# SOIL AND GEOLOGY 5

## CONTENTS


INTRODUCTION ........ 5-1
RECEIVING ENVIRONMENT ........ 5-1
Study Methodology ........ 5-1
Regional Geology ........ 5-1
Local Geology ........ 5-2
Geological Heritage ........ 5-5
Economic Geology ........ 5-5
Karstification ........ 5-5
IMPACT OF PROPOSED WASTE FACILITY ........ 5-6
Evaluation of Impacts ........ 5-6
Interaction with Other Environmental Receptors ........ 5-8
Do-nothing Scenario ........ 5-8
MITIGATION MEASURES ........ 5-8
REFERENCES ........ 5-10


## TABLES


Table 5-1 Lithological Sequence of the Formations Present in the Huntstown Quarry Area
Table 5-2 Importance of Geological Attributes in Vicinity of Application Site
Table 5-3 Significance of Impacts on Soil and Geology


## PLATES


Plate 5-1 Limestone Exposed in the Western Face of North Quarry
Plate 5-2 North-western area of North Quarry
Plate 5-3 Huntstown Central Quarry: Exposure of Geological Contact
Plate 5-4 Limestone Sequence Exposed in South-western Part of South Quarry

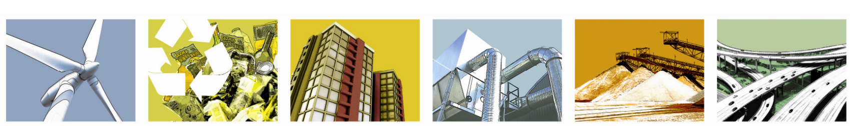

For inspection purposes only.
Consent of copyright owner required for any other use.

## FIGURES


Figure 5-1 Regional Soils Map
Figure 5-2 Regional Subsoils Map
Figure 5-3 Regional Bedrock Geology Map
Figure 5-4 Detailed Local Bedrock Geology Map
Figure 5-5 Geological Cross-Section


## APPENDICES


Appendix 5A Letter from the Geological Survey of Ireland (GSI) in Relation to Geological Heritage Issues

EPA Export 24-02-2011:11:34:11

## INTRODUCTION

5.1 This Chapter of the Environmental Impact Statement evaluates the regional and local geological conditions at the proposed inert waste recovery facility at Huntstown and assesses the impact that the backfilling activity will have on the geology of the area.

5.2 The information presented in this chapter is based on a detailed examination of the existing quarry and its surroundings and was prepared by EurGeol Dr. John Kelly PGeo, MIMMM, MIQ in accordance with the publication *Geology in Environmental Impact Statements* issued by the Institute of Geologists of Ireland.

## RECEIVING ENVIRONMENT

### Study Methodology

5.3 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 were undertaken to review the solid and drift geology in each of the existing quarries (active and inactive) at Huntstown and in the surrounding area.

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

5.5 The following activities were undertaken to allow a geological assessment to be completed:

- 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
- Site / quarry face inspections

### Regional Geology

#### *Soil*

5.6 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.

Consent of copyright owner required for any other use. For inspection purposes only.



EPA Export 24-02-2011:11:34:11

5.7 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*

5.8 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*

5.9 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 and Lucan Formations. The Tober Colleen and Lucan Formation are 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.

For inspection purposes only. Consent of copyright owner required for any other use.

## Local Geology

### *Introduction*

5.10 There are currently three main areas at the Huntstown Quarry complex where extraction is taking place, or has taken place in the past (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 drilling, allows a reasonable assessment of the distribution of different lithological formations and the structure of the application site to be made.

### *Soil and Subsoil Deposits*

5.11 Soils and superficial deposits have been entirely stripped from the footprint of the current and previous extraction areas and only minimal future movement of soil and/or subsoil deposit material is anticipated.

### *Bedrock Geology*

5.12 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 sequence in the Huntstown area determined by Jones *et al.* is presented in Table 5-1 overleaf.



EPA Export 24-02-2011:11:34:11

**Table 5-1**

**Lithological Sequence of the Formations present in the Huntstown Quarry area, partly based on Jones *et al.* 1988**

| FORMATION | MEMBERS | Estimated thickness | Description |
|---|---|---|---|
| **LUCAN FORMATION** | | 250m at Huntstown?<br>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 |

Consent of copyright owner required for any other use.
For inspection purposes only.



EPA Export 24-02-2011:11:34:11

5.13 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 with minor shales. Banded, interbedded limestone and shale are exposed in the north-western corner of this extraction area.

5.14 The Central Quarry is not currently being worked and has been developed 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

5.15 The North Quarry, where the proposed inert soil recovery facility is to be located, 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. The sequence becomes shale dominated to the north-west as seen in borehole GW04 and in the upper part of the faces in the extreme north-west corner of the quarry.

## *Structure*

Consent of copyright owner required for any other use. For inspection purposes only.

5.16 The bedrock sequence at Huntstown dips steeply to the north or north-west (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°.

5.17 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 and southern quarries. 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.

5.18 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.

5.19 In light of this, it would be expected that the area between the top of the Tober Colleen and the reverse fault should be underlain by limestones of the Lucan Formation which lies above the Tober Colleen in the sequence. Rock exposures in the prospective (future) Western Quarry were examined but determination of these rocks as being Lucan or Malahide Formation can only be undertaken by biostratigraphic analysis.



EPA Export 24-02-2011:11:34:11

5.20 The rocks 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 northern and southern quarries, but are more common in the Central Quarry.

5.21 The rock is strong to very strong and weathering is rarely significant more than a few tens of metres below the rock surface.

5.22 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 5-1 to 5-4 at the end of this chapter.

## Geological Heritage

5.23 Consultations were 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 have been identified for possible designation as part of Theme 8 of the Irish Geological Heritage (IGH) Programme (Lower Carboniferous).

Consent of copyright owner required for any other use. For inspection purposes only.

5.24 Arising from consultations, staff working on the IGH Programme have requested a visit to the exposure to assess its' significance and 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

5.25 Crushed rock, and some overlying sand and gravel which are currently extracted from Huntstown Quarry are used for a wide range of aggregate uses including:-

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

## Karstification

5.26 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.



EPA Export 24-02-2011:11:34:11

5.27 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.

5.28 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.

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

5.30 The presence, nature and extent of any karstification at Huntstown Quarry has been separately assessed by inspection of existing quarry faces. 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.

5.31 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.

5.32 No significant karstification was observed or recorded in the recent drilling of groundwater monitoring wells across the Huntstown Quarry complex.

Consent of copyright owner required for any other use.
For inspection purposes only.

## IMPACT OF PROPOSED WASTE FACILITY

### Evaluation of Impacts

5.33 The evaluation of impacts of the proposed inert waste recovery facility on soil and geology at and in the vicinity of the North 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).

5.34 The importance of existing soil and geology attributes identified above is assessed in Table 5-2 below.



EPA Export 24-02-2011:11:34:11

Table 5-2

Importance of Geological Attributes in Vicinity of Application Site

| Attribute | Status / Occurrence | Importance |
|---|---|---|
| Geohazards | Erosion of exposed soils on existing slopes and stockpiles. | Low |
| Geological Heritage | No heritage feature at application site, although prospective site at Central Quarry, approximately 200m to south | None |
| Economic Geology | Economic extraction effectively complete at application site. | Low |
| Agricultural Soil | Productive soil previously removed and stockpiled at 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 |

5.35 The significance of the impacts on the soil and geology attributes is assessed in Table 5-3 below:

Consent of copyright owner required for any other use. For inspection purposes only.

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 | No further extraction possible at backfilled areas. Long-term sterilisation of underlying potential aggregate resource. Large resource available elsewhere within quarry complex. | Small, negative |
| Agricultural Soils | Restoration of former landform and placement of topsoil / subsoil on completion of backfilling will restore lands to basic agricultural use. | Small, positive |
| Made Ground | Importation of soil, stones and possibly small volumes of inert construction and demolition waste introduces a risk of potential soil contamination | Small, negative |

5.36 The proposed inert waste recovery activity, in backfilling and restoring the existing quarry void will restore the ground surface to its original, pre-quarrying ground level. It will 'smooth' the site topography and integrate it into the surrounding rural landscape.



EPA Export 24-02-2011:11:34:11

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

5.38 In the absence of any controls, the importation of soil, stones and small quantities of inert construction and demolition waste could introduce a risk of potential soil contamination at the application site.

5.39 Assuming the proposed waste recovery facility is run in accordance with best waste management practice, this risk of potential contamination is likely to remain small. 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.

## Interaction with Other Environmental Receptors

5.40 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).

5.41 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.

For inspection purposes only. Consent of copyright owner required for any other use.

5.42 During the backfilling and restoration works, the presence of exposed, unvegetated soil surfaces could give rise to dust blows during dry windy weather. These issues are discussed in more detail in Chapter 7 of this EIS (Air Quality).

## Do-nothing Scenario

5.43 If the application site is not restored to a similar ground level as the surrounding quarry, 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 the void slope or face instability could arise around the existing quarry, most likely in the form of localised soil slope instability or rockfall.

## MITIGATION MEASURES

5.44 In order to minimise the risk of importing and introducing contaminated soil to the site, management systems will be 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 will be established to test the material for compliance and will include:



EPA Export 24-02-2011:11:34:11

- 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.

5.45 During backfilling of the quarry, all temporary surfaces will be graded to facilitate overground run-off of surface water, thereby minimising the volume of rainfall percolating through the backfilled material. This will further reduce any residual risks of any potential contaminants leaching into the soil and bedrock (or groundwater).

5.46 In order to confirm that there are no residual risks to in-situ soil and geology, monitoring of groundwater will continue for the duration of the quarry void backfilling works and for a short aftercare period.

5.47 In order to reduce the risk of localised erosion and potential dust emissions during the backfilling works, the area of bare or exposed subsoils, particularly those outside the quarry void (stockpiles), will be kept to a minimum, insofar as practicable. Consideration could be given to establishing temporary vegetation cover over exposed soil surfaces pending final backfilling and restoration to final ground level.

5.48 In order to maximise the future agricultural potential of the restored land, a minimum 150mm thick layer of topsoil and 300mm thick layer of subsoil should 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 quarry.

Consent of copyright owner required for any other use.
For inspection purposes only.



EPA Export 24-02-2011:11:34:11

## 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.

M**cConnell, 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.

For inspection purposes only.
Consent of copyright owner required for any other use.



EPA Export 24-02-2011:11:34:11

# PLATES

For inspection purposes only.
Consent of copyright owner required for any other use.



EPA Export 24-02-2011:11:34:11

Plate 5-1 Limestones Exposed in Western Face of the North Quarry.
Note steep dip to north-west and well-bedded nature of the limestones.

Consent of copyright owner required for any other use.
For inspection purposes only.

Plate 5-2 North-western Area of North Quarry (immediately NE of GW04).
Note shales dominating sequence in upper part of quarry face.



EPA Export 24-02-2011:11:34:11

Plate 5-3 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.

For inspection purposes only.
Consent of copyright owner required for any other use.

Plate 5-4. Limestone Sequence Exposed in South-western Part of South Quarry



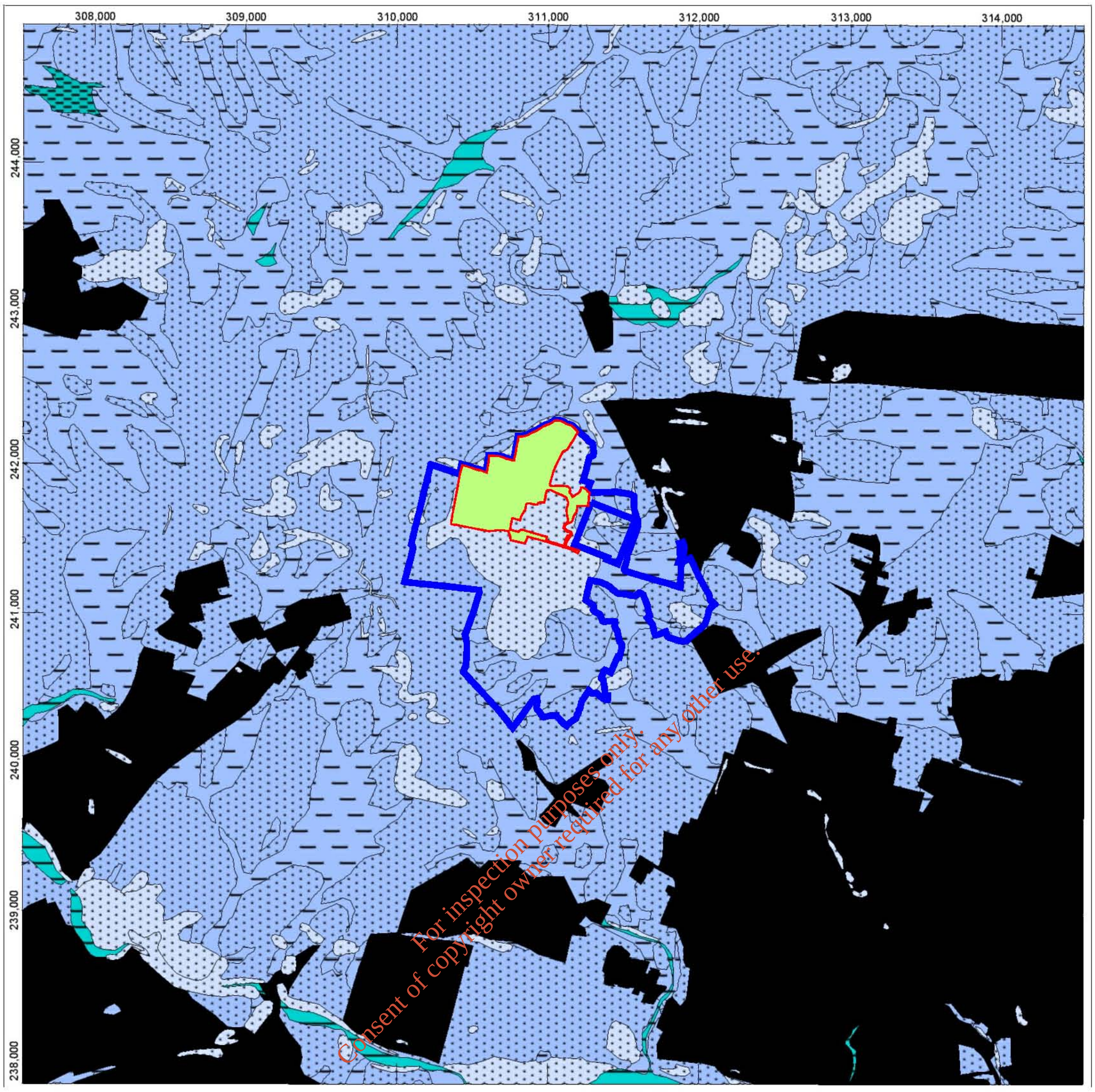
EPA Export 24-02-2011:11:34:11

**FIGURES**

For inspection purposes only.
Consent of copyright owner required for any other use.



EPA Export 24-02-2011:11:34:11




For inspection purposes only.
Consent of copyright owner required for any other use.

**Teagasc Soil Mapping**
IFS Soil Type

- Lacustrine Sediments
- Alluvium - Mineral
- Grey Brown Podzolics and Brown Earths
- Renzinas and Lithosols
- Surface and Ground Water Gleys derived from calcareous parent
- Made Ground

ROADSTONE WOOD LTD. LANDHOLDING (C. 201.8 ha)

WASTE LICENCE APPLICATION AREA (c. 35.9 ha)

1. EXTRACT FROM TEAGASC-SUB SOIL PARENT MATERIAL MAPPING

0 500 1000 1500 2000m 3000 4000 5000
Metres
1:50,000

Roadstone Wood
The Right Choice

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

ROADSTONE WOOD LTD.
ENVIRONMENTAL IMPACT STATEMENT

WASTE RECOVERY FACILITY,
HUNTSTOWN QUARRY,
NORTH ROAD, FINGLAS, DUBLIN 11

**REGIONAL SOILS MAP**

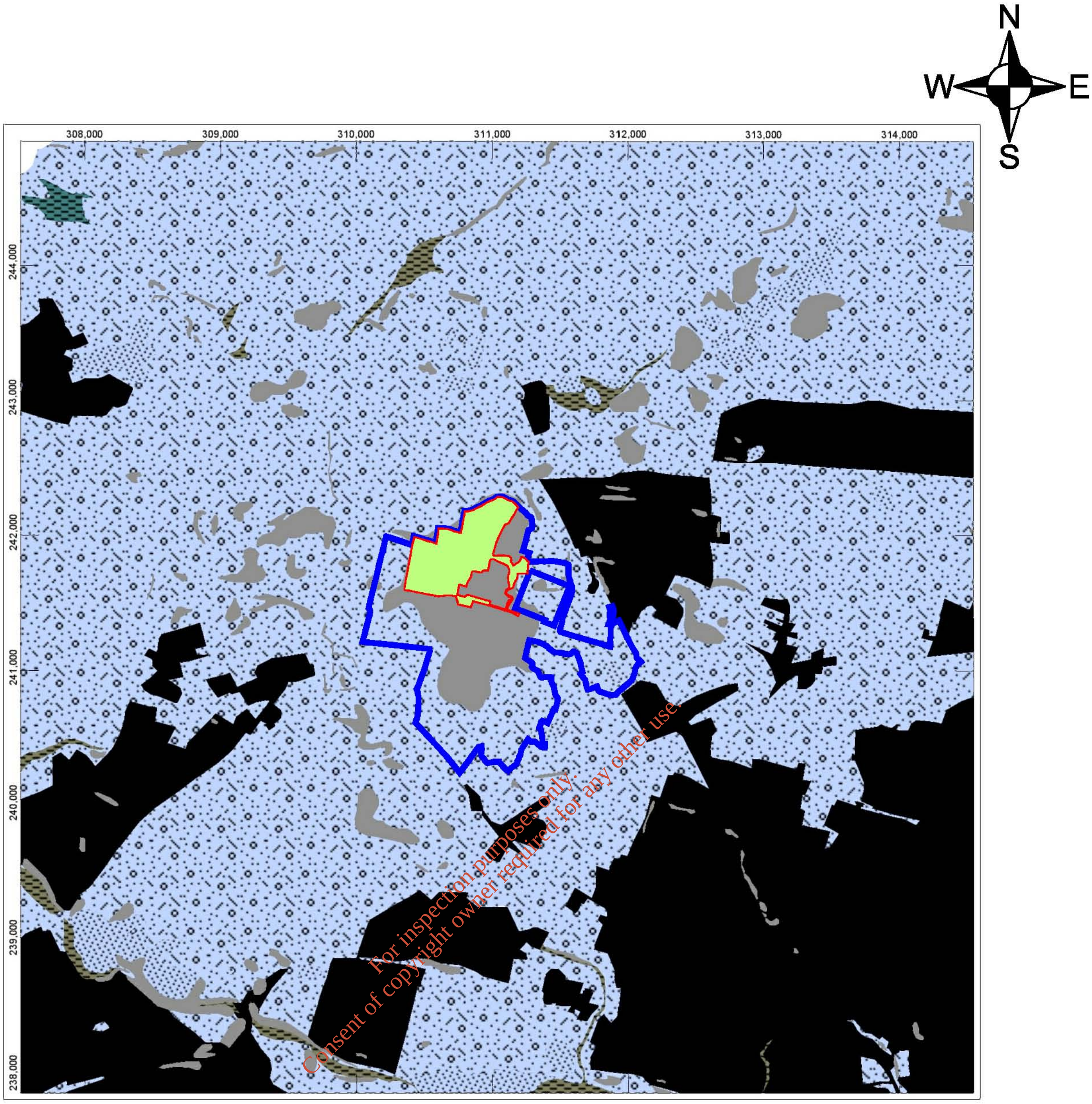
**FIGURE 5-1**

Scale 1:50,000 @ A4

Date FEBRUARY 2011

00180.00015.18.5-1.R0.SOILS MAP.dwg

EPA Export 24-02-2011:11:34:11




For inspection purposes only.
Consent of copyright owner required for any other use.

**Teagasc Subsoil Mapping**
Superficial Deposit Type

- Alluvium
- Lacustrine Sediments
- Sand and Gravel - Carboniferous Limestones
- Till - Carboniferous Limestone Clasts
- Outcrop & Subcrop
- Made Ground

ROADSTONE WOOD LTD. LANDHOLDING (C. 201.8 ha)

WASTE LICENCE APPLICATION AREA (c. 35.9 ha)

1. EXTRACT FROM TEAGASC-SUB SOIL PARENT MATERIAL MAPPING

0 500 1000 1500 2000m 3000 4000 5000
Metres
1:50,000

Roadstone WOOD
The Right Choice

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

ROADSTONE WOOD LTD.
ENVIRONMENTAL IMPACT STATEMENT

WASTE RECOVERY FACILITY,
HUNTSTOWN QUARRY,
NORTH ROAD, FINGLAS, DUBLIN 11

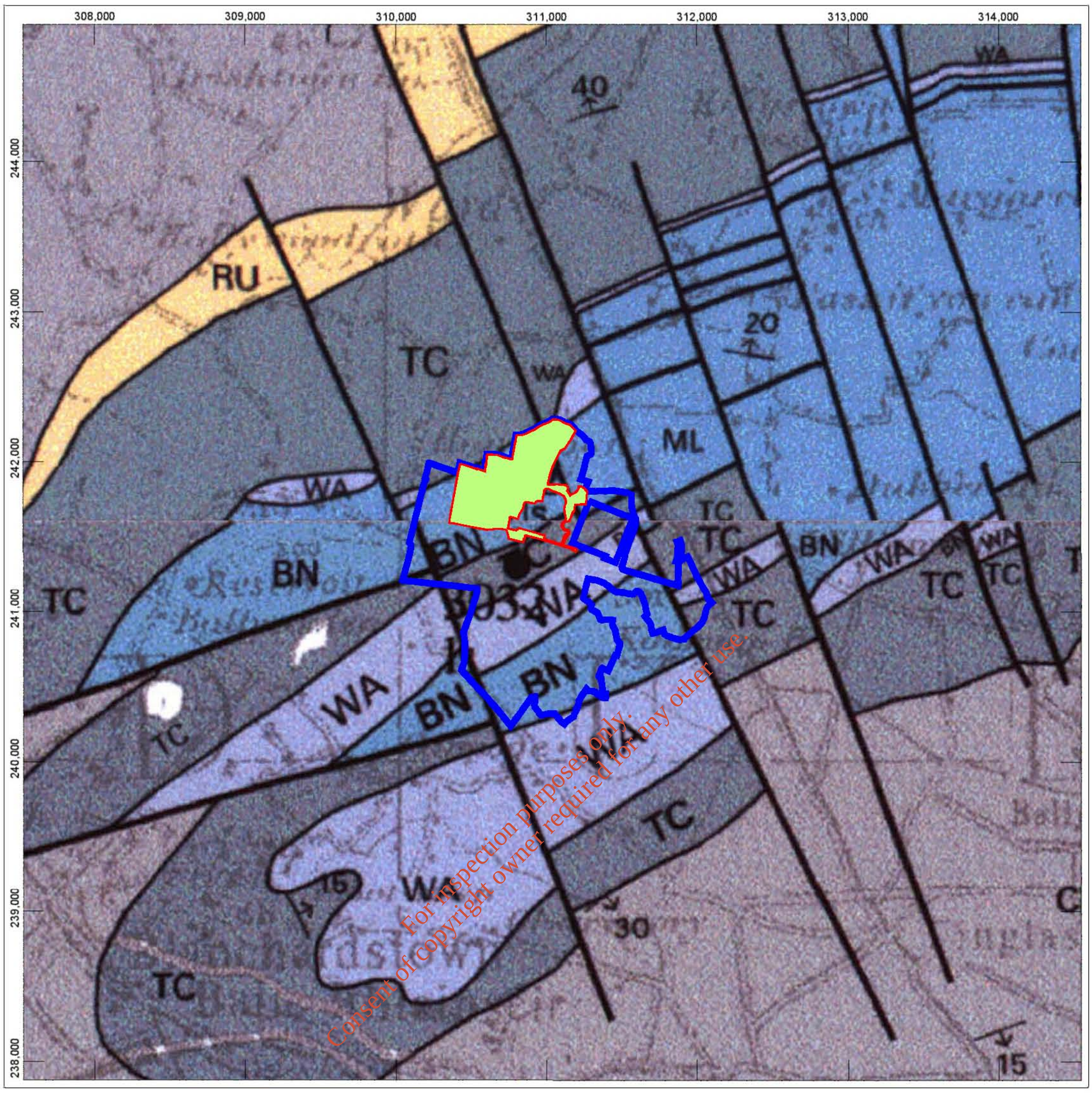
**REGIONAL SUBSOIL MAP**

**FIGURE 5-2**

| Scale | Date |
|---|---|
| 1:50,000 @ A4 | FEBRUARY 2011 |

00180.00015.18.5-2.R0.REGIONAL SUBSOIL MAP.dwg

EPA Export 24-02-2011:11:34:11




For inspection purposes only.
Consent of copyright owner required for any other use.

| | |
|---|---|
| LU | **Lucan Formation** Dark limestone & shale (Calp) |
| RU | **Rush Conglomerate Formation** Conglomerate, shale, limestone |
| TC | **Tober Colleen Formation** Calcareous shale, limestone conglomerate |
| WA | **Waulsortian Limestones** Massive unbedded lime-mudstone |
| ML | **Malahide Formation** Argillaceous bioclastic limestone, shale (Also Known as Boston Hill Formation (BN)) |

ROADSTONE WOOD LTD. LANDHOLDING (C. 201.8 ha)

WASTE LICENCE APPLICATION AREA (c. 35.9 ha)

1. EXTRACT FROM 1:50,000 O.S DISCOVERY MAP NO. 50

0 500 1000 1500 2000m 3000 4000 5000

Metres
1:50,000

Roadstone Wood
The Right Choice

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

ROADSTONE WOOD LTD.
ENVIRONMENTAL IMPACT STATEMENT

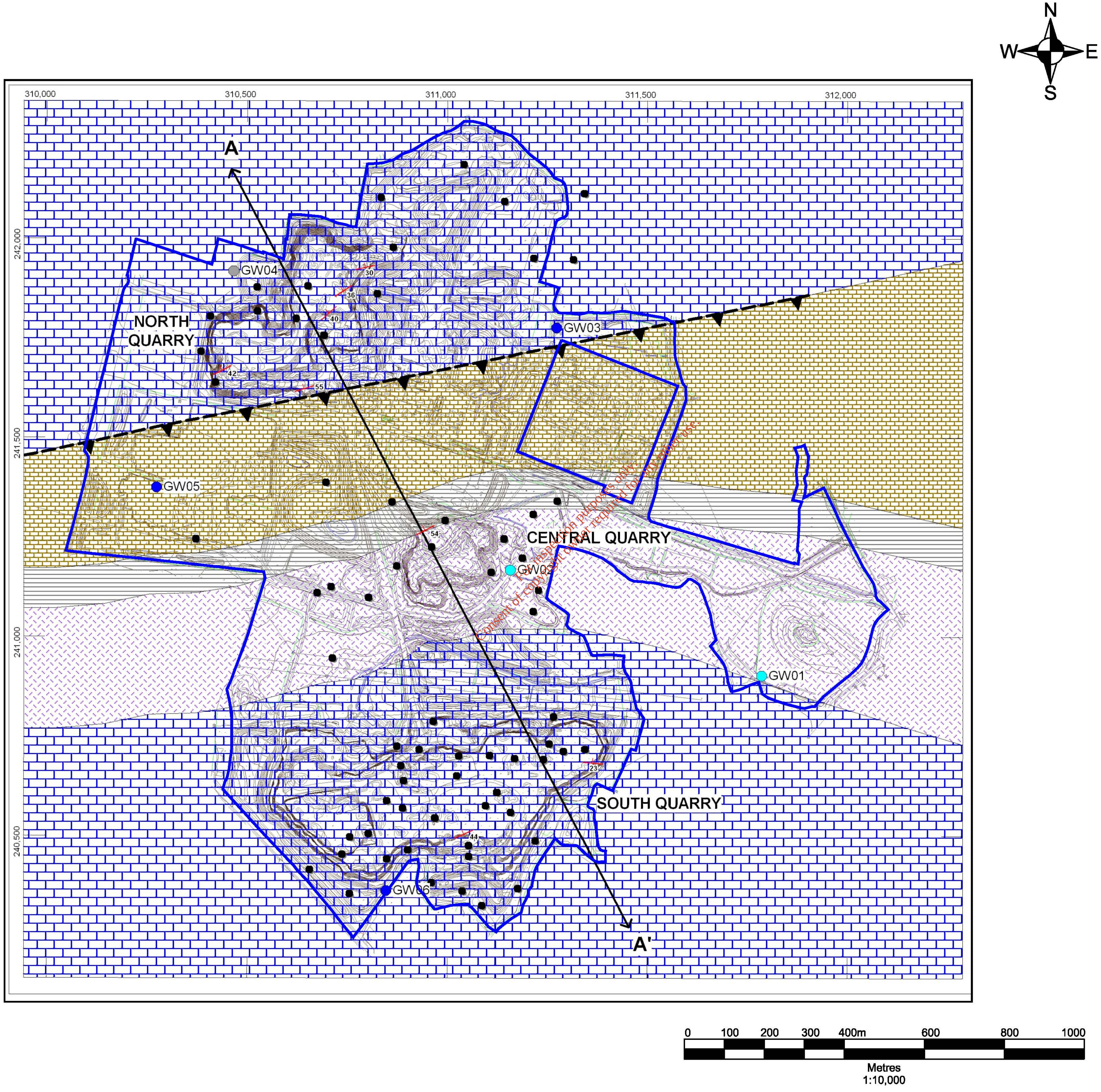
WASTE RECOVERY FACILITY,
HUNTSTOWN QUARRY,
NORTH ROAD, FINGLAS, DUBLIN 11

**REGIONAL BEDROCK GEOLOGY MAP**

**FIGURE 5-3**

| Scale | Date |
|---|---|
| 1:50,000 @ A4 | FEBRUARY 2011 |

00180.00015.18.5-3.R0.REGIONAL BEDROCK GEOLOGY MAP.dwg




NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY MAP NO. 50

2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000711 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

ROADSTONE WOOD LTD. LANDHOLDING (C. 201.8 ha)

SECTION LINE A-A'

Huntstown Quarry Bedrock Geology

- Lucan Formation
- Tober Colleen Formation
- Feltrim Limestone Formation (Waulsortian)
- Malahide Limestone Formation

Huntstown Quarry Groundwater Wells

Collar Lithology

- Dark Limestone
- Limestone and Shale
- Feltrim Limestone fmn (Waulsortian)

Roadstone WOOD The Right Choice


SLR

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com


ROADSTONE WOOD LTD.
ENVIRONMENTAL IMPACT STATEMENT

WASTE RECOVERY FACILITY, HUNTSTOWN QUARRY, NORTH ROAD, FINGLAS, DUBLIN 11

**DETAILED LOCAL BEDROCK GEOLOGY MAP**

**FIGURE 5-4**

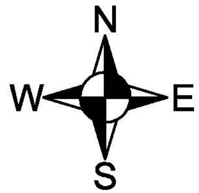
| Scale | Date |
|---|---|
| 1:10,000 @ A3 | FEBRUARY 2011 |

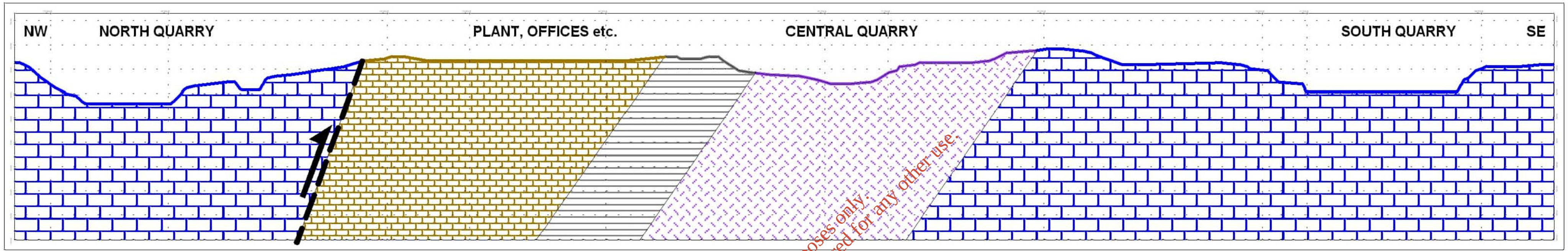
00180.00015.18.5-4.R0.DETAILED LOCAL BEDROCK GEOLOGY MAP.dwg


For inspection purposes only. Consent of copyright owner required for any other use.

EPA Export 24-02-2011:11:34:11

00180.00015.18.5-5.R0.GEOLOGICAL CROSS-SECTION.dwg




For inspection purposes only.
Consent of copyright owner required for any other use.

**Huntstown Quarry Bedrock Geology**

- Lucan Formation
- Tober Colleen Formation
- Feltrim Limestone Formation (Waulsortian)
- Malahide Limestone Formation

Roadstone WOOD
The Right Choice

SLR
SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

ROADSTONE WOOD LTD.
ENVIRONMENTAL IMPACT STATEMENT

WASTE RECOVERY FACILITY,
HUNTSTOWN QUARRY,
NORTH ROAD, FINGLAS, DUBLIN 11

**GEOLOGICAL CROSS-SECTION**

**FIGURE 5-5**

| Scale | Date |
|---|---|
| 1:6,000 @ A4 | FEBRUARY 2011 |

EPA Export 24-02-2011:11:34:11

# APPENDICES

For inspection purposes only.
Consent of copyright owner required for any other use.



EPA Export 24-02-2011:11:34:11

For inspection purposes only.
Consent of copyright owner required for any other use.

**Appendix 5A**

**Letter from the Geological Survey of Ireland (GSI) in relation to Geological Heritage Issues**



EPA Export 24-02-2011:11:34:11

**From:** Sarah Gatley [mailto:Sarah.Gatley@gsi.ie]
**Sent:** 16 August 2010 14:30
**To:** John Kelly
**Cc:** SophiePreteseille
**Subject:** RE: Heritage Query - Huntstown Quarry

Hi John,

Huntstown Quarry is on our database of IGH sites under the IGH8 Lower Carboniferous theme, for its significance in showing the base of the Tober Colleen Fm, where it directly overlies Waulsortian (Sheet 13, p. 19). As you probably know, GSI completed an audit and report on geological Heritage sites in Fingal in 2007, as an action of their Heritage Plan. At the time the consultant conducting the audit reported back that he was unable to gain access to the quarry as he did not hold a quarry pass (which was perfectly understandable). Unfortunately, because of the usual pressures, no-one in GSI was able to follow this up and the site was omitted from the report, but still remains on our database with a note to follow it up. I regret that this means that the quarry operator is maybe unaware that the quarry is cited on our database as of geological significance. As with all active quarry operations, the IGH programme has no wish to prevent or disrupt quarrying, but aims for a mutually-beneficial relationship with the operator, whereby we are notified of any new features uncovered, have a chance to record them and can often advise in return.

In this particular instance, the section of particular interest is the boundary between the Tober Colleen and the Waulsortian, which has only been reported elsewhere in borehole AD-5 and in the Feltrim Quarry. If this boundary is still visible in a part of the quarry, we would welcome the opportunity to visit, and our ultimate aim would be to request that a representative section of this part of the stratigraphy be preserved at the end of quarry life, and ideally promoted through, for example a viewing area and information panel. IGH has a growing number of such co-operations with quarry operators and we find that they are equally welcoming of such initiatives as they help improve public perception of the industry, especially where the operator has 'given back' the quarry to the community and demonstrated that quarrying and heritage can be compatible.

Consent of copyright owner required for any other use.
For inspection purposes only.

I hope that there is some scope for future co-operation with Roadstone in the Huntstown Quarry, and if you need any further information please contact me.

Kind regards
Sarah

Dr Sarah Gatley
Senior Geologist, Head Geological Heritage Programme
Geological Survey of Ireland
Beggars Bush
Haddington Road
Dublin 4
Tel(Dir) +353-1/01 6782837
Fax: +353-1/01 6782559

Email: <mailto:sarah.gatley@gsi.ie>
Website: www.gsi.ie
Latest GSI Newsletter: www.gsi.ie/newsletters/

EPA Export 24-02-2011:11:34:11

| Theme Site No. | Site Name | County | Sheet No. 6 inch | Sheet No. 1:50,000 | Easting | Northing | Principal characteristics Critical feature(s) key words | Townland(s)/district | Grid Ref. | Nominated by or ex-ASI site? | Summary description | definite NHA | NHA? | Definite CGS | Key references | IGH Theme - Primary | IGH Theme - Secondary | IGH Theme- Tertiary | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IGH8 | Huntstown Quarry, Finglas | Dublin - Fingal | 13, 14 | 50 | 310750 | 241600 | Lower Carboniferous Limestone Quarry | Huntstown | O 107 416 | | Limestone Quarry showing base of Tober Colleen Fm where it directly overlies Waulsortian (SH 13, p.19) ( ~311000 241230); also Boston Hill, ?Malahide Fms, Roadstone (59 in Quarry database, p110). | | NHA? | | Sh 13, p.19 | IGH8 Lower Carboniferous | | | Wasn't allowed access to quarry - needed a quarry pass - AC.; site omitted form Fingal Rept (sg); Base Tober Colleen only otherwise seen in bh AD-5 and Feltrim Quarry (Sh 13, p.19). |

For inspection purposes only.
Consent of copyright owner required for any other use.



EPA Export 24-02-2011:11:34:11