developed within sub-Waulsortian limestones of the Malahide Formation.

5.24 The West Quarry is underlain predominantly by the Malahide Formation with the exception of the southeast corner where it is underlain by calcareous mudstones and argillaceous limestones of the Tober Colleen Formation. The Malahide Formation in this area is described as comprising of limestones, dolomitised limestones and interbedded argillaceous limestones.

5.25 The Tober Colleen Formation in the West Quarry is in reverse fault contact with the limestones, dolomitised limestones and interbedded argillaceous limestones of the Malahide Formation.

5.26 The geophysical survey and the presence in the drill core of significant fracturing, veining and dolomitization indicates that the rock mass of the Malahide Formation contains significant internal faulting.

Structure

5.27 The bedrock sequence at Huntstown dips steeply to the north or north-west (refer to Figures 5-4 and 5-5), with recorded dip values varying from 23° in the east of the South Quarry to 44° in the west. The sequence in the Central Quarry is recorded as dipping at 54° to the north-west. The sequence in the North Quarry dips reasonably uniformly to the north-west or north-northwest, with dip values varying from 30° to 55°.

5.28 As the limestones exposed in the North Quarry have been dated as being older than, and therefore stratigraphically below, the Waulsortian Limestones of the Central Quarry, there must be a significant reverse fault present between the Central Quarry and North Quarry. A probable fault plane has been identified in the immediate southern part of the North Quarry where the main access road enters this area. This is interpreted as part of the trace of the reverse fault and the trace of the reverse fault has therefore been located on the basis of this exposure.

5.29 The Tober Colleen Formation is interpreted as being approximately 200m thick in the Huntstown area and the steep dip suggests that the sub-crop area of the Tober Colleen Formation would be approximately 100m in width from the exposure of the basal contact of this unit in the Central Quarry access road.

5.30 The rocks of the Tober Colleen Formation are well jointed. The dominant joint-set trends roughly N-S and are sub-vertical, typically dipping between 87° east

and 87° west. These joints are frequently associated with calcite or calcite dolomite veins. In some locations they may be solutionally enlarged and have brown clay fills which are rare in the North Quarry and South Quarry, but more common in the Central Quarry.

5.31 The sequence in the West Quarry dips steeply (25° to 45°) to the north or north-northwest. The rock is strong to very strong and weathering is rarely significant more than a few tens of metres below the rock surface.

5.32 The Malahide Formation within the West Quarry at Huntstown is fault separated from the North Quarry by a major reverse fault, exposed along the south faces of the North Quarry and identified by geophysics and drilling in the north-western part of the West Quarry.

5.33 A detailed local bedrock geology map prepared on the basis of information presented and discussed above is presented in Figure 5-4, while a simplified geological cross-section through the Huntstown Quarry complex is provided in Figure 5-5 Some of the geological features and characteristics discussed above are illustrated in Plates 5-4 to 5-9 at the end of this chapter.

Geological Heritage

5.34 Consultations were previously held with the Geological Survey of Ireland (GSI) to ascertain and confirm the geological heritage value of rock exposures at Huntstown. These consultations revealed that the geological contact between the Waulsortian Limestones of the Feltrim Limestone Formation and the Tober Colleen Formation exposed in the roadway leading into the Central Quarry has been designated as a Geological Heritage Site as part of Theme 8 of the Irish Geological Heritage (IGH) Programme (Lower Carboniferous).

5.35 Arising from consultations, staff working on the IGH Programme have requested that the exposure be maintained if possible. In time, the existing exposure could be designated as a Natural Heritage Area (NHA) on geological and geomorphological grounds under the Wildlife (Amendment) Act of 2000.

Economic Geology

5.36 Crushed rock, and some overlying sand and gravel which are currently extracted from quarries across the Huntstown complex are used to produce aggregates which in turn have a variety of uses including:-

- Concrete products;
- Readymix concrete;
- Road sub-base, base and blacktop (tarmacadam) surfacing; and
- General aggregate, structural backfill etc.

Karstification

5.37 Pure limestones, comprising 100% calcium carbonate ($CaCO_3$), are readily dissolved by weak acid rainfall. The dissolution and enlargement of discontinuities in the limestone (such as joints, fractures, etc.) over geological time leads to the formation of unique landforms such as closed depressions (dolines), sinkholes, springs, turloughs and caves.

5.38 Strictly speaking, the term ‘karst’ is applied to areas where surface drainage has been disrupted by underground capture of surface streams by dissolution of the bedrock. A broader definition of the term however includes landscapes

where distinctive karst landforms occur as a result of dissolution of the underlying bedrock.

5.39 Dissolution features in karst limestones, whether open or infilled present significant environmental challenges, particularly with respect to protection of groundwater quality and groundwater fed ecosystems. They also present unique engineering challenges, particularly with respect to slope instability and control of drainage.

5.40 A review of the GSI Karst Database indicates that there are no known karst related features in the vicinity of Huntstown Quarry.

5.41 The presence, nature and extent of any karstification at Huntstown Quarry has been separately assessed by inspection of existing quarry faces and from the 2015 geophysics and drilling programme. These inspections revealed a number of minor solutionally enlarged and clay-infilled joints, particularly in the Central Quarry. One particularly wide joint is exposed in the eastern part of the South Quarry, where the joint has been enlarged to approximately 0.5m to 2.0m in width. This feature appears to pinch rapidly to the south and would be expected to pinch with depth. The quarry manager reports that these features do not significantly interfere with quarrying operations.

5.42 Development of the Central Quarry to the east has been terminated by a series of major clay-infilled features. Examination of these features indicates that these are largely vertical or sub-vertical features, orientated north-south or north-northwest – south-southeast.

5.43 To the west of the existing Central Quarry, the 2015 drilling programme intersected a number of clay-infilled solution features, interpreted as a thin zone of vertical to sub-vertical fissures, again orientated roughly north-south.

5.44 A thin zone of epikarst is developed immediately below the contact between bedrock and overburden. In the existing quarry faces, this epikarst zone extends for only 1.0m into the bedrock and is characterised by slight enlargement of discontinuities by dissolution.

IMPACT OF PROPOSED DEVELOPMENT

Evaluation of Impacts

5.45 The evaluation of impacts of the proposed intensification of backfilling and recovery activities at the existing waste facility at Huntstown on soil and geology at and in the vicinity of the North Quarry, West Quarry and surrounding areas is based on a methodology similar to that outlined in the '*Guidelines for the Assessment of Geology, Hydrology and Hydrogeology for National Road Schemes' published by the National Roads Authority* (2009).

5.46 The importance of existing soil and geology attributes identified at the application site is assessed in Table 5-2 overleaf:

Table 5-2
Importance of Geological Attributes in Vicinity of Application Site

Attribute	Status / Occurrence	Importance
Geohazards	Long-term erosion of exposed soils on existing slopes and stockpiles.	Low
Geological Heritage	Heritage feature at Central Quarry, located over approximately 200m to south.	High
Economic Geology	Economic extraction effectively complete at North Quarry application site. Extensive geological assessment carried out in the West Quarry deemed the potential aggregate quality to be low.	Low
Agricultural Soil	Productive soil previously removed and stockpiled at / around the application site. Other soil beyond quarry site supports agricultural activity / urban development.	Low
Made Ground	Crushed aggregate and glacial till materials re-used at the site are of low economic or environmental value. They are free of contamination.	Low

5.47 The magnitude of these impacts on the soil and geology attributes is assessed in Table 5-3 below:

Table 5-3
Significance of Impacts on Soil and Geology

Attribute	Impact of Proposal on Attribute	Magnitude
Geohazards	Elimination of localised erosion at existing soil slopes and stockpiles. Elimination of risk of rockfalls and rock slope instability at quarry face.	Small, positive
Geological Heritage	No impact	None
Economic Geology	Limits further rock extraction at North Quarry, with more immediate long-term sterilisation of underlying potential aggregate resource. Large resource available elsewhere within quarry complex. No extraction carried out in the west quarry due to the underlying poor resource quality.	Small, negative
Agricultural Soils	Earlier restoration of landform and placement of topsoil / subsoil on completion of backfilling will restore lands to basic agricultural use.	Small, positive
Made Ground	Importation of more soil and stones (and in a shorter time period) introduces a risk of potential soil contamination. Risk of fuel leaks and/or spills from plant and trucks.	Small to moderate, negative

5.48 The proposed increase in the current rate of waste intake at the inert waste recovery activity, in backfilling and restoring the existing quarry voids will restore the ground surface to its original, pre-quarrying level at an earlier time than permitted by existing planning and/or waste consents. It will 'smooth' the site topography and integrate it into the surrounding rural landscape.

5.49 The restoration of ground level above the groundwater table and the creation of a more uniform topography will facilitate the (initial) re-establishment of agricultural soil across the application site and its return to agricultural use. As such, the proposal constitutes a small improvement on an attribute of low importance. This impact is assessed as being minor and positive.

5.50 Without mitigation the increase in traffic volumes and the increase in waste activities could increase the probability of a leak or spillage of fuels/oils at the site. The potential impact of hydrocarbons is considered to be local and long term.

5.51 Without mitigation there is greater likelihood that contaminated materials could be imported to the recovery facility, with a resultant risk of ground contamination at the application site. The potential impact of contaminated consignments being delivered to, and end-tipped at, the recovery facility is considered to be local and long term.

5.52 Assuming the waste recovery facility continues to run in accordance with existing best waste management practice, with the required plant and staff resources put in place to facilitate this, the risk of introducing potential ground contamination is likely to remain small to moderate. Given that the risk of introducing contamination into existing relatively degraded, low value subsoil and/or rock is small to moderate, the significance of this potential impact is assessed as minor and negative. It is considered that mitigation measures are required to manage / limit potential impacts.

5.53 With an increased rate of backfilling and recovery, there is greater potential for instability of temporary working slopes in backfilled soils during the construction / operational phase. The significance of this potential impact is assessed as minor and negative and it is considered that mitigation measures are required to reduce the likelihood of this potential impact.

Interaction with Other Environmental Receptors

5.54 The potential risks associated with the introduction of contaminated soil when backfilling and restoring the application site could have implications for groundwater quality, were infiltrating rainfall to percolate down through the contaminated backfill materials into the underlying locally important aquifer. This aspect is discussed in more detail in Chapter 6 of this EIS (Water).

5.55 When successfully completed however, the proposed backfilling and restoration works will provide an increased thickness of soil and subsoil cover above the existing groundwater table, thereby reducing the potential risk of future groundwater contamination. The intensification of backfilling and recovery activities means that this could be achieved at an earlier date than currently possible under existing planning and waste consents.

5.56 During the backfilling and restoration works, the presence of wider areas if exposed, unvegetated soil surfaces could give rise to dust blows during dry windy weather. These issues are discussed in in Chapter 8 of this EIS (Air Quality).

Do-nothing Scenario

5.57 If the application site is not restored to a similar ground level as the surrounding ground, and it remains essentially unchanged from its existing layout, the limited, or non-existent soil cover at the site will mean that there is limited, or no protection for groundwater quality. Left unmanaged over time, there is also a small risk that some slope face instability could arise around the North Quarry and West Quarry, possibly in the form of localised soil slope instability or rockfall.

MITIGATION MEASURES

5.58 Several measures are currently being implemented at the application site to mitigate against any potential adverse impacts on the receiving soil and subsoil environment which could arise during the backfilling / operational phase. The existing (and proposed additional) mitigation measures include the following:

- Fuel is stored at an auto diesel fuel storage tank at the site infrastructure area. This tank is constructed over a sealed concrete pavement and with a perimeter bund sized to provide a storage / retention capacity of 110% of tank storage volume.
- Oils, greases and hydraulic fluids are stored under cover in bunded containers in a container shed placed over a drained concrete slab;
- Refuelling and routine servicing of plant and machinery used in the construction phase takes place on paved hardstanding areas;
- Good site management practices is implemented to reduce risks of spills, including regular monitoring and inspection of storage vessels and regular maintenance and servicing of construction plant and equipment;
- Such additional plant and resources as is necessary to ensure that the recovery facility continues to be managed and operated in accordance with best waste management practice and to ensure compliance with in-house environmental management systems, planning consents and waste licence conditions will be provided by the Applicant;
- Contingency plans / procedures have been developed and are in place to deal with potential leaks and spills. An emergency spill response kit is held on site.

5.59 In order to minimise the risk of importing and introducing contaminated soil to the site, management systems have been introduced at the application site to establish the source of imported materials in advance and to confirm that they are inert. Once received at the site a multiple level soil testing regime is in place to test the material for compliance and includes:

- comprehensive on-site verification, comprising visual inspection and record of all imported soil unloading at the site
- basic characterisation testing covering a wide range of parameters to determine the leaching behaviour of the inert soils imported to site;
- frequent, compliance testing covering a limited range of key soil parameters.

5.60 Temporary side slopes in backfilled soils are generally graded at an angle no steeper than 35° (approximately 1v:1.5h) and often much shallower, sufficient

to ensure no large scale instability arises over the short-term. Ongoing assessment of slope stability is undertaken at the application site as backfilling progresses and where necessary, slopes are re-graded having due regard to safe systems of work.

5.61 During backfilling of the quarries, all temporary surfaces will continue to be graded to facilitate overground run-off of surface water, thereby minimising the volume of rainfall percolating through the backfilled material. This helps reduce further any residual risk of potential contaminants being leached into the underlying soil and bedrock (or groundwater).

5.62 In order to confirm that there are no residual risks to in-situ soil and geology, provision is made for continued monitoring of groundwater for the duration of the quarry backfilling and soil recovery activities and for a short aftercare period thereafter.

5.63 In order to reduce the risk of localised erosion and potential dust emissions during the backfilling and recovery operations, the area of bare or exposed subsoils, particularly those outside the quarry voids (stockpiles), will continue to be kept to a minimum, insofar as practicable. Where required, consideration can be given to establishing temporary vegetation cover over exposed soil surfaces pending final backfilling and restoration to final ground level.

5.64 In order to maximise the future agricultural potential of the restored land, a minimum 150mm thick layer of topsoil will be placed over the backfilled materials. The final landform will also be graded so as to facilitate long-term run-off overground toward the watercourse on the eastern side of the north quarry.

RESIDUAL IMPACT ASSESSMENT

5.65 The potential impacts of the proposed development upon the soils and geology have been identified and assessed, and where appropriate, mitigation measures have been identified which significantly mitigate any potential environmental impacts arising from the proposed increase in waste intake rates to the waste recovery facility at Huntstown.

5.66 It is recommended that all aspects of the proposed backfilling / operation phase works should be undertaken in accordance with best practice environmental guidance, similar to that which is currently being implemented and that such additional plant and resources as may be required are made available by the Applicant.

Backfilling / Operational Phase

5.67 Measures have been identified which will ensure that there will be no significant impact on the soils, subsoils and bedrock at the application site during the backfilling / operational phase of the project.

Post Restoration Phase

5.68 Measures have also been identified which will ensure that there will be no significant impact on the soils, subsoils and bedrock at and beyond the application site after the quarry voids have been backfilled.

REFERENCES

Jones, G.Ll., Somerville, I.D. and Strogen, P. 1988. The Lower Carboniferous (Dinantian) of the Swords Area: Sedimentation and Tectonics in the Dublin Basin, Ireland. Geological Journal 23, p221 – 248.

McConnell, B.J., Philcox, M.E., Sleeman, A.G., Stanley, G., Flegg, A.M. , Daly, E.P. & Warren, W.P. 1994. Geology of Meath. Geological Survey of Ireland Bedrock Geology 1:100,000 Scale Map Series, Sheet 13.

McConnell, B.J. and Philcox, M.E. 1994. Geology of Kildare - Wicklow. Geological Survey of Ireland Bedrock Geology 1:100,000 Scale Map Series, Sheet 16.

PLATES

Plate 5-1. Sidewall of 16-TP1 showing topsoil over glacial till.

Plate 5-2. Trial hole 16-TP2 showing exposed bedrock at the base.

Plate 5-3. Trial hole 16-TP2 spoil heap and weathered bedrock.

Plate 5-4 Limestones Exposed in Western Face of the North Quarry.
Note steep dip to north-west and well-bedded nature of the limestones.

Plate 5-5 Partially Backfilled Area of North Quarry.

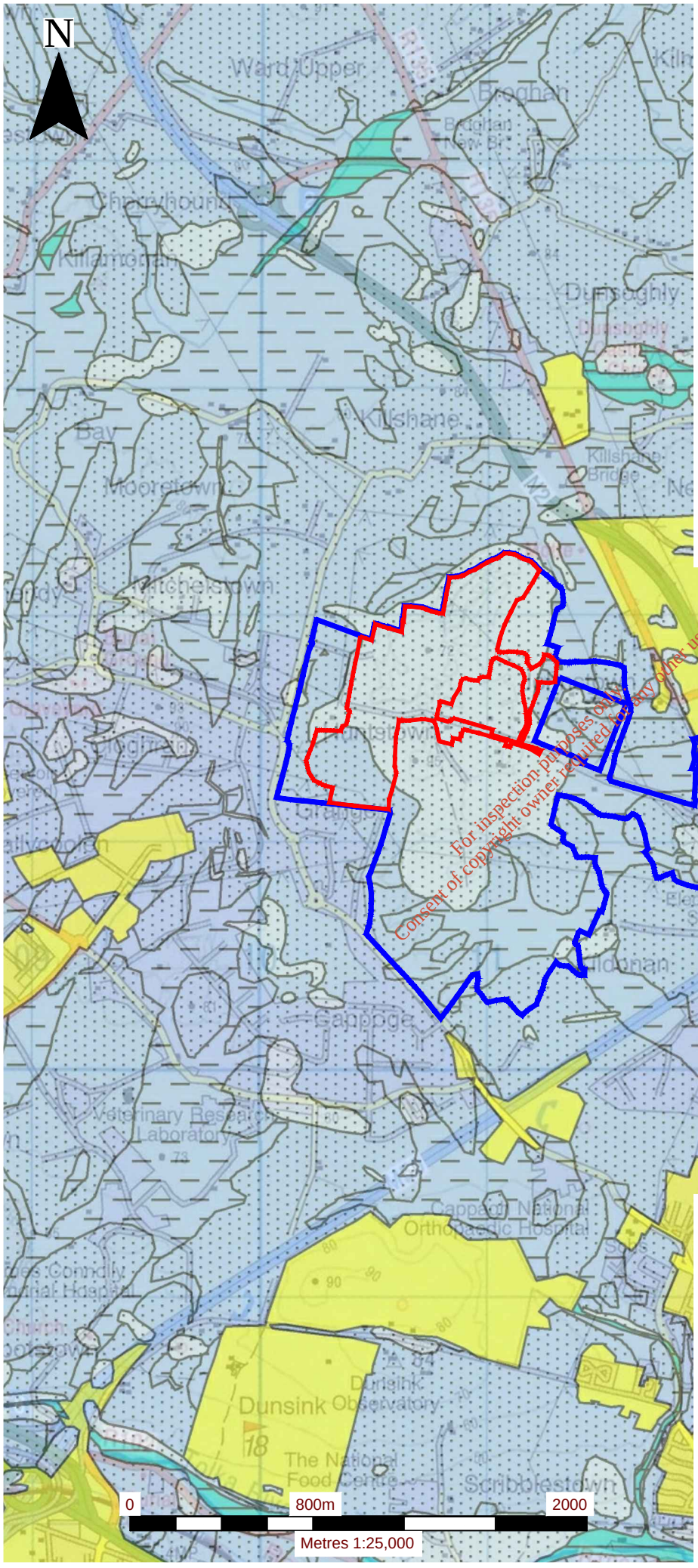
Plate 5-6 View across the stripped overburden area of the West Quarry.

Plate 5-7 Close up view of the overburden material at the West Quarry.

Plate 5-8 Huntstown Central Quarry. Exposure of the Geological Contact between the Waulsortian Limestones of the Feltrim Limestone Formation (to right) and Tober Colleen Formation (to left). Contact marked by arrow.

Plate 5- 9 Limestone Sequence Exposed in SW Area of South Quarry

FIGURES



LEGEND

- ROADSTONE LIMITED LAND INTEREST **(c. 200.3 ha)**
- APPLICATION AREA **(c. 48.65 ha)**
- ALLUVIUM - MINERAL
- GREY BROWN PODZOLICS & BROWN
- SURFACE & GROUNDWATER GLEYS DERVIED FROM CALC.
- RENZINAS & LITHOSOLS
- MADE GROUND

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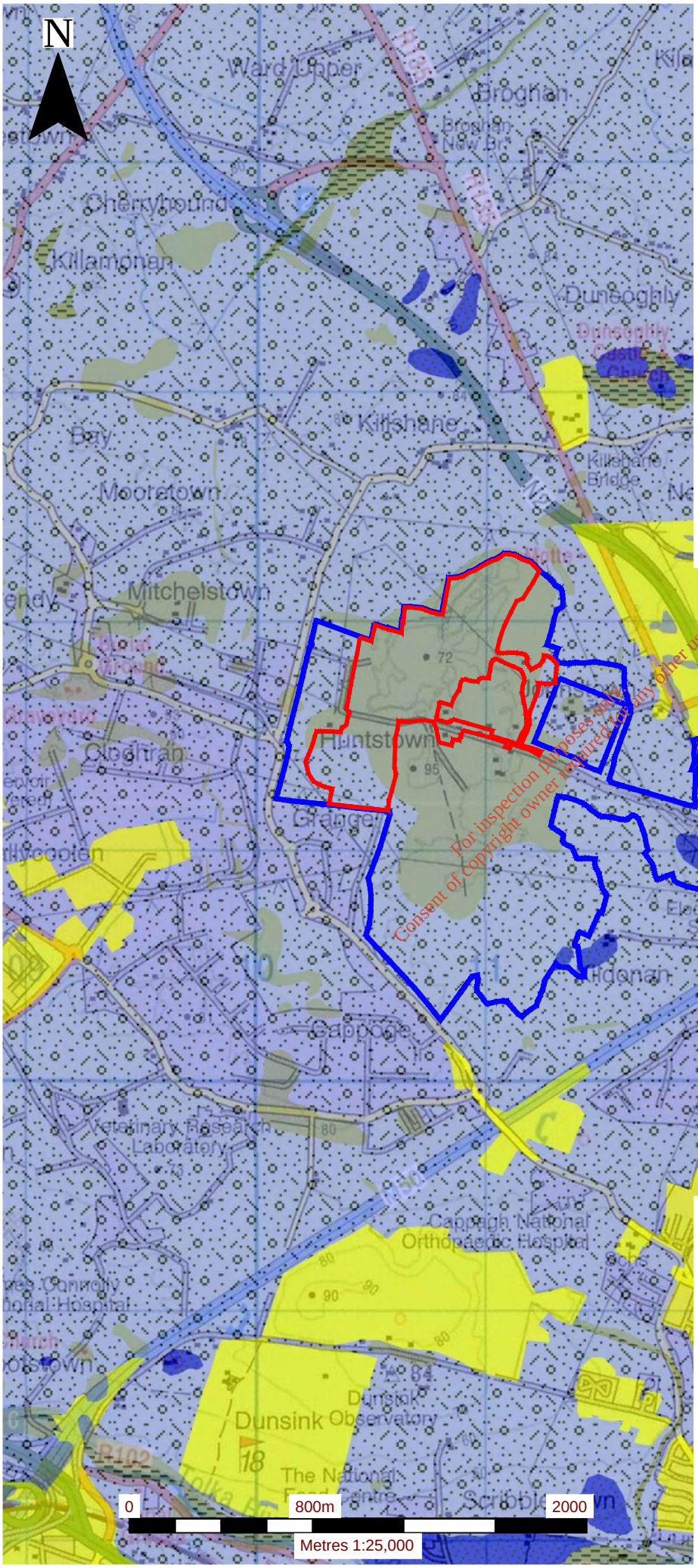
ROADSTONE LIMITED
ENVIRONMENTAL IMPACT STATEMENT
HUNTSTOWN WASTE RECOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11

REGIONAL SOILS MAP

FIGURE 5-1

Scale	Date
1:25,000 @ A4	AUGUST 2016

0180.00152.0.FIG_5-1.Regional Soils Map.dwg



LEGEND

- ROADSTONE LIMITED LAND INTEREST **(c. 200.3 ha)**
- APPLICATION AREA **(c. 48.65 ha)**
- ALLUVIUM - MINERAL
- SAND & GRAVEL - CARBONIFEROUS LIMESTONES
- MADE GROUND
- OUTCROP & SUBCROP
- TILL - CARBONIFEROUS LIMESTONES CLASTS

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ROADSTONE LIMITED

ENVIRONMENTAL IMPACT STATEMENT

HUNTSTOWN WASTE RECOVERY FACILITY

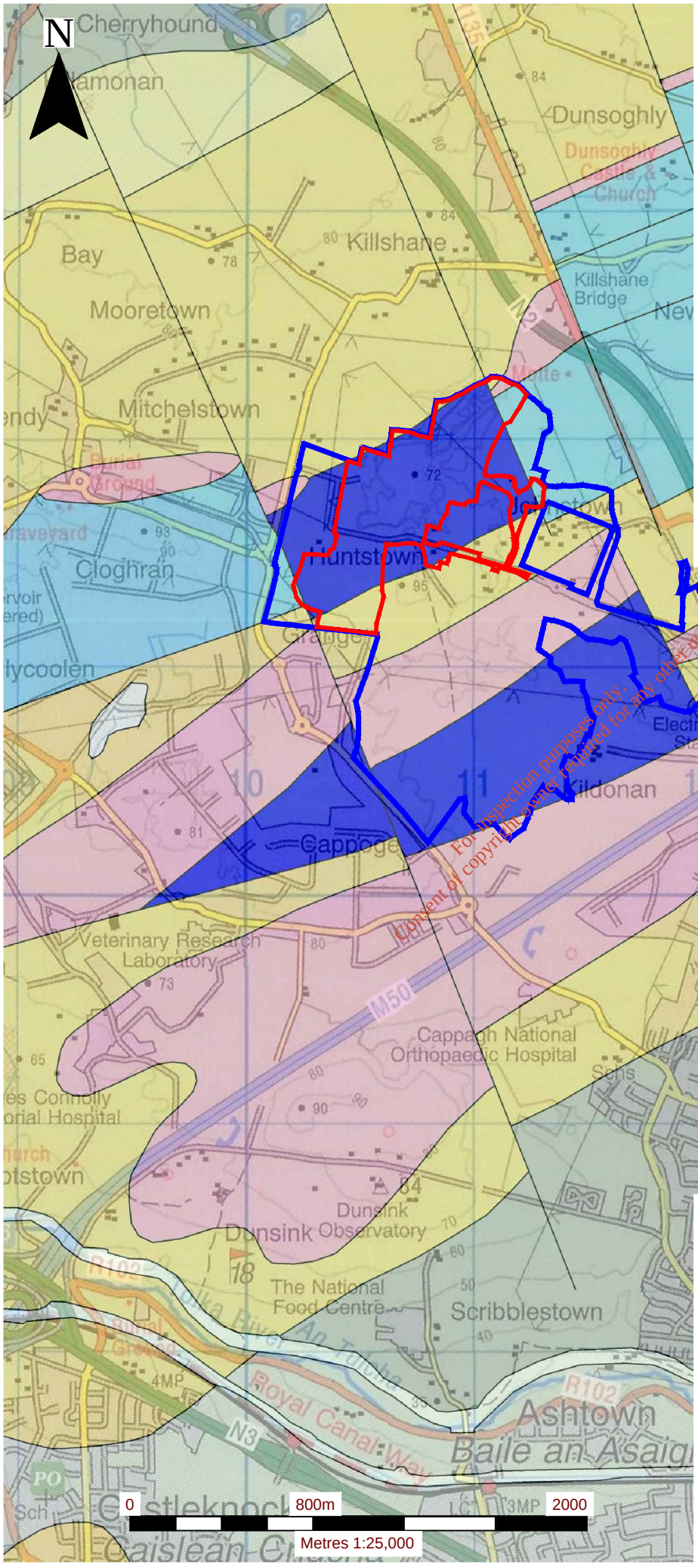
NORTH ROAD, FINGLAS, DUBLIN 11

REGIONAL SUBSOILS MAP

FIGURE 5-2

Scale	Date
1:25,000 @ A4	AUGUST 2016

0180.00152.0.FIG_5-2.Regional Sub-Soils Map.dwg



LEGEND

- ROADSTONE LIMITED LAND INTEREST **(c. 200.3 ha)**
- APPLICATION AREA **(c. 48.65 ha)**
- BOSTON HILL FORMATION
- LUCAN FORMATION
- MALAHIDE FORMATION
- TOBER COLLEEN FORMATION
- WAULSORTIAN LIMESTONES

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HUNTSTOWN WASTE RECOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11
REGIONAL BEDROCK GEOLOGY MAP

FIGURE 5-3

Scale	Date
1:25,000 @ A4	AUGUST 2016

0180.00152.0.FIG_5-3.Regional Bedrock Geology Map.dwg

NOTES

1. EXTRACT FROM 1:2,500 ORDNANCE SURVEY DIGITAL SHEET **NO'S. 3062-A, 3062-B, 3062-C, 3062-D, 3063-A, 3063-C, 3130-A & 3130-B**.

2. ORDNANCE SURVEY IRELAND LICENCE NO. **SU 0000716 (C)** ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- ROADSTONE LIMITED LAND INTEREST **(c. 200.3 ha)**
- APPLICATION AREA **(c. 48.65 ha)**
- N2 DUAL CARRIAGEWAY
- NORTH ROAD (R135)
- LOCAL ROAD
- 1980s RC BOREHOLE (NO DATA)
- 2015 RC BOREHOLE
- 2016 TRIAL PIT LOCATIONS
- TOBER COLLEEN (& RUSH?) FORMATION
- FELTRIM LIMESTONE FORMATION (WAULSORTIAN)
- MALAHIDE LIMESTONE FORMATION
- REVERSE FAULTS

16-TP2
16-TP1
15-HTW-01
15-HTW-05
15-HTW-09
15-HTW-02
15-HTW-06
15-HTW-10
15-HTW-07
15-HTW-03
15-HTW-08
15-HTW-11
15-HTW-04
15-HTW-12
15-HTC-09
15-HTC-03
15-HTC-01
15-HTC-05
15-HTC-02
15-HTC-08
15-HTC-04
15-HTC-07
15-HTC-06

VIRIDIAN POWER STATION
(EXCLUDED - NOT OWNED BY ROADSTONE LIMITED)

0 50 100 150 200m 300 400 500
Metres 1:5000

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
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DUBLIN 14
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ROADSTONE LIMITED
ENVIRONMENTAL IMPACT STATEMENT
HUNTSTOWN WASTE RECOVERY FACILITY
NORTH ROAD, FINGLAS, DUBLIN 11

DETAILED LOCAL BEDROCK GEOLOGY MAP

FIGURE 5-4

Scale 1:5,000 @ A3
Date AUGUST 2016

0180.00152.0.FIG_5-4.Detailed Local Bedrock Geology Maps.dwg

APPENDICES

APPENDIX 5-A

TRIAL PIT LOGS

Trial Pit Log

Trialpit No
16-TP1
Sheet 1 of 1

Project Name: Huntstown West	Project No. 501.00180.00152	Co-ords: - Level:	Date 30/06/2016
Location: Huntstown Quarry		Dimensions (m): Depth 1.80	Scale 1:25
Client: Roadstone			Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30			Mid brown sandy TOPSOIL
	0.50	ES					Firm brown mottled grey and orange sandy gravelly CLAY with occasional cobbles
				1.80			End of pit at 1.80 m

Remarks: Dry and stable

Stability:

Trial Pit Log

Trialpit No **16-TP2** Sheet 1 of 1

Project Name: Huntstown West	Project No. 501.00180.00152	Co-ords: - Level:	Date 30/06/2016
Location: Huntstown Quarry		Dimensions (m): Depth 1.60	Scale 1:25
Client: Roadstone			Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20			Brown sandy TOPSOIL
				0.40			Light brown sandy CLAY
	1.00	ES					Firm to stiff mid brown minor orange mottling sandy gravelly CLAY
				1.40			Weathered Rock
				1.60			End of pit at 1.60 m

Remarks: Dry and stable

Stability:

APPENDIX 5-B
GEOCHEMICAL TEST RESULTS

ALcontrol Laboratories

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

SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Tom Moore

CERTIFICATE OF ANALYSIS

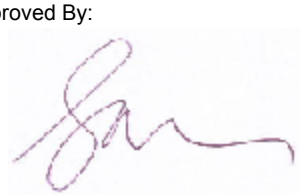
Date:	12 July 2016
Customer:	D_SLRCON_DUB
Sample Delivery Group (SDG):	160703-45
Your Reference:	
Location:	Hunts Town
Report No:	368724

We received 2 samples on Saturday July 02, 2016 and 2 of these samples were scheduled for analysis which was completed on Tuesday July 12, 2016. 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.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
13700864	16-TP1		0.50	30/06/2016
13700865	16-TP2		1.00	30/06/2016

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

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

SOLID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container					
			13700864	13700865	16-TP1	16-TP2			0.50	1.00	1kg TUB	250g Amber Jar (AL	60g VOC (ALE215)	1kg TUB	250g Amber Jar (AL	60g VOC (ALE215)
Anions by Kone (w)	All	NDPs: 0 Tests: 2	X	X												
CEN Readings	All	NDPs: 0 Tests: 2	X	X												
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2	X	X												
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2	X	X												
Fluoride	All	NDPs: 0 Tests: 2	X	X												
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2											X			X
Mercury Dissolved	All	NDPs: 0 Tests: 2	X	X												
Mineral Oil	All	NDPs: 0 Tests: 2										X			X	
PAH by GCMS	All	NDPs: 0 Tests: 2										X			X	
PAH Value of soil	All	NDPs: 0 Tests: 2										X			X	
PCBs by GCMS	All	NDPs: 0 Tests: 2										X			X	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2	X	X												
Sample description	All	NDPs: 0 Tests: 2										X			X	
Total Dissolved Solids on Leachates	All	NDPs: 0 Tests: 2	X	X												
Total Organic Carbon	All	NDPs: 0 Tests: 2										X			X	

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**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

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
13700864	16-TP1	0.50	Light Brown	Clay Loam	0.002 - 0.063 mm	Vegetation	None
13700865	16-TP2	1.00	Dark Brown	Clay Loam	0.002 - 0.063 mm	Vegetation	Stones

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

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

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

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	16-TP1	16-TP2				
			Depth (m)	0.50	1.00				
			Sample Type	Soil/Solid	Soil/Solid				
			Date Sampled	30/06/2016	30/06/2016				
			Sample Time	.	.				
			Date Received	02/07/2016	02/07/2016				
			SDG Ref	160703-45	160703-45				
			Lab Sample No.(s)	13700864	13700865				
			AGS Reference						
Moisture Content Ratio (% of as received sample)	%	PM024		17	12				
Mineral oil >C10-C40	<1 mg/kg	TM061		11.7	15.7				
Surrogate Value	-	TM061		44.6	47.7				
Mineral Oil Surrogate % recovery**	%	TM061		89.1	95.4				
Organic Carbon, Total	<0.2 %	TM132		0.499 M	0.493 M				
PCB congener 28	<3 µg/kg	TM168		<3 M	<3 M				
PCB congener 52	<3 µg/kg	TM168		<3 M	<3 M				
PCB congener 101	<3 µg/kg	TM168		<3 M	<3 M				
PCB congener 118	<3 µg/kg	TM168		<3 M	<3 M				
PCB congener 138	<3 µg/kg	TM168		<3 M	<3 M				
PCB congener 153	<3 µg/kg	TM168		<3 M	<3 M				
PCB congener 180	<3 µg/kg	TM168		<3 M	<3 M				
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168		<21	<21				
Coronene	<2 mg/kg	TM213		<2	<2				
Polyaromatic hydrocarbons, Total 17	<10 mg/kg	TM213		<10	<10				

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

GRO by GC-FID (S)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	16-TP1	16-TP2				
			Depth (m)	0.50	1.00				
			Sample Type	Soil/Solid	Soil/Solid				
			Date Sampled	30/06/2016	30/06/2016				
			Sample Time	.	.				
			Date Received	02/07/2016	02/07/2016				
			SDG Ref	160703-45	160703-45				
			Lab Sample No.(s)	13700864	13700865				
			AGS Reference						
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089		<5 #	<5 #				
Benzene	<10 µg/kg	TM089		<10 M	<10 M				
Toluene	<2 µg/kg	TM089		<2 M	<2 M				
Ethylbenzene	<3 µg/kg	TM089		<3 M	<3 M				
m,p-Xylene	<6 µg/kg	TM089		<6 M	<6 M				
o-Xylene	<3 µg/kg	TM089		<3 M	<3 M				
sum of detected mpo xylene by GC	<9 µg/kg	TM089		<9	<9				
sum of detected BTEX by GC	<24 µg/kg	TM089		<24	<24				

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

PAH by GCMS

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	16-TP1	16-TP2				
			Depth (m)	0.50	1.00				
			Sample Type	Soil/Solid	Soil/Solid				
			Date Sampled	30/06/2016	30/06/2016				
			Sample Time	.	.				
			Date Received	02/07/2016	02/07/2016				
			SDG Ref	160703-45	160703-45				
			Lab Sample No.(s)	13700864	13700865				
			AGS Reference						
Naphthalene-d8 % recovery**	%	TM218		104	112				
Acenaphthene-d10 % recovery**	%	TM218		103	112				
Phenanthrene-d10 % recovery**	%	TM218		106	115				
Chrysene-d12 % recovery**	%	TM218		92.2	100				
Perylene-d12 % recovery**	%	TM218		87.2	93.9				
Naphthalene	<9 µg/kg	TM218		<9 M	<9 M				
Acenaphthylene	<12 µg/kg	TM218		<12 M	<12 M				
Acenaphthene	<8 µg/kg	TM218		<8 M	<8 M				
Fluorene	<10 µg/kg	TM218		<10 M	<10 M				
Phenanthrene	<15 µg/kg	TM218		<15 M	<15 M				
Anthracene	<16 µg/kg	TM218		<16 M	<16 M				
Fluoranthene	<17 µg/kg	TM218		<17 M	<17 M				
Pyrene	<15 µg/kg	TM218		<15 M	<15 M				
Benz(a)anthracene	<14 µg/kg	TM218		<14 M	<14 M				
Chrysene	<10 µg/kg	TM218		<10 M	<10 M				
Benzo(b)fluoranthene	<15 µg/kg	TM218		<15 M	<15 M				
Benzo(k)fluoranthene	<14 µg/kg	TM218		<14 M	<14 M				
Benzo(a)pyrene	<15 µg/kg	TM218		<15 M	<15 M				
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218		<18 M	<18 M				
Dibenzo(a,h)anthracene	<23 µg/kg	TM218		<23 M	<23 M				
Benzo(g,h,i)perylene	<24 µg/kg	TM218		<24 M	<24 M				
PAH, Total Detected USEPA 16	<118 µg/kg	TM218		<118	<118				

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Hunts Town
Mass Sample taken (kg)	0.109	**Natural Moisture Content (%)**	20.7
Mass of dry sample (kg)	0.175	**Dry Matter Content (%)**	82.8
Particle Size <4mm	>95%		

Case	
SDG	160703-45
Lab Sample Number(s)	13700864
Sampled Date	30-Jun-2016
Customer Sample Ref.	16-TP1
Depth (m)	0.50

Eluate Analysis	**C_2** Concⁿ in 10:1 eluate (mg/l)		**A_2** 10:1 concⁿ leached (mg/kg)		Murphy Limits of Detection mg/kg dry		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Dissolved Organic Carbon	<3	<3	<30	<30	-	-	-
Fluoride	0.633	<0.5	6.33	<5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Total Dissolved Solids	73.6	<10	736	<100	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	0.000252	<0.00016	0.00252	<0.0016	-	-	-
Arsenic	<0.00012	<0.00012	<0.0012	<0.0012	-	-	-
Barium	0.00593	<0.00003	0.0593	<0.0003	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Cresols by HPLC (W)	<0.006	<0.006	<0.06	<0.06	-	-	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.08	<0.08	-	-	-
Cadmium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	-	-	-
Chromium	0.00159	<0.00022	0.0159	<0.0022	-	-	-
Copper	<0.00085	<0.00085	<0.0085	<0.0085	-	-	-
Lead	<0.00002	<0.00002	<0.0002	<0.0002	-	-	-
Molybdenum	0.00228	<0.00024	0.0228	<0.0024	-	-	-
Nickel	0.000537	<0.00015	0.00537	<0.0015	-	-	-
Selenium	0.000427	<0.00039	0.00427	<0.0039	-	-	-
Zinc	0.00116	<0.00041	0.0116	<0.0041	-	-	-

Leach Test Information

Date Prepared	08-Jul-2016
pH (pH Units)	8.42
Conductivity (µS/cm)	89.60
Temperature (°C)	20.30
Volume Leachant (Litres)	0.881

Mcerts Certification does not apply to leachates

12/07/2016 15:24:46

15:24:37 12/07/2016

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Hunts Town
Mass Sample taken (kg)	0.111	**Natural Moisture Content (%)**	23.1
Mass of dry sample (kg)	0.175	**Dry Matter Content (%)**	81.2
Particle Size <4mm	>95%		

Case	
SDG	160703-45
Lab Sample Number(s)	13700865
Sampled Date	30-Jun-2016
Customer Sample Ref.	16-TP2
Depth (m)	1.00

Eluate Analysis	**C_2** Concⁿ in 10:1 eluate (mg/l)		**A_2** 10:1 concⁿ leached (mg/kg)		Murphy Limits of Detection mg/kg dry		
	Result	Limit of Detection	Result	Limit of Detection			
Dissolved Organic Carbon	<3	<3	<30	<30	-	-	-
Fluoride	0.583	<0.5	5.83	<5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Total Dissolved Solids	72.5	<10	725	<100	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	0.000453	<0.00016	0.00453	<0.0016	-	-	-
Arsenic	0.000248	<0.00012	0.00248	<0.0012	-	-	-
Barium	0.003	<0.00003	0.03	<0.0003	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Cresols by HPLC (W)	<0.006	<0.006	<0.06	<0.06	-	-	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.08	<0.08	-	-	-
Cadmium	0.000107	<0.0001	0.00107	<0.001	-	-	-
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	-	-	-
Chromium	0.00144	<0.00022	0.0144	<0.0022	-	-	-
Copper	<0.00085	<0.00085	<0.0085	<0.0085	-	-	-
Lead	0.000086	<0.00002	0.00086	<0.0002	-	-	-
Molybdenum	0.00349	<0.00024	0.0349	<0.0024	-	-	-
Nickel	0.000483	<0.00015	0.00483	<0.0015	-	-	-
Selenium	0.000608	<0.00039	0.00608	<0.0039	-	-	-
Zinc	<0.00041	<0.00041	<0.0041	<0.0041	-	-	-

Leach Test Information

Date Prepared	08-Jul-2016
pH (pH Units)	8.51
Conductivity (µS/cm)	88.30
Temperature (ºC)	20.30
Volume Leachant (Litres)	0.879

Mcerts Certification does not apply to leachates

12/07/2016 15:24:46

15:24:37 12/07/2016

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

CEN 10:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Hunts Town
Mass Sample taken (kg)	0.109	**Moisture Content Ratio (%)**	20.7
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	82.8
Particle Size <4mm	>95%		

Case	
SDG	160703-45
Lab Sample Number(s)	13700864
Sampled Date	30-Jun-2016
Customer Sample Ref.	16-TP1
Depth (m)	0.50

Solid Waste Analysis	**Result**	**Murphy LoD mg/kg dry substance**			
Total Organic Carbon (%)	0.499	<30,000.0 mg/kg dry substance	-	-	-
Loss on Ignition (%)	-		-	-	-
Sum of BTEX (mg/kg)	<0.024	<6.0	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	<1.0	-	-	-
Mineral Oil (mg/kg)	11.7	<500.0	-	-	-
PAH Sum of 17 (mg/kg)	<10	<100.0	-	-	-
pH (pH Units)	-		-	-	-
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)**		**Murphy Limits of Detection mg/kg dry**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	<0.00012	<0.00012	<0.0012	<0.0012	0.5	-	-
Barium	0.00593	<0.00003	0.0593	<0.0003	20	-	-
Cadmium	<0.0001	<0.0001	<0.001	<0.001	0.04	-	-
Chromium	0.00159	<0.00022	0.0159	<0.0022	0.5	-	-
Copper	<0.00085	<0.00085	<0.0085	<0.0085	2	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	-	-
Molybdenum	0.00228	<0.00024	0.0228	<0.0024	0.5	-	-
Nickel	0.000537	<0.00015	0.00537	<0.0015	0.4	-	-
Lead	<0.00002	<0.00002	<0.0002	<0.0002	0.5	-	-
Antimony	0.000252	<0.00016	0.00252	<0.0016	0.06	-	-
Selenium	0.000427	<0.00039	0.00427	<0.0039	0.1	-	-
Zinc	0.00116	<0.00041	0.0116	<0.0041	4	-	-
Chloride	<2	<2	<20	<20	800	-	-
Fluoride	0.633	<0.5	6.33	<5	10	-	-
Sulphate (soluble)	<2	<2	<20	<20	1000	-	-
Total Dissolved Solids	73.6	<10	736	<100	4000	-	-
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	500	-	-

Leach Test Information

Date Prepared	08-Jul-2016
pH (pH Units)	8.42
Conductivity (µS/cm)	89.60
Temperature (ºC)	20.30
Volume Leachant (Litres)	0.881
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
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CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

CEN 10:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Hunts Town
Mass Sample taken (kg)	0.109	**Moisture Content Ratio (%)**	20.7
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	82.8
Particle Size <4mm	>95%		

Case	
SDG	160703-45
Lab Sample Number(s)	13700864
Sampled Date	30-Jun-2016
Customer Sample Ref.	16-TP1
Depth (m)	0.50

Solid Waste Analysis	**Result**	**Murphy LoD mg/kg dry substance**			
Total Organic Carbon (%)	0.499	<30,000.0 mg/kg dry substance	-	-	-
Loss on Ignition (%)	-		-	-	-
Sum of BTEX (mg/kg)	<0.024	<6.0	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	<1.0	-	-	-
Mineral Oil (mg/kg)	11.7	<500.0	-	-	-
PAH Sum of 17 (mg/kg)	<10	<100.0	-	-	-
pH (pH Units)	-		-	-	-
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)**		**Murphy Limits of Detection mg/kg dry**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Cresols by HPLC (W)	<0.006	<0.006	<0.06	<0.06	-	-	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.08	<0.08	-	-	-

Leach Test Information

Date Prepared	08-Jul-2016
pH (pH Units)	8.42
Conductivity (µS/cm)	89.60
Temperature (ºC)	20.30
Volume Leachant (Litres)	0.881
Volume of Eluate VE1 (Litres)	

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

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

CEN 10:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Hunts Town
Mass Sample taken (kg)	0.111	**Moisture Content Ratio (%)**	23.1
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	81.2
Particle Size <4mm	>95%		

Case	
SDG	160703-45
Lab Sample Number(s)	13700865
Sampled Date	30-Jun-2016
Customer Sample Ref.	16-TP2
Depth (m)	1.00

Solid Waste Analysis	**Result**	**Murphy LoD mg/kg dry substance**			
Total Organic Carbon (%)	0.493	<30,000.0 mg/kg dry substance	-	-	-
Loss on Ignition (%)	-		-	-	-
Sum of BTEX (mg/kg)	<0.024	<6.0	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	<1.0	-	-	-
Mineral Oil (mg/kg)	15.7	<500.0	-	-	-
PAH Sum of 17 (mg/kg)	<10	<100.0	-	-	-
pH (pH Units)	-		-	-	-
ANC to pH 6 (mol/kg)	-		-	-	-
ANC to pH 4 (mol/kg)	-		-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Murphy Limits of Detection mg/kg dry**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	0.000248	<0.00012	0.00248	<0.0012	0.5	-	-
Barium	0.003	<0.00003	0.03	<0.0003	20	-	-
Cadmium	0.000107	<0.0001	0.00107	<0.001	0.04	-	-
Chromium	0.00144	<0.0022	0.0144	<0.0022	0.5	-	-
Copper	<0.00085	<0.00085	<0.0085	<0.0085	2	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	-	-
Molybdenum	0.00349	<0.00024	0.0349	<0.0024	0.5	-	-
Nickel	0.000483	<0.00015	0.00483	<0.0015	0.4	-	-
Lead	0.000086	<0.00002	0.00086	<0.0002	0.5	-	-
Antimony	0.000453	<0.00016	0.00453	<0.0016	0.06	-	-
Selenium	0.000608	<0.00039	0.00608	<0.0039	0.1	-	-
Zinc	<0.00041	<0.00041	<0.0041	<0.0041	4	-	-
Chloride	<2	<2	<20	<20	800	-	-
Fluoride	0.583	<0.5	5.83	<5	10	-	-
Sulphate (soluble)	<2	<2	<20	<20	1000	-	-
Total Dissolved Solids	72.5	<10	725	<100	4000	-	-
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	500	-	-

Leach Test Information

Date Prepared	08-Jul-2016
pH (pH Units)	8.51
Conductivity (µS/cm)	88.30
Temperature (ºC)	20.30
Volume Leachant (Litres)	0.879
Volume of Eluate VE1 (Litres)	

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

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

CEN 10:1 STAGE BATCH TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Hunts Town
Mass Sample taken (kg)	0.111	**Moisture Content Ratio (%)**	23.1
Mass of dry sample (kg)	0.175	**Dry Matter Content Ratio (%)**	81.2
Particle Size <4mm	>95%		

Case	
SDG	160703-45
Lab Sample Number(s)	13700865
Sampled Date	30-Jun-2016
Customer Sample Ref.	16-TP2
Depth (m)	1.00

Solid Waste Analysis	**Result**	**Murphy LoD mg/kg dry substance**			
Total Organic Carbon (%)	0.493	<30,000.0 mg/kg dry substance	-	-	-
Loss on Ignition (%)	-		-	-	-
Sum of BTEX (mg/kg)	<0.024	<6.0	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	<1.0	-	-	-
Mineral Oil (mg/kg)	15.7	<500.0	-	-	-
PAH Sum of 17 (mg/kg)	<10	<100.0	-	-	-
pH (pH Units)	-		-	-	-
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)**		**Murphy Limits of Detection mg/kg dry**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Cresols by HPLC (W)	<0.006	<0.006	<0.06	<0.06	-	-	-
Xylenols by HPLC (W)	<0.008	<0.008	<0.08	<0.08	-	-	-

Leach Test Information

Date Prepared	08-Jul-2016
pH (pH Units)	8.51
Conductivity (µS/cm)	88.30
Temperature (ºC)	20.30
Volume Leachant (Litres)	0.879
Volume of Eluate VE1 (Litres)	

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

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
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		
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds 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		
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils		
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		
TM213	In-house Method	Rapid Determination of PAHs by GC-FID		
TM218	Microwave extraction – EPA method 3546	Microwave extraction - EPA method 3546		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	13700864	13700865
Customer Sample Ref.	16-TP1	16-TP2
AGS Ref.		
Depth	0.50	1.00
Type	SOLID	SOLID
Anions by Kone (w)	12-Jul-2016	12-Jul-2016
CEN 10:1 Leachate (1 Stage)	08-Jul-2016	08-Jul-2016
CEN Readings	11-Jul-2016	11-Jul-2016
Dissolved Metals by ICP-MS	12-Jul-2016	12-Jul-2016
Dissolved Organic/Inorganic Carbon	12-Jul-2016	12-Jul-2016
Fluoride	12-Jul-2016	12-Jul-2016
GRO by GC-FID (S)	11-Jul-2016	11-Jul-2016
Mercury Dissolved	12-Jul-2016	12-Jul-2016
Mineral Oil	12-Jul-2016	12-Jul-2016
PAH by GCMS	12-Jul-2016	12-Jul-2016
PAH Value of soil	12-Jul-2016	12-Jul-2016
PCBs by GCMS	12-Jul-2016	12-Jul-2016
Phenols by HPLC (W)	12-Jul-2016	12-Jul-2016
Sample description	08-Jul-2016	08-Jul-2016
Total Dissolved Solids on Leachates	12-Jul-2016	12-Jul-2016
Total Organic Carbon	11-Jul-2016	11-Jul-2016

SDG:	160703-45	**Location:**	Hunts Town	**Order Number:**	2983
Job:	D_SLRCON_DUB-122	**Customer:**	SLR Consulting Ireland	**Report Number:**	368724
Client Reference:		**Attention:**	Tom Moore	**Superseded Report:**	

Appendix

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

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. 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.

5. 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.

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

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

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

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

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

13. **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%, they are generally wider for volatiles analysis, 50-150%. 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 .

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

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

18. 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.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

General

20. 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.

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

22. 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.

23. 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.

24. **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.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before presevation was performed
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

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

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

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

Visual Estimation Of Fibre Content

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

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.