

# SOIL AND GEOLOGY 5

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## INTRODUCTION

- 5.1 This Chapter of the Environmental Impact Statement evaluates the regional and local geological conditions prevailing at the established construction and demolition (C&D) waste recovery facility at the Central Quarry at Huntstown and the location of the planned long-term replacement facility to be located at the north-eastern corner of the quarry complex.
- 5.2 This Chapter also assesses the impact of the proposed intensification of C&D waste recovery activity at the Central Quarry in the near-term (next 2-3years) and at the planned replacement facility over the longer term thereafter. The extent of the application site to which this 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 Derek Luby B.E. (Civil) MSc. (Soil Mechanics) and 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 at the Central Quarry and at the location of the proposed replacement facility within the Huntstown quarry complex. Surrounding areas were also inspected at the same time.
- 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 May 2015, a geophysical survey was undertaken at the Central Quarry site by APEX Geoservices Ltd. to determine the likely lithological distribution and bedrock structure in that area. The results from the geophysical surveying informed the planning and execution of a subsequent drilling programme which sought to establish the location and depth of geological contacts within and/or between limestone formations and the distribution and nature of any potential karstic clay-infilled features which may have been present. The drilling programme at the Central Quarry was undertaken in June 2015 and comprised a total of 9 No. boreholes.
- 5.7 In August and September 2016, a geophysical survey was undertaken by APEX Geoservices to assess the likely lithological distribution and bedrock structure at the site of the proposed replacement recovery facility to the north-east of the quarry complex. A follow-up drillhole investigation was undertaken in November 2016 to verify the findings of the geophysical investigation.
- 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 quarry complex 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 site of the proposed replacement recovery facility in the north-eastern corner is possibly one of the few relatively undisturbed areas within the quarry landholding. The Teagasc mapping indicates that this area is underlain by renzinas and lithosols, thin stony soils comprised principally of partially weathered (limestone) rock fragments, which in turn suggests rock occurs at or close to the ground surface.
- 5.11 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

- 5.12 Teagasc sub-soil (parent material) mapping, reproduced in Figure 5-2, indicates that the application site at Huntstown is underlain by bedrock at, or close to, the ground surface. In areas beyond the application site, where subsoils do occur, they typically comprise glacial tills derived from Carboniferous limestone.

#### Bedrock Geology

- 5.13 The GSI 1:100,000 geology maps (Sheets 13 and 16) indicate 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 north-west by the Waulsortian Limestones of the Feltrim Limestone Formation which is, in turn, overlain to the north-west by the Tober Colleen. The Tober Colleen is in faulted contact with the Malahide Formation to the north-west, the Malahide Formation in this area having reverse faulted to the south over the Tober Colleen Formation.

## Local Geology

### Introduction

5.14 There are currently three main areas at the Huntstown Quarry complex where extraction is taking place, or has taken place in the recent past. 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 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

5.15 Soils and superficial deposits have been entirely stripped from the footprint of the existing waste recovery facility at the Central Quarry and on much of the surrounding land (at higher level). Soil stripping was undertaken principally to facilitate past and proposed future quarrying at this location. Some of the surrounding land has also been used at various times in the past for stockpiling of aggregate.

5.16 Significant further disturbance of in-situ soils and subsoil deposits is anticipated at the existing recycling facility on foot of the planned future development of the Central Quarry (once the existing C&D facility has been relocated to the north-east of the Huntstown complex). Planning permission for future development of the Central Quarry was granted by Fingal County Council in 2014 (Planning Ref. No. FW12A-0022 and An Bord Pleanála Ref. No. 06F.241693).

5.17 Inspection of the road descent and quarry faces around the Central Quarry suggests that the original depth of subsoil, prior to site stripping and rock excavation was quite thin, on order of 1m to 2m maximum, and that it generally comprised very stony glacial till.

5.18 Inert construction and demolition waste has been imported to and recovered at the existing permitted waste recovery facility at the Central Quarry since 2004 and was suspended in 2015 pending regularisation of waste management regulatory issues. The unprocessed C&D waste (and processed / recycled aggregate derived from it) which is currently stockpiled at the established recovery facility was sourced from construction and development sites across the Greater Dublin Area and is inert.

5.19 The proposed replacement facility in the north-eastern corner of the quarry complex is currently used as seasonal grassland and is grazed by horses. The soil is likely to be relatively thin and stony and appears to be free draining, with only minor quantities of run-off collecting at a minor closed depression at the south-western corner.

5.20 Geophysical testing undertaken at the proposed replacement facility in the north-eastern corner of the quarry complex in 2016 suggests that soil / subsoil cover at the southern and central sections is relatively thin, typically 2m to 5m thick over bedrock, although it appears to thicken notably toward the northern section, up to 10m deep, as the upper surface of the underlying bedrock falls to the north.

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- 5.21 Follow-up rotary drilling in November 2016 indicated that the depth to solid competent rock at the relocated facility was 3m. Geophysical survey and drillhole data for this area is reproduced in Appendix 5-A.

### Bedrock Geology

- 5.22 The geological sequence at Huntstown was investigated in detail by *Jones et al.* (1988), although at that time development of 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 below.

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

FORMATION	MEMBERS	ESTIMATED THICKNESS	Description
<b>LUCAN FORMATION</b>		250m at Huntstown? 1000m+ Regionally	Dark fine-grained limestone and thin shales
<b>TOBER COLLEEN FORMATION</b>		100 – 200m?	Shales and dark limestones
<b>FELTRIM LIMESTONE FORMATION (WAULSORTIAN)</b>		200 – 250m	Pale-grey micritic sparry limestones
<b>MALAHIDE LIMESTONE FORMATION</b>	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

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- 5.23 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.
- 5.24 As already noted, the Central Quarry is currently in use as a C&D waste recycling facility and is not currently being worked. The existing quarry (and planned future extension thereto) is developed in the pale micritic Waulsortian limestones of the Feltrim Limestone Formation.
- 5.25 The Waulsortian Limestones at the Central Quarry are overlain to the north and north-northwest by argillaceous limestones and mudstones / shales of the Tober Colleen Formation which dip steeply to the north-northwest, above the Waulsortian Limestones. The contact between the Waulsortian limestones and the Tober Colleen Formation is exposed in the sides of the roadway leading down into the Central Quarry.
- 5.26 The North Quarry, where inert soil waste recovery is currently ongoing 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.
- 5.27 The West Quarry is underlain predominantly by the Malahide Formation, with the exception of the south-eastern 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.
- 5.28 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.
- 5.29 A detailed geological map showing outcrops of, and contact between, the various rock formations around the Huntstown Quarry complex is presented in Figure 5.4. This geological map is more accurate than the regional mapping published by the GSI as it is based on extensive site specific data obtained by way of geophysical surveying and rock drilling at Huntstown over many years.
- 5.30 The geophysical survey data obtained from across the quarry complex, together with the presence of significant fracturing, veining and dolomitization in drill cores also indicates that the rock mass of the Malahide Formation contains significant internal faulting.
- 5.31 Recent bedrock drilling at the site of the relocated recovery facility intersected sequences of dolomitised packstones (limestones) from the Dunsoghley Massive Crinoidal Member and Huntstown Laminated Member and the underlying interbedded argillaceous bioclastic limestones, limestone and calcareous mudstone of the St. Margaret's Banded Member at depth. The strong dolomitisation identified in the rock cores, particularly at the northern end, suggests that there is a fault in close proximity to this area. Geophysical survey and drillhole data for this area is reproduced in Appendix 5-A.

### Structure

- 5.32 The bedrock sequence at Huntstown dips steeply to the north or north-west, with recorded dip values varying from 23° in the east of the South Quarry to



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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°.

- 5.33 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.
- 5.34 The Tober Colleen Formation is interpreted as being approximately 200m thick in the Huntstown e 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.
- 5.35 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 around the Central Quarry.
- 5.36 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.
- 5.37 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.
- 5.38 A simplified geological cross-section through the Central Quarry and 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

- 5.39 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).
- 5.40 Arising from consultations, staff working on the IGH Programme have requested that the exposure be maintained if possible as part of any future planned development at the Central Quarry. 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

- 5.41 Crushed rock which is 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

- 5.42 Pure limestones, comprising 100% calcium carbonate ( $\text{CaCO}_3$ ), 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.
- 5.43 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.
- 5.44 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.
- 5.45 A review of the GSI Karst Database indicates that there is no known historic (or mapped) karst related features in the vicinity of Huntstown Quarry.
- 5.46 The presence, nature and extent of any karstification at Huntstown Quarry has been separately assessed by inspection of existing quarry faces and from a programme of geophysical surveying and rock drilling undertaken in 2015. These inspections revealed a number of minor solutionally enlarged and clay-infilled joints, particularly within the Feltrim (Waulsortian) Limestone Formation which occurs around the Central Quarry. Where they occur, such features would generally be expected to pinch (narrow) with depth.
- 5.47 The previous development of the Central Quarry was terminated by a series of major clay-infilled features which occur at its eastern end. Examination of these features indicates that they are largely vertical or sub-vertical features, orientated north-south or north-northwest to south-southeast. As a consequence, planned future development of this quarry will be to the west and south.
- 5.48 The recent drilling programme (in 2015) identified a number of clay-infilled solution features, interpreted as a thin zone of vertical to sub-vertical fissures, orientated roughly north-south, over 200m to the west of the existing western limit of the Central Quarry.



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- 5.49 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

- 5.50 The evaluation of impacts of the proposed intensification and relocation of C&D waste recovery activity at Huntstown on soil and geology at and in the vicinity of the Central Quarry, the new (relocated) facility and the 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).
- 5.51 The importance of existing soil and geology attributes identified at the application site is assessed in the table below :

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

Attribute	Status / Occurrence	Importance
Agricultural Soil	Low-value productive soil (grazed grassland) at the relocated site to be removed (lost) and stockpiled in screening berms around the proposed facility or elsewhere within the quarry complex. Other soil beyond quarry site supports agricultural activity / urban development.	Medium
Geological Heritage	Heritage feature located along access road leading to Central Quarry	High
Economic Geology (I)	Existing C&D waste recovery facility at Central Quarry located over high quality limestone resource which has planning approval for extraction. No extraction currently possible due to presence of C&D recovery facility and waste / processed stockpiles.	High
Economic Geology (II)	Geological surveys, drilling and assessment carried out at the location of the replacement C&D waste recovery facility indicate the potential aggregate quality to be low.	Low
Subsoil	Subsoils are relatively free draining and free of contamination, but otherwise have limited function.	Low
Geohazards	Potential for instability / erosion of soil in screening berms and/or stockpiles around quarry complex. Occasional rockfalls at Central Quarry – limited by presence of stockpiled materials against existing rock faces.	Low

- 5.52 The magnitude of these impacts on the soil and geology attributes is assessed in Table 5.3 overleaf:

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**Table 5-3  
Significance of Impacts on Soil and Geology**

Attribute	Impact of Proposal on Attribute	Magnitude
Agricultural Soils	Loss of existing soil cover and existing agriculture use (grazing). Loss relatively insignificant in both local and regional context.	Small, negative
Geological Heritage	No impact - the proposed development will not alter the existing exposure / geological contact	None
Economic Geology (I)	Relocation of existing recovery facility will facilitate further rock extraction at Central Quarry (already approved) and extraction of proven resource.	Moderate, positive
Economic Geology (II)	Development of replacement facility limits potential rock extraction at new location, with long-term sterilisation of underlying, low quality limestone resource. Other, higher value geological resources are however available elsewhere within quarry complex.	Small, negative
Subsoil	Importation of more C&D waste and more intensive processing / recycling activity introduces an increased risk of potential subsoil / bedrock contamination. Also risk of fuel leaks and/or spills from plant and trucks.	Moderate, negative
Subsoil	Construction of hardstand area at replacement facility will not adversely impact existing subsoil function (principally drainage).	None
Geohazards	Continuation and/or intensification of recovery activities at Central Quarry will have no impact on existing low level hazards.	None

- 5.53 The proposed development of a replacement waste recovery facility at the north-eastern corner of the Huntstown quarry complex will result in the loss of productive agricultural soil (a maximum of 5.2 hectares of grassland). As there is abundant soil resource in the surrounding local area, the magnitude of this loss is considered to be small, even in a local context. As the magnitude of loss of a medium value soil resource is small, the significance of this impact is deemed to be **minor** and negative.
- 5.54 The proposed relocation of the waste recovery facility to the north-east of the quarry complex over the short-to medium term will facilitate extraction of a relatively high value limestone resource. As the magnitude of this impact on local economic geology is assessed as moderate, the overall significance of this impact is assessed as **moderate** and positive over the short-to medium term.
- 5.55 The relocation of the recovery facility to the north-east of the quarry complex will prevent extraction of any underlying low value limestone aggregate underlying this site. As the magnitude of this impact on local economic geology is assessed as small, the overall significance of this impact is assessed as **imperceptible**.

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- 5.56 Without mitigation, the increase in traffic volumes and the increase in C&D waste recovery activities could increase the probability of a leak or spillage of fuels/oils at the existing recovery facility and planned replacement facility. The magnitude of any potential impact from hydrocarbons on underlying subsoil and bedrock likely to be local and long-term.
- 5.57 Without mitigation there is also an increased risk of ground contamination at the existing or planned replacement recovery facility on account of the intensification of waste importation and recovery activities. The potential impact of contaminated consignments being delivered to, and end-tipped at, the recovery facilities is considered to be local and long term.
- 5.58 Assuming the waste recovery facilities continue 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 be small to moderate at worst. Given that the risk of introducing contamination into existing relatively 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.

### Interaction with Other Environmental Receptors

- 5.59 The potential risks associated with the importation and handling of contaminated C&D materials at either the existing or proposed replacement facility could have implications for groundwater quality, were infiltrating rainfall to percolate down through any contaminated materials and hardstanding materials into the underlying locally important aquifer. This aspect is discussed in more detail in Chapter 6 of this EIS (Water).
- 5.60 During establishment / set-up of the replacement C&D waste recovery facility, the existence of unvegetated soil stockpiles and/or screening berms could give rise to dust blows during dry windy weather. These issues are discussed in in Chapter 8 of this EIS (Air Quality).
- 5.61 The stripping of soil at the replacement C&D waste recovery facility at the north-east corner of the quarry complex during the set-up / establishment phase could impact on underlying buried archaeological resources. These issues are discussed in in Chapter 11 of this EIS (Cultural Heritage).

### Do-nothing Scenario

- 5.62 If output from the existing C&D recovery facility remains unchanged and the facility is not relocated to the north-eastern corner of the landholding, there will be some continued risk of adverse impact on geological resources, principally arising from potential for contamination by imported C&D wastes and/or plant engaged in recycling activity, albeit the level of risk may be somewhat lower than otherwise envisaged by this proposal.
- 5.63 Were the proposed development not to proceed, there would be no loss of soil or soil function for the existing grassland area in the north-eastern corner of the quarry complex. However, given existing development pressures on this and surrounding lands arising from its proximity to Dublin and high capacity national road infrastructure, it is unlikely that this site would remain undeveloped over the medium to long-term future.

### MITIGATION MEASURES

- 5.64 Several measures are currently being implemented at the existing C&D waste recovery facility to mitigate against any potential adverse impacts on the receiving geological environment which could arise in the course of waste recovery activities. 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. Occasional refuelling will also be undertaken over hardstanding areas at the recovery facilities using double skinned bowsers.
  - Oils, greases and hydraulic fluids are stored under cover in banded containers placed over a concrete slab at the maintenance shed;
  - Refuelling and routine servicing of plant and machinery will take place at existing maintenance sheds or over paved, drained hardstanding areas;
  - Good site management practices are 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.
- 5.65 In order to minimise the risk of importing and introducing contaminated waste materials to the site, management systems have been introduced at the recovery facility to establish the source of imported materials in advance and to confirm that they are inert. Once received at the site a multiple level testing regime will be put in place to test the materials for compliance and includes:
- comprehensive on-site verification, comprising visual inspection and record of all imported C&D wastes unloading at the site
  - basic characterisation testing covering a wide range of parameters to determine the leaching behaviour of the inert wastes imported to site;
  - frequent, compliance testing covering a limited range of key parameters.
- 5.66 It is considered that the combined effect of the above measures will be to reduce the overall magnitude of the potential contamination impact to small and that the corresponding significance of the mitigated impact will be **minor** and negative.
- 5.67 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 C&D waste recovery activities and for a short aftercare period thereafter.
- 5.68 In order to reduce the risk of localised erosion and potential dust emissions during the establishment phase for the replacement facility in the north-eastern corner of the quarry complex, the area of bare or newly exposed subsoils will

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be kept to a minimum and hardstanding materials will be placed over the exposed subsoil as soon as possible after soil stripping. Any new, re-profiled or extended soil stockpiles or raised screening berms will also be immediately vegetated or grassed to minimise erosion and dust blow.

- 5.69 It is proposed to restore the lands at the replacement facility in the north-eastern corner following cessation of C&D waste recovery activities. In order to facilitate future agricultural use of the restored land, all hardstanding materials will be removed and a minimum 300mm combined thickness of any stripped topsoil and subsoil stockpiled nearby will be placed over the in-situ subsoil. The final landform will also be graded so as to facilitate long-term run-off overground toward the proposed drainage channel along the western side of the facility which will remain in place.

### RESIDUAL IMPACT ASSESSMENT

- 5.70 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 mitigate any potential environmental impacts arising from the proposed increase in C&D waste intake rates to the waste recovery facility at Huntstown.
- 5.71 It is recommended that all aspects of C&D waste recovery activity should continue to 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.

### Intensification of Activity at Central Quarry

- 5.72 Measures have been identified which will continue to ensure that there will be no significant impact on the any residual subsoil cover and/or bedrock at the Central Quarry arising from the intensification of C&D waste recovery activities over the short term.

### Relocation of Activity to New Facility

- 5.73 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 proposed replacement facility at the north-eastern corner of the quarry complex as a result of planned C&D waste recovery activities.
- 5.74 Measures are also proposed to provide for long-term restoration of these lands to agricultural use following cessation of waste recovery activities.

### REFERENCES

**Jones, G.LI., Somerville, I.D. and Strogon, 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.

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## PLATES

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## SOIL AND GEOLOGY 5



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.



Plate 5-2 Exposure of the Geological Contact in Huntstown Central Quarry.  
between the Waulsortian Limestones of the Feltrim Limestone  
Formation (to right) and Tober Colleen Formation (to left). Contact  
marked by arrow. Unprocessed C&D waste in foreground.

## SOIL AND GEOLOGY 5

---



Plate 5-3 View to South-East across Central Quarry with processed C&D waste / recycled aggregate stockpiled in foreground



Plate 5-4 View to South across Central Quarry with unprocessed C&D waste stockpiled in foreground

## FIGURES

Figure 5-1  
Regional Soils Map

Figure 5-2  
Regional Subsoils Map

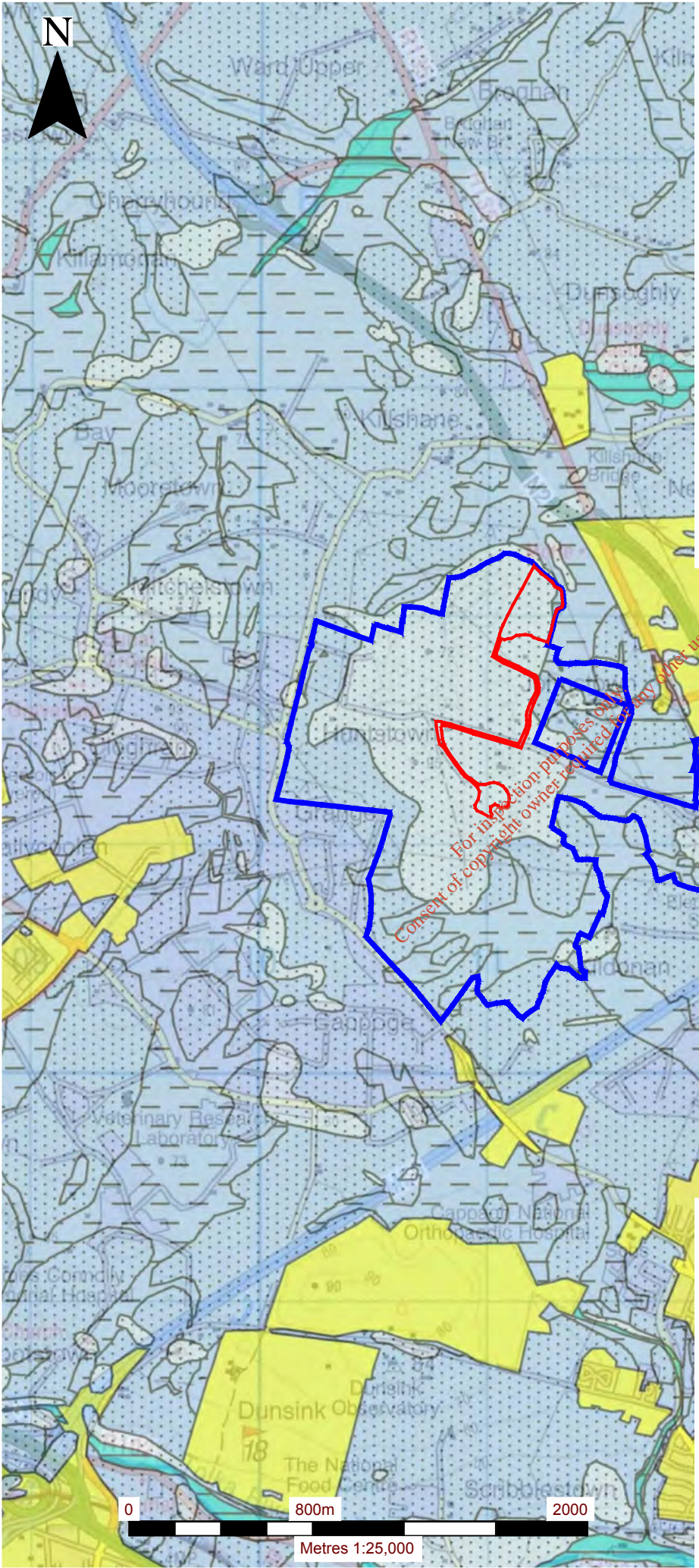
Figure 5-3  
Regional Bedrock Geology Map

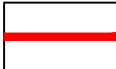

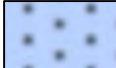
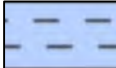
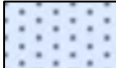

Figure 5-4  
Detailed Local Bedrock Geology Map

Figure 5-5  
Geological Cross Section Through Central Quarry



0180.00166.0.FIG\_5-1.Regional Soils Map.dwg



LEGEND	
	ROADSTONE LIMITED LAND INTEREST (c. 200.3 ha)
	APPLICATION AREA (c. 8.27 ha)
	ALLUVIUM - MINERAL
	GREY BROWN PODZOLICS & BROWN
	SURFACE & GROUNDWATER GLEYS DERIVED FROM CALC.
	RENZINAS & LITHOSOLS
	MADE GROUND

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**ROADSTONE LIMITED**  
ENVIRONMENTAL IMPACT STATEMENT

---

**C&D WASTE RECOVERY FACILITY**  
HUNTSTOWN QUARRY, FINGLAS, DUBLIN 11

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**REGIONAL SOILS MAP**

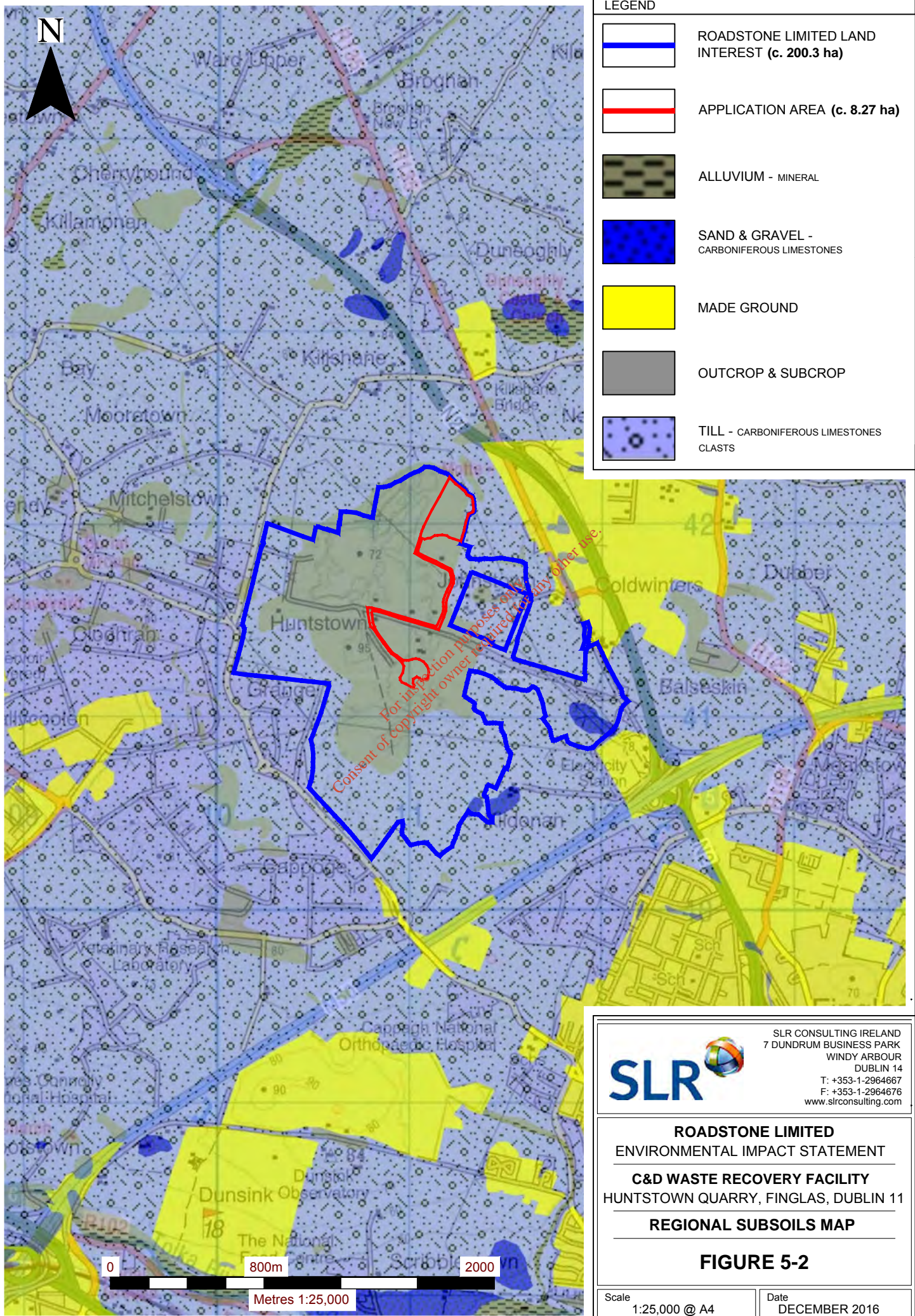
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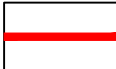
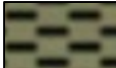


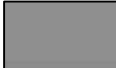
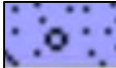
**FIGURE 5-1**

Scale 1:25,000 @ A4	Date DECEMBER 2016
------------------------	-----------------------



0180.00166.0.FIG\_5-2.Regional Sub-Soils Map.dwg



LEGEND	
	ROADSTONE LIMITED LAND INTEREST (c. 200.3 ha)
	APPLICATION AREA (c. 8.27 ha)
	ALLUVIUM - MINERAL
	SAND & GRAVEL - CARBONIFEROUS LIMESTONES
	MADE GROUND
	OUTCROP & SUBCROP
	TILL - CARBONIFEROUS LIMESTONES CLASTS

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**C&D WASTE RECOVERY FACILITY**  
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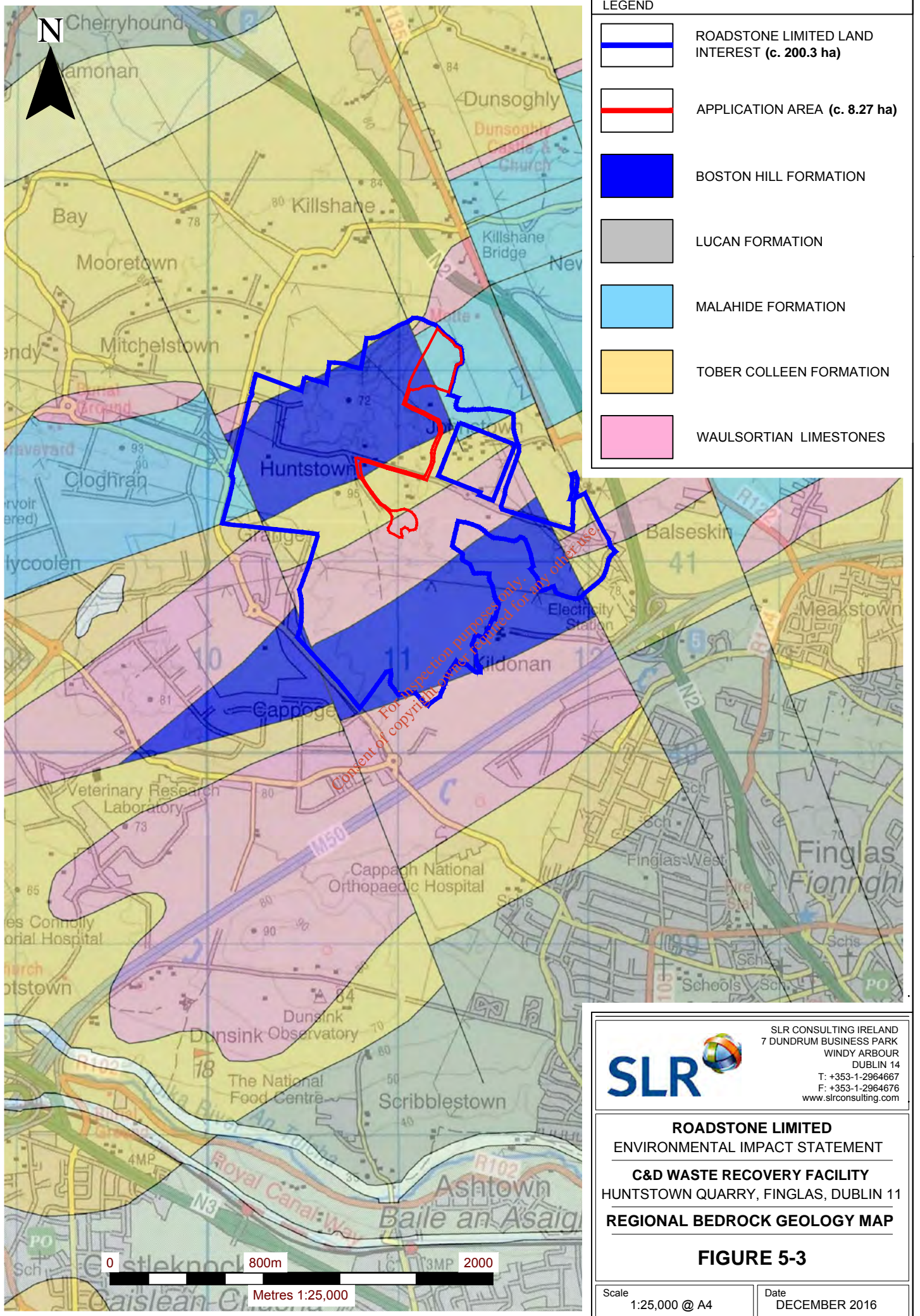
**REGIONAL SUBSOILS MAP**

**FIGURE 5-2**

Scale 1:25,000 @ A4	Date DECEMBER 2016
------------------------	-----------------------



0180.00166.0.FIG\_5-3.Regional Bedrock Geology Map.dwg



LEGEND	
	ROADSTONE LIMITED LAND INTEREST (c. 200.3 ha)
	APPLICATION AREA (c. 8.27 ha)
	BOSTON HILL FORMATION
	LUCAN FORMATION
	MALAHIDE FORMATION
	TOBER COLLEEN FORMATION
	WAULSORTIAN LIMESTONES

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**REGIONAL BEDROCK GEOLOGY MAP**

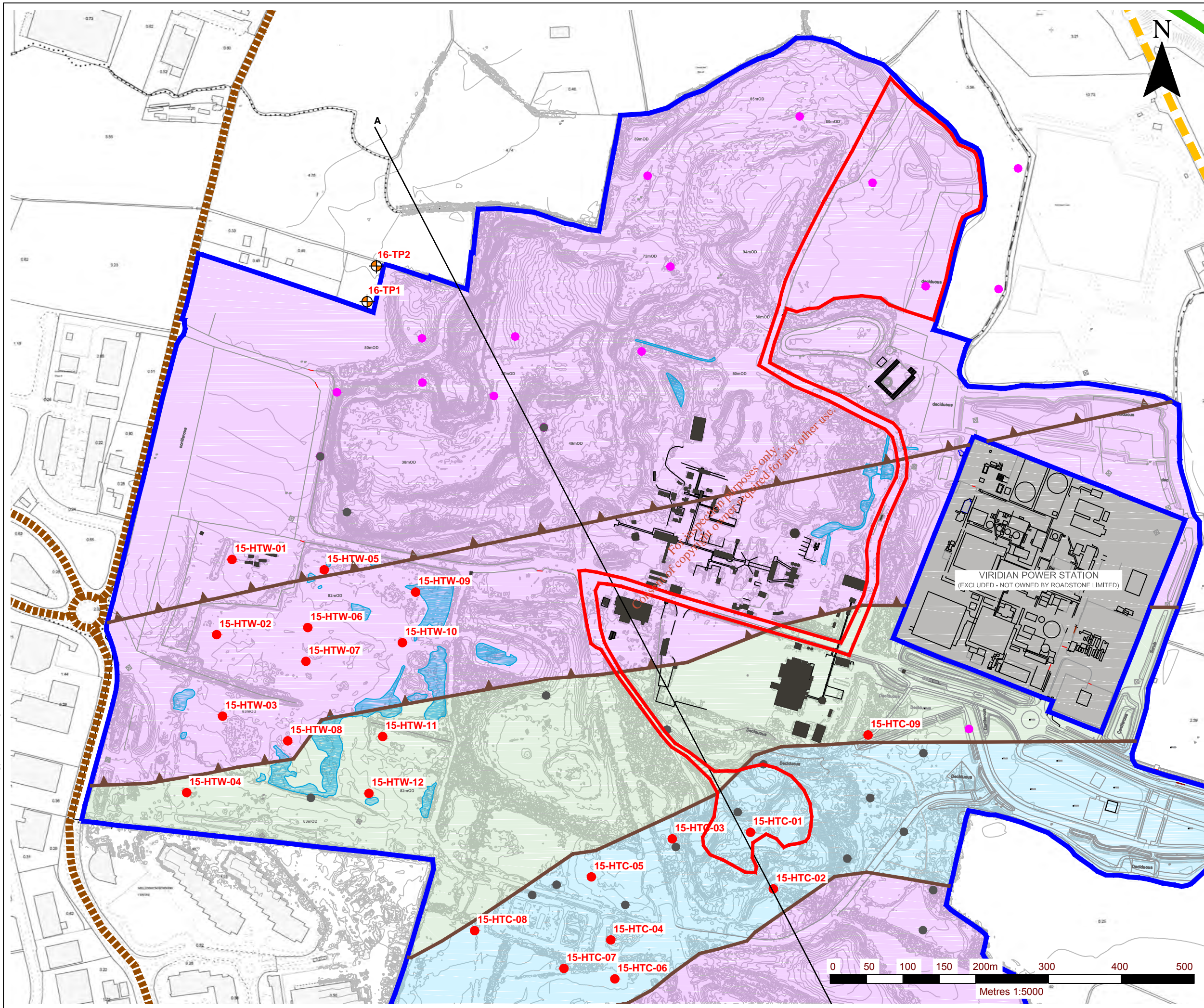
**FIGURE 5-3**

Scale 1:25,000 @ A4	Date DECEMBER 2016
------------------------	-----------------------

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0180.00166.0.FIG\_5-4.Detailed Local Bedrock Geology Maps.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. 8.27 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
	LOCATION OF CROSS SECTION A-A'

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**DETAILED LOCAL BEDROCK**  
**GEOLOGY MAP**

**FIGURE 5-4**  
 Scale 1:5,000 @ A3  
 Date DECEMBER 2016



# APPENDICES

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## APPENDICES

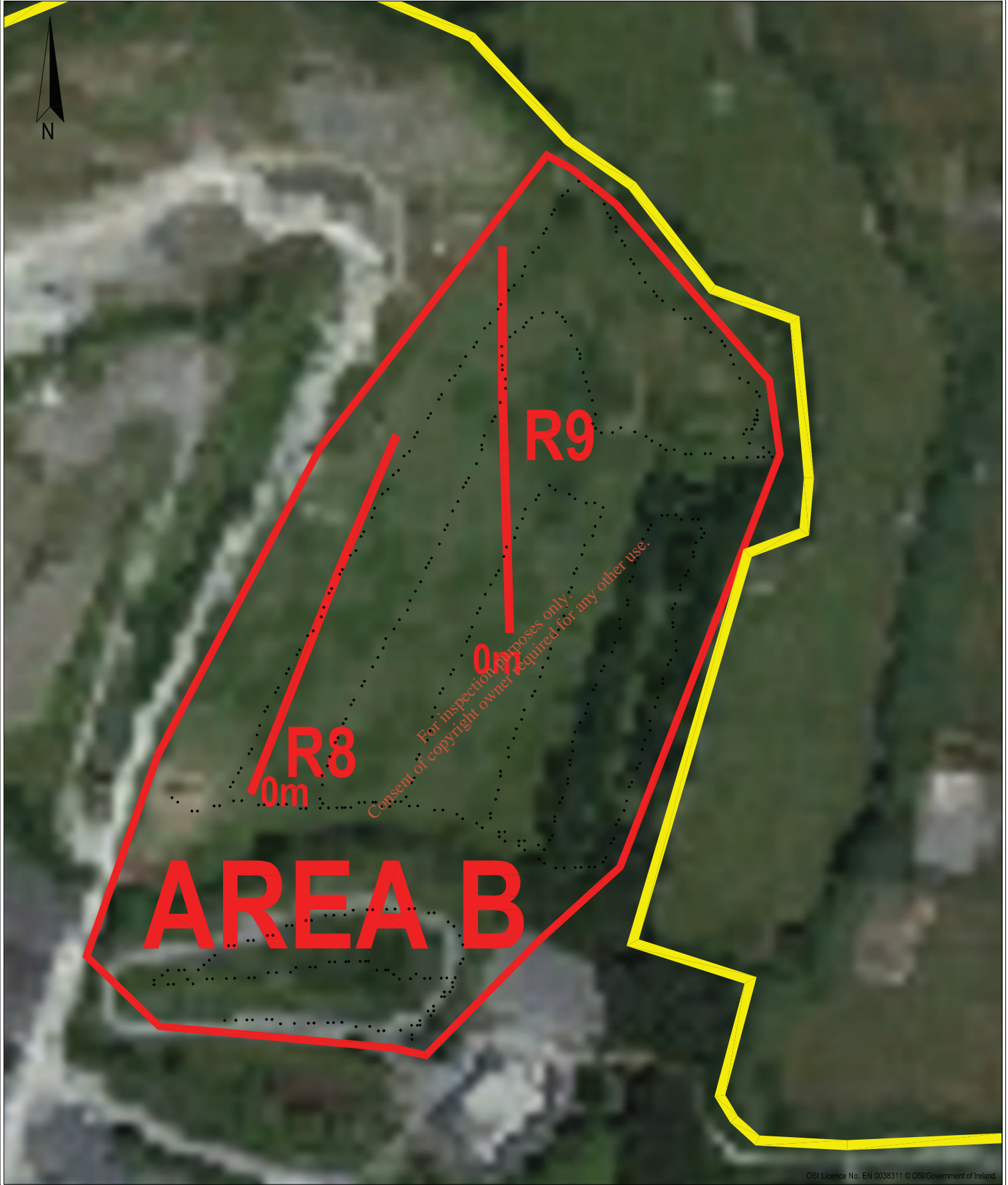
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**APPENDIX 5-A**  
**GEOPHYSICAL SURVEY / BOREHOLE DATA : NORTH EASTERN**  
**AREA**

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FIGURE 1: GEOPHYSICAL LOCATIONS - AREA B

SCALE 1:2500



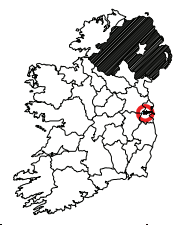
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UK  
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E info@apexgeoservices.co.uk  
www.apexgeoservices.co.uk

INDEX MAP:



LEGEND:

- + EM conductivity station
- R1 2D resistivity profile
- S1 Seismic refraction profile

PROJECT: HUNTSTOWN QUARRY EXTENSION GEOPHYSICAL SURVEY			
DRAWING No.: AGL16196_05			
DATE: 22ND SEPTEMBER 2016			
CLIENT: SLR			
SCALE: AS INDICATED @ A4			
Version:	Date:	Drawn By:	Checked:
01	22/09/2016	MN	POC

FIGURE 1: EM CONDUCTIVITY RESULTS 2016 - AREA B

SCALE 1:2500

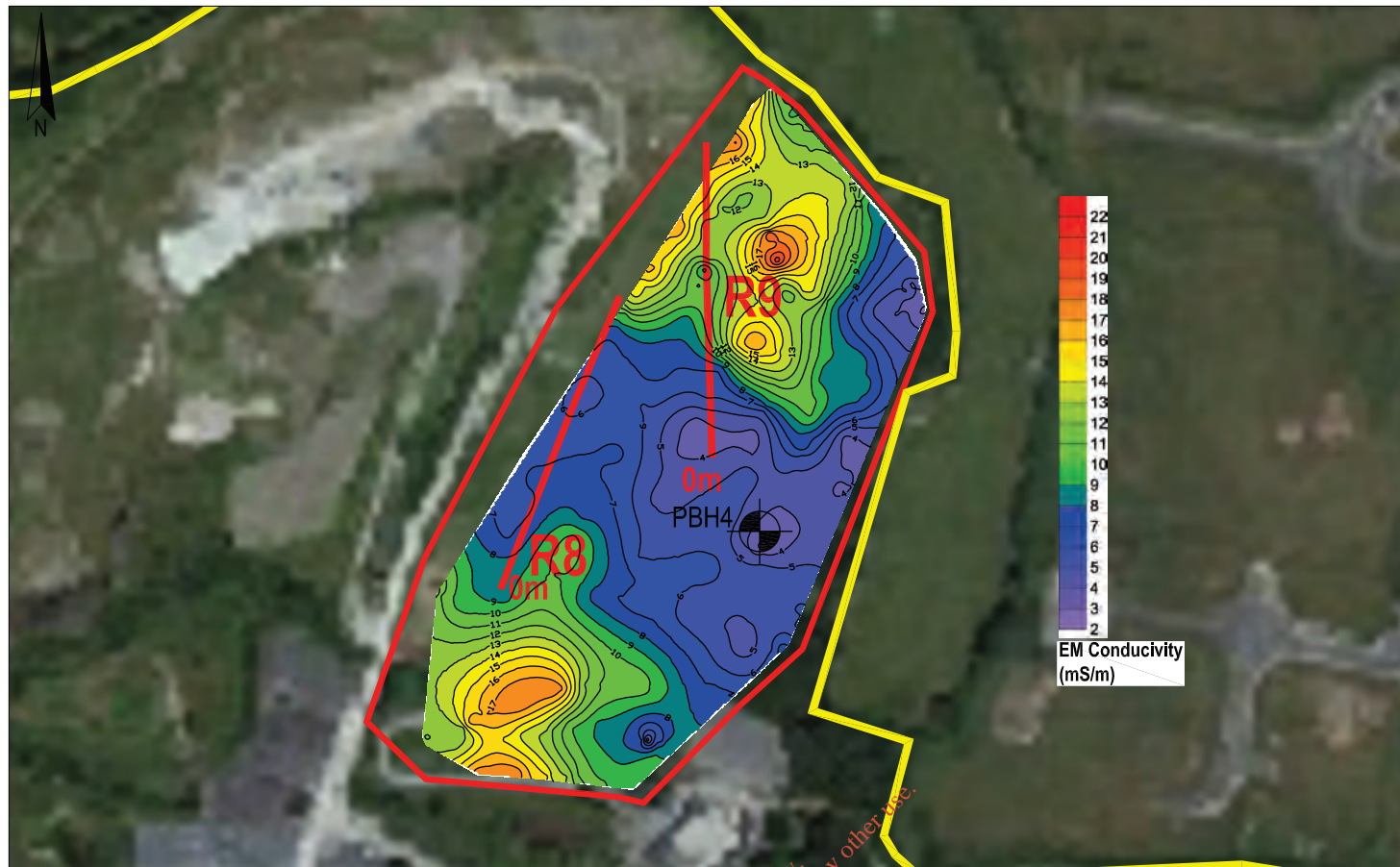


FIGURE 2: SUMMARY MAP 2016 - AREA B

SCALE 1: 2500

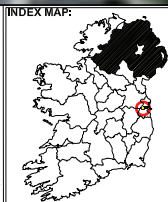


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E info@apexgeoservices.co.uk  
www.apexgeoservices.co.uk



LEGEND:

- 2D resistivity profile
- Seismic refraction profile
- Zone of possible cleaner limestone with argillaceous bands (2-5 m bgl)
- Argillaceous limestone and mudstone (3-8 m bgl)
- Proposed borehole

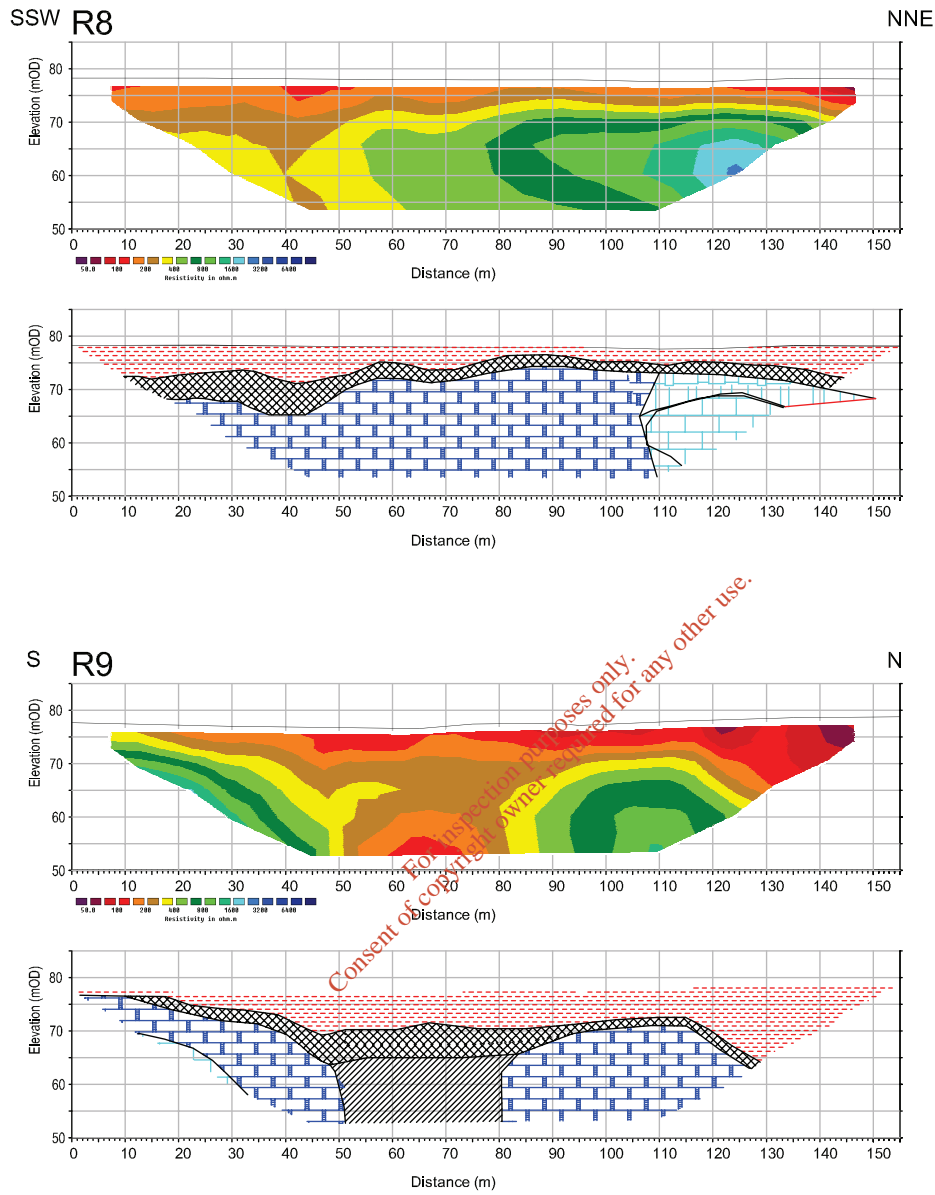
NOTES:

PROJECT:	HUNTSTOWN QUARRY EXTENSION GEOPHYSICAL SURVEY		
DRAWING NO.:	AGL16196_06		
DATE:	22ND SEPTEMBER 2016		
CUSTOMER:	SLR		
SCALE:	AS INDICATED @ A4		
Version:	Date:	Drawn By:	Checked:
01	22/09/2016	MN	POC



FIGURE 1: INTERPRETED ERT SECTIONS 2016 - AREA B

SCALE 1: 1000



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**LEGEND:**

- Gravely silty CLAY
- Silty clayey GRAVEL
- Weathered ARGILLACEOUS LIMESTONE/MUDSTONE
- ARGILLACEOUS LIMESTONE/MUDSTONE at 3-8 m bgl
- MUDSTONE / SHALE
- Weathered possible cleaner LIMESTONE with argillaceous bands at 2-5 m bgl
- Possible cleaner LIMESTONE with argillaceous bands.

**NOTES:**

PROJECTS: HUNTSTOWN QUARRY EXTENSION GEOPHYSICAL SURVEY			
DRAWN BY: AGL16196_07			
DATE: 22ND SEPTEMBER 2016			
CLIENT: SLR			
SCALE: AS INDICATED @ A4			
Version:	Drawn By:	Checked:	
01	22/09/2016	MN	POC



# Rotary Core Log

Borehole No.  
**16-HTN-17**

Sheet 1 of 4

Project Name: Huntstown Geological Assessment	Project No. 501.00180.00165	Co-ords: 311129.29 - 242020.32	Hole Type RC
Location: Huntstown Quarry		Level: 77.42	Scale 1:50
Client: Roadstone		Dates: 10/11/2016 - 14/11/2016	Logged By CB

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		0.00 - 4.00		37	9	0			OVERBURDEN No Recovery	1	
							3.00	74.42		Strong, massive, medium light grey, medium grained dolomitised PACKSTONE. Fractured throughout. Minor dark grey weak mudstone in lowermost 20cm. Limestone dolomitised throughout hole.	2
							4.00	73.42		LIMESTONE - Huntstown Laminated Member Strong, massive, medium light grey, medium grained dolomitised PACKSTONE. Fractured throughout. Minor dark grey weak mudstone in lowermost 20cm. Limestone dolomitised throughout hole.	3
							4.00	73.42		LIMESTONE - Huntstown Laminated Member Strong, massive, brown grey, medium grained, moderately weathered dolomitised PACKSTONE with minor iron stained clay infill. Minor calcite veining.	4
		4.00 - 7.00		100	83	70				Laminations in brown weathered Packstone @ 20deg Brown weak mudstone laminations @ 20deg SCA Strong, massive, brown grey, medium grained, moderately weathered dolomitised PACKSTONE with minor iron stained clay infill. Minor calcite veining.	5
							7.00	70.42		LIMESTONE - Huntstown Laminated Member	6
							7.00	70.42		LIMESTONE - Huntstown Laminated Member Brown weak mudstone laminations @ 20deg SCA	7
										Strong, massive, brown grey, medium grained, moderately weathered dolomitised PACKSTONE with minor iron stained clay infill. Minor calcite veining.	8
		7.00 - 10.00		100	57	41				LIMESTONE - Huntstown Laminated Member Moderately strong, massive-laminated, medium grey-red, medium grained, moderately weathered dolomitised PACKSTONE with common-numerous, weak, red mudstone interbeds.	9
							9.00	68.42		LIMESTONE - Huntstown Laminated Member Moderately strong, massive, red brown grey, medium grained, moderately weathered dolomitised PACKSTONE with common calcite veining and minor red mudstone laminations. Vuggy in parts, with iron stained clay infill.	10

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Remarks  
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Continued on next sheet





# Rotary Core Log

Borehole No.

**16-HTN-17**

Sheet 2 of 4

Project Name: **Huntstown Geological Assessment**

Project No. **501.00180.00165**

Co-ords: **311129.29 - 242020.32**

Hole Type **RC**

Location: **Huntstown Quarry**

Level: **77.42**

Scale **1:50**

Client: **Roadstone**

Dates: **10/11/2016 - 14/11/2016**

Logged By **CB**

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		10.00 - 13.00		99	91	86	11.00	66.42		<p><i>Strong, laminated-massive, light brown grey, medium grained, moderately weathered PACKSTONE (slightly dolomitised?), with numerous iron stained calcite veins throughout. Rare red mudstone wisps.</i></p> <p><b>LIMESTONE - Huntstown Laminated Member</b></p> <p><i>Strong, laminated-massive, light brown grey, medium grained, moderately weathered PACKSTONE (slightly dolomitised?), with numerous iron stained calcite veins throughout. Rare red mudstone wisps.</i></p>	11
		13.00 - 16.00		100	98	86					12
		16.00 - 19.00		97	92	84	16.00	61.42		<b>CALCITE VEIN - Huntstown Laminated Member</b>	16
							17.00	60.42		<p><i>Strong, massive, cream brown CALCITE VEIN.</i></p> <p><i>Strong, massive-laminated, light grey-cream brown, medium grained, slightly weathered dolomitised PACKSTONE with numerous cream brown calcite veining with iron stained. Rare red mudstone wisps. Iron staining and weathering increasing with depth.</i></p> <p><b>LIMESTONE - Huntstown Laminated Member</b></p> <p><i>Strong, massive-laminated, light grey-cream brown, medium grained, slightly weathered dolomitised PACKSTONE with numerous cream brown calcite veining with iron stained. Rare red mudstone wisps. Iron staining and weathering increasing with depth.</i></p>	17
							19.00	58.42		<i>Strong, massive, brown white CALCITE VEIN with iron staining.</i>	19
							19.00	58.42		<p><b>CALCITE VEIN - Huntstown Laminated Member</b></p> <p><i>Strong, massive, brown white CALCITE VEIN with iron staining.</i></p> <p><b>LIMESTONE - Huntstown Laminated Member</b></p> <p><i>Strong, massive, rust grey, medium grained, moderately weathered dolomitised PACKSTONE with numerous weathered calcite veining and minor iron stained clay infill.</i></p>	20

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Continued on next sheet





# Rotary Core Log

Borehole No.  
**16-HTN-17**

Sheet 3 of 4

Project Name: **Huntstown Geological Assessment**

Project No.  
501.00180.00165

Co-ords: 311129.29 - 242020.32

Hole Type  
RC

Location: **Huntstown Quarry**

Level: 77.42

Scale  
1:50

Client: **Roadstone**

Dates: 10/11/2016 - 14/11/2016

Logged By  
CB

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		19.00 - 22.00		100	64	44				Strong, massive, rust grey, medium grained, moderately weathered dolomitised PACKSTONE with numerous weathered calcite veining and minor iron stained clay infill. Fractured throughout. 3cm wide brown weak mudstoneat down hole contact @ 10deg SCA	21
		22.00 - 25.00		99	74	57					22
		25.00 - 28.00		100	59	26	25.00	52.42		Moderately strong, laminated, medium dark grey, fine grained dolomitised PACKSTONE interbedded with intervals of dark grey-black, weak, fractured and partially iron stained mudstone. Common calcite veining and fractured throughout. <b>LIMESTONE - Huntstown Laminated Member</b> Moderately strong, laminated, medium dark grey, fine grained dolomitised PACKSTONE interbedded with intervals of dark grey-black, weak, fractured and partially iron stained mudstone. Common calcite veining and fractured throughout.	25
		28.00 - 31.00		100	78	57	29.00 29.00	48.42 48.42		Moderately weak, laminated, black-rust brown, calcareous MUDSTONE with minor calcite veining. Iron stained decreasing with depth. Fault Zone <b>MUDSTONE - St Margaret's Banded Member</b> Moderately weak, laminated, black-rust brown, calcareous MUDSTONE with minor calcite veining. Iron stained decreasing with depth. Fault Zone <b>CALCITE VEIN - Swords Argillaceous Bioclastic</b> Strong, massive, white-medium grey CALCITE VEIN with	29
							30.00	47.42			30

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Remarks  
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# Rotary Core Log

Borehole No.

**16-HTN-17**

Sheet 4 of 4

Project Name: Huntstown Geological Assessment

Project No. 501.00180.00165

Co-ords: 311129.29 - 242020.32

Hole Type RC

Location: Huntstown Quarry

Level: 77.42

Scale 1:50

Client: Roadstone

Dates: 10/11/2016 - 14/11/2016

Logged By CB

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		31.00 - 34.00		100	99	73	34.00	73.72		<p><i>Strong, massive, white-medium grey CALCITE VEIN with brecciated appearance and packstone infill. Minor iron staining.</i></p> <p><i>Strong, laminated, medium dark grey, fine-medium grained, argillaceous bioclastic WACKESTONE with common wackestone laminations. Minor calcite veining and bioclasts throughout. Rock is fresh.</i></p> <p><b>LIMESTONE - St Margaret's Banded Member</b></p> <p><i>Strong, laminated, medium dark grey, fine-medium grained, argillaceous bioclastic WACKESTONE with common wackestone laminations. Minor calcite veining and bioclasts throughout. Rock is fresh.</i></p>	31 32 33
		34.00 - 37.00		98	98	95	37.00	40.42		<p><i>Strong, laminated, medium dark grey, bioclastic MUDSTONE with minor medium grey, fine grained packstone interbeds. Minor-trace calcite veining.</i></p> <p><b>MUDSTONE - St Margaret's Banded Member</b></p> <p><i>Strong, laminated, medium dark grey, bioclastic MUDSTONE with minor medium grey, fine grained packstone interbeds. Minor-trace calcite veining.</i></p>	34 35 36
		37.00 - 40.00		97	96	90	40.00	37.42		<p><b>MUDSTONE - St Margaret's Banded Member</b></p> <p><b>MUDSTONE - St Margaret's Banded Member</b></p> <p><i>Wavy laminations @ 20deg SCA</i></p> <p><i>Strong, laminated, medium dark grey, bioclastic MUDSTONE with minor medium grey, fine grained packstone interbeds. Minor-trace calcite veining.</i></p>	37 38 39
							40.00	37.42		End of borehole at 40.00 m	40

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# Rotary Core Log

Borehole No.  
**16-HTN-18**

Sheet 1 of 4

Project Name: Huntstown Geological Assessment	Project No. 501.00180.00165	Co-ords: 311164.00 - 242116.00	Hole Type RC
Location: Huntstown Quarry		Level: 77.80	Scale 1:50
Client: Roadstone		Dates: 14/11/2016 - 14/11/2016	Logged By CB

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		0.00 - 4.00		40	29	18			OVERBURDEN No Recovery.		1
							3.00	74.80	<p>Very strong, massive-laminated, slightly rusty brown grey, medium grained dolomitised PACKSTONE with minor-trace iron stained fractures with clay infill. Minor calcite veining. Trace argillaceous wisps. Limestone is dolomitised throughout hole.</p> <p><b>LIMESTONE - Dunsoghley Massive Crinoidal Member</b></p> <p>Very strong, massive-laminated, slightly rusty brown grey, medium grained dolomitised PACKSTONE with minor-trace iron stained fractures with clay infill. Minor calcite veining. Trace argillaceous wisps. Limestone is dolomitised throughout hole.</p>		2
		4.00 - 7.00		100	90	89					
									<p><b>LIMESTONE - Dunsoghley Massive Crinoidal Member</b></p> <p>Strong, massive, medium dark grey, fine grained dolomitised PACKSTONE with minor fractured mudstone intervals with slight iron staining. Trace argillaceous wisps throughout and minor calcite veining.</p> <p>&lt;1cm wide slightly argillaceous dark grey laminations @ 20deg SCA</p> <p>Strong, massive, medium dark grey, fine grained dolomitised PACKSTONE with minor fractured mudstone intervals with slight iron staining. Trace argillaceous wisps throughout and minor calcite veining.</p> <p><b>LIMESTONE - Dunsoghley Massive Crinoidal Member</b></p> <p>&lt;1cm wide slightly argillaceous dark grey laminations @</p>		4
		7.00 - 10.00		98	79	56	8.00	69.80			
							9.00	68.80			6
							9.00	68.80			7
											8
											9
											10

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Continued on next sheet





# Rotary Core Log

Borehole No.  
**16-HTN-18**

Sheet 2 of 4

Project Name: Huntstown Geological Assessment	Project No. 501.00180.00165	Co-ords: 311164.00 - 242116.00	Hole Type RC
Location: Huntstown Quarry		Level: 77.80	Scale 1:50
Client: Roadstone		Dates: 14/11/2016 - 14/11/2016	Logged By CB

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		10.00 - 13.00		100	66	52	12.00	65.80		<p>&lt;1cm wide slightly argillaceous dark grey laminations @ 20deg SCA</p> <p>Strong, massive, medium dark grey, fine grained dolomitised PACKSTONE with minor fractured mudstone intervals with slight iron staining. Trace argillaceous wisps throughout and minor calcite veining.</p> <p>LIMESTONE - Dunsoghley Massive Crinoidal Member</p>	11
		13.00 - 16.00		100	83	73	15.00	62.80		<p>&lt;1cm wide slightly argillaceous dark grey laminations @ 20deg SCA</p> <p>Strong, massive, medium dark grey, fine grained dolomitised PACKSTONE with minor fractured mudstone intervals with slight iron staining. Trace argillaceous wisps throughout and minor calcite veining.</p> <p>LIMESTONE - Dunsoghley Massive Crinoidal Member</p> <p>Strong, massive, medium grey, fine grained dolomitised PACKSTONE with common brecciated calcite veining and minor argillaceous wisps throughout. Minor fractured intervals with concentrations of argillaceous wisps and slightly iron staining.</p>	12 13
		16.00 - 19.00		93	78	37				<p>LIMESTONE - Dunsoghley Massive Crinoidal Member</p> <p>Moderately strong, laminated, medium dark grey, fine grained dolomitised PACKSTONE with interbedded dark grey wackestone. Minor intervals where wackestone grades to weak, slightly iron stained mudstone interbeds-laminations.</p>	14 15 16
							20.00	57.80		<p>Weak, massive, dark grey brown, fine grained muddy WACKESTONE. Faulted.</p>	17 18 19 20

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# Rotary Core Log

Borehole No.  
**16-HTN-18**

Sheet 3 of 4

Project Name: Huntstown Geological Assessment	Project No. 501.00180.00165	Co-ords: 311164.00 - 242116.00	Hole Type RC
Location: Huntstown Quarry		Level: 77.80	Scale 1:50
Client: Roadstone		Dates: 14/11/2016 - 14/11/2016	Logged By CB

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		19.00 - 22.00		100	39	27	20.13	57.67		LIMESTONE - Dunsoghley Massive Crinoidal Member <i>Weak, massive, dark grey brown, fine grained muddy WACKSTONE. Faulted.</i> LIMESTONE - Huntstown Laminated Member <i>Strong, massive, rust grey, medium grained, moderately weathered dolomitised PACKSTONE</i>	21
		22.00 - 25.00		100	92	58					22
		25.00 - 28.00		100	65	40					23
		28.00 - 31.00		100	92	72					24
											25
											26
											27
											28
											29
											30

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# Rotary Core Log

Borehole No.  
**16-HTN-18**

Sheet 4 of 4

Project Name: Huntstown Geological Assessment	Project No. 501.00180.00165	Co-ords: 311164.00 - 242116.00	Hole Type RC
Location: Huntstown Quarry		Level: 77.80	Scale 1:50
Client: Roadstone		Dates: 14/11/2016 - 14/11/2016	Logged By CB

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description
				TCR	SCR	RQD				
		31.00 - 34.00		100	86	64				
		34.00 - 37.00		100	83	68				
		37.00 - 40.00		98	95	80				
							40.00	37.80		End of borehole at 40.00 m

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**APPENDIX 5-B**  
**BOREHOLE LOGS : CENTRAL QUARRY**

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Borehole No

**15-HTC-01**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310979E - 241197N	Hole Type Rotary
Location: Huntstown		Level: 57.27 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 24/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
	0.00							Waulsortian Stromatactid Biomicrite Non - Intact returns of light grey, fine grained stromatactid biomicrite LIMESTONE with occasional clay	
		50	19	3	25				
	3.00					2.90	54.37	Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE	
		100	80	55	9				
	6.00							Muddy Limestone / Calcareous Mudstone Moderately strong dark grey muddy LIMESTONE with fine grained mudstone interbeds, occasional clay filled fractures	
		97	87	63	10			Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE	
	9.00								

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Borehole No

**15-HTC-01**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 310979E - 241197N

Hole Type  
Rotary

Location: Huntstown

Level: 57.27 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 24/06/2015

Logged By  
TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
		80	70	47	9			Waulsortian Stromatactid Biomicrite	
	12.00					11.70	45.57	Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE	
		27	23	18	25				
	15.00								
		37	28	28	25				
						17.30	39.97	Waulsortian Stromatactid Biomicrite Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
	18.00								
		100	100	97	4				

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310979E - 241197N	Hole Type Rotary
Location: Huntstown		Level: 57.27 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 24/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	21.00					21		Waulsortian Stromatactid Biomicrite	
		100	97	93	5	22			
						23			
						23.60	33.67		
	24.00					24		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LESTONE	
		100	97	92	6	25			
						26			
	27.00					27			
		100	53	53	8	28			
						29			

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310979E - 241197N	Hole Type Rotary
Location: Huntstown		Level: 57.27 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 24/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	30.00								Waulsortian Stromatactid Biomicrite
		100	100	100	3	31			
						32			
	33.00					33.00	24.27		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite with occasional white irregular patches
		100	100	100	3	34			
						35.00	22.27		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE
	36.00					36			
		100	87	87	4	37			
						38			
	39.00					39			
		40	30	30	1				
End of Borehole at 40.00 m									

Remarks: Drilled by IDL



Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 311011E - 241119N	Hole Type Rotary
Location: Huntstown		Level: 77.55 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 23/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
	0.00							Waulsortian Veines Bleues Strong, massive, mid grey, fine grained, veines bleues LIMESTONE with occasional irregular calicte infill	
		73	57	40	13				
	3.00								
		73	53	53	12				
	6.00					5.80 66.00	71.75 71.55	Clay Clay Infill	
		78	70	67	7			Waulsortian Veines Bleues Strong, massive, medium grey, veines bleues LIMESTONE with occasional stromatactid biomicrite with occasional white irregular patches	
	9.00								

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Borehole No

**15-HTC-02**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 311011E - 241119N	Hole Type Rotary
Location: Huntstown		Level: 77.55 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 23/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
		100	100	97	5			Waulsortian Veines Bleues	
	12.00					11			
						12			
						12.70	64.85	Waulsortian Stromatactid Biomicrite	
						13		Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with minor veines bleues LIMESTONE	
		87	80	77	5	14			
						14.40	63.15	Waulsortian Stromatactid Biomicrite	
	15.00					15		Strong, massive, light grey, fine grained biomicrite LIMESTONE	
		100	83	80	5	16			
						17			
	18.00					18.00	59.55	Waulsortian Stromatactid Biomicrite	
						19		Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
		97	90	90	5				

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Borehole No

**15-HTC-02**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 311011E - 241119N

Hole Type  
Rotary

Location: Huntstown

Level: 77.55 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 23/06/2015

Logged By  
TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	21.00					21		Waulsortian Stromatactid Biomicrite	
						22			
		100	63	63	8	23			
	24.00					24			
						25		Waulsortian Stromatactid Biomicrite	
						26			
		100	97	97	4	27			
	27.00					28			
						29			
		100	97	93	7				

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Borehole No

**15-HTC-02**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 311011E - 241119N

Hole Type  
Rotary

Location: Huntstown

Level: 77.55 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 23/06/2015

Logged By  
TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	30.00								Waulsortian Stromatactid Biomicrite
		100	90	87	10	31			
						32			
	33.00					33			
		97	83	83	6	34			
						35			
	36.00					36			
		100	100	97	6	37			
						38			
						38.70	38.85		Argillaceous Bioclastic Limestone Strong medium to dark grey thinly bedded LIMESTONE with argillaceous interbeds
	39.00					39			
						39.20	38.35		Argillaceous Bioclastic Limestone Strong dark grey to black thinly bedded CALCAREOUS MUDSTONE with interbedded argillaceous bioclastic LIMESTONE
						39.80	37.75		

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Borehole No

**15-HTC-02**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 311011E - 241119N

Hole Type  
Rotary

Location: Huntstown

Level: 77.55 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 23/06/2015

Logged By  
TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description	
	Drill Tag	TCR	SCR	RQD	FI					
						40.00	37.55		Clay Detail 39.80m - 40.00m : Clay Infill	
		77	63	63	25					Argillaceous Bioclastic Limestone Strong dark grey to black thinly bedded CALCAREOUS MUDSTONE with interbedded argillaceous bioclastic LIMESTONE
	42.00									
		93	83	77	7					
						45.00	32.55			End of Borehole at 45.00 m

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Borehole No

**15-HTC-03**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310872E - 241188N	Hole Type Rotary
Location: Huntstown		Level: 84.99 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 22/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
	0.00							No Recovery No recovery, minor returns of clay and dark limestone	
		10	7	4	25				
	3.00					33.00	81.99	Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
		40	32	25	9				
	6.00					6		Waulsortian Karst No Recovery returns of clay and cobbles	
		33	30	18	25				
						6.50	78.49		
	9.00					8.70	76.29	Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
						99.00	75.99	Waulsortian Karst Karst - Dark brown to black glacial till with occasional light brown to buff clay interbeds, light brown to range clay at the bottom 30cm	

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310872E - 241188N	Hole Type Rotary
Location: Huntstown		Level: 84.99 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 22/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
		62	0	0	25			Waulsortian Karst	
	12.00					11			
						12			
						12.70	72.29	Waulsortian Stromatactid Biomicrite Dolomitised Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
		70	60	57	7	13			
						14.00	70.99	Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE	
						14.20	70.79	Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE	
	15.00					14.80	70.19	Waulsortian Karst Feature Karst - Light brown / buff Clay	
						15		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE partially dolomitised	
						16			
						16.10	68.89	Waulsortian Karst Feature Karst - Light brown / orange Clay	
		75	40	33	10	17			
						17.30	67.69	Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE partially dolomitised	
	18.00					18			
						19			
		83	37	27	25				

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310872E - 241188N	Hole Type Rotary
Location: Huntstown		Level: 84.99 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 22/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
					20.00	64.99		Waulsortian Karst Karst - Light brown / orange Clay	
	21.00				20.70	64.29		Waulsortian Stromatactid Biomicrite	
					21.00	63.99		Dolomitised Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
								Waulsortian Karst Karst - Returns of Clay	
		17	12	8	25				
	24.00				23.70	61.29		Waulsortian Stromatactid Biomicrite	
					24.00	60.99		Dolomitised Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
								Waulsortian Karst Karst - returns of orange / buff clay	
		10	0	0	25				
	27.00				27				
		60	33	30	25				
					28				
					29				
					29.90	55.09			

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Borehole No

**15-HTC-03**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310872E - 241188N	Hole Type Rotary
Location: Huntstown		Level: 84.99 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 22/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	30.00					30.20 30.25	54.79 54.74		Waulsortian Stromatactid Biomicrite Detail 29.90m - 30.20m : Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE partially dolomitised
						31			Clay Clay Infill
		97	93	93	3	31.45	53.54		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE partially dolomitised
						32			Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE
	33.00					33			
						34			
		80	63	63	25	35			
						35.80 35.90 36.00	49.19 49.09 48.99		Clay Clay Infill
	36.00								Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE
						37			Waulsortian Karst Karst - returns of orange / buff clay
		48	30	27	25	37.90	47.09		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE
						38			
	39.00					39			
		25	18	15	25				
End of Borehole at 40.00 m									

Remarks: Drilled by IDL



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Borehole No

**15-HTC-04**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310787E - 241049N	Hole Type Rotary
Location: Huntstown		Level: 82.69 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 18/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
	0.00							No Recovery Non - Intact returns of limestone cobbles and occasional clay	
		8	0	0	25				
	3.00								
		72	27	15	25	4.30	78.39	Waulsortian Stromatactid Biomicrite Strong, massive, light to mid grey, fine grained, stromatactid biomicrite LIMESTONE partially dolomitised	
	6.00								
						6.50	76.19	Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues	
						6.80	75.89	LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
		100	50	40	16			Waulsortian Stromatactid Biomicrite Strong, massive, light to mid grey, fine grained, stromatactid biomicrite LIMESTONE partially dolomitised	
						8.50	74.19	Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues	
	9.00					99.00	73.69	LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
						9.40	73.29	Waulsortian Stromatactid Biomicrite Strong, massive, light to mid grey, fine grained, stromatactid biomicrite LIMESTONE partially dolomitised	
								Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues	

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Borehole No

**15-HTC-04**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 310787E - 241049N

Hole Type  
Rotary

Location: Huntstown

Level: 82.69 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 18/06/2015

Logged By  
TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
					10.00	72.69		Remaining Detail : 9.40m - 10.00m : LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
		100	80	80				Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
					11				
					11.50	71.19		Brecciated Calcite Vein	
					11.60	71.09		Brecciated calcite vein	
	12.00				12			Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
					13				
		100	98	98					
					13.60	69.09		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
					14				
	15.00				15			Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
					16				
		100	73	73					
					16.50	66.19		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
					17			Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
					17.90	64.79		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
	18.00				18				
					18.30	64.39		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
					19				
		100	78	60					

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Borehole No

**15-HTC-04**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310787E - 241049N	Hole Type Rotary
Location: Huntstown		Level: 82.69 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 18/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	21.00					21			Waulsortian Veines Bleues
		100	97	97	3	22.40	60.29		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE
						22.90	59.79		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
	24.00					24			
		100	87	87	4	25			
						26			
	27.00					27.00	55.69		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE
		100	73	70	6	28			
						29			

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310787E - 241049N	Hole Type Rotary
Location: Huntstown		Level: 82.69 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 18/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
	30.00							Waulsortian Stromatactid Biomicrite	
		100	87	83	6				
						32.70	49.99		
	33.00							Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE	
		100	98	98	2				
	36.00								
		100	99	99	2				
	39.00								
		100	100	100	1				
End of Borehole at 40.00 m									

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Borehole No

**15-HTC-05**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310761E - 241135N	Hole Type Rotary
Location: Huntstown		Level: 81.27 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 17/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	0.00								No Recovery Overburden, returns of boulder clay and limestone cobbles
		3	2	0	25	2			
						3			
	4.00					4			
						4.70	76.57		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
		60	18	5	6	5			
	6.00					6			
						7			
		100	78	75	5	8			
						9			
	9.00								

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Borehole No

**15-HTC-05**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310761E - 241135N	Hole Type Rotary
Location: Huntstown		Level: 81.27 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 17/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
		100	73	67	5	11			Waulsortian Veines Bleues
	12.00					12			
		100	82	82	1	14			
	15.00					15			
						15.80	65.47		Waulsortian Stromatactid Biomicrite
						16			Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE
		100	22	22	4	16.10	65.17		Waulsortian Veines Bleues
						17			Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
	18.00					18			
		100	100	100	1	19			

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310761E - 241135N	Hole Type Rotary
Location: Huntstown		Level: 81.27 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 17/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
	21.00				21 21.10	60.17		Waulsortian Veines Bleues	
					22			Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE	
		100	92	92	22.60 22.65	58.67 58.62		Clay Clay Infill	
					23.00	58.27		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE	
	24.00				24			Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
		100	98	98	25				
					26				
	27.00				27				
					27.40	53.87		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
		100	75	72	28 29				

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Borehole No

**15-HTC-05**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310761E - 241135N	Hole Type Rotary
Location: Huntstown		Level: 81.27 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 17/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	30.00								Waulsortian Stromatactid Biomicrite
		100	97	97	2	31.50	49.77		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
	33.00								
		100	98	98	1	34.40	46.87		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE
						34.80	46.47		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
	36.00								Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE
		100	97	97	3				
	39.00								
		100	100	100	0	39.30	41.97		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
									End of Borehole at 40.00 m

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Borehole No

**15-HTC-06**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310792E - 240995N	Hole Type Rotary
Location: Huntstown		Level: 79.19 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 16/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	0.00								No Recovery Non - Intact retruns of limestone
		67	45	30	25	1.40	77.79		Waulsortian Stromatactid Biomicrite Strong, massive, light grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE
	3.00								
		100	100	100	3				
	6.00								
		100	77	77	4				
	9.00								

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Borehole No

**15-HTC-06**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310792E - 240995N	Hole Type Rotary
Location: Huntstown		Level: 79.19 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 16/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
		100	82	80	4			Waulsortian Stromatactid Biomicrite	
	12.00					12.00	67.19	Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
	15.00	100	100	100	2				
	18.00	100	70	65	5				
		100	80	80	4	19.50	59.69	Waulsortian Stromatactid Biomicrite Strong, medium grey, fine grained, stromatactid biomicrite	

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Borehole No

**15-HTC-06**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 310792E - 240995N

Hole Type  
Rotary

Location: Huntstown

Level: 79.19 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 16/06/2015

Logged By  
TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	21.00					21		Remaining Detail : 19.50m - 24.20m : LIMESTONE with occasional veines bleues LIMESTONE	
						22			
		100	83	83	2	23			
	24.00					24		Waulsortian Biomicrite Strong, pale to medium grey, fine grained biomicrite LIMESTONE	
						24.20	54.99		
						25			
		100	97	97	4	26			
	27.00					27		Waulsortian Stromatactid Biomicrite Strong, medium grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
						27.10	52.09		
						28			
		100	78	78	8	29			

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Borehole No

**15-HTC-06**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310792E - 240995N	Hole Type Rotary
Location: Huntstown		Level: 79.19 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 16/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	30.00								Waulsortian Stromatactid Biomicrite
		100	83	80	8	31			
						32			
	33.00					33			
		100	90	90	3	34			
						35			
	36.00					36			
		100	97	97	4	37			
						37.95	41.24		Argillaceous Bioclastic Limestone Strong dark grey fine grained, thinly bedded bioclastic argillaceous LIMESTONE, bedded at 25A°, interbedded with pale grey biomicrite LIMESTONE
	39.00					39.00	40.19		Argillaceous Bioclastic Limestone Strong dark grey fine grained, thinly bedded bioclastic argillaceous LIMESTONE
		100	100	100	2				
End of Borehole at 40.00 m									

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Borehole No

**15-HTC-07**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310722E - 241010N	Hole Type Rotary
Location: Huntstown		Level: 79.44 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 15/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
	0.00							No Recovery Non - Intact returns of limestone cobbles and occasional clay	
		23	12	6	25				
						76.94		Waulsortian Stromatactid Biomicrite Strong, massive, medium grey, fine grained, partially weathered stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
	3.00								
		50	23	5	7				
						73.54		Waulsortian Karst Karst - Light brown clay returns with brecciated calcite vein	
	6.00							Waulsortian Biomicrite Strong, massive, pale to medium grey fine grained biomicrite LIMESTONE	
						73.04			
		80	53	40	20				
						71.84		Waulsortian Karst Moderately strong, pale to light brown orange stained partially dolomitised LIMESTONE	
						71.54			
						71.44		Waulsortian Biomicrite Strong, massive, medium grey, fine grained, partially weathered stromatactid biomicrite LIMESTONE	
						71.34			
						71.14		Waulsortian Karst Karst - Light brown clay returns	
						71.09		Waulsortian Biomicrite Moderately strong, pale to light brown orange stained partially dolomitised LIMESTONE	
	9.00								
						69.99		Waulsortian Karst Clay filled fracture	
						69.89			

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Borehole No

**15-HTC-07**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310722E - 241010N	Hole Type Rotary
Location: Huntstown		Level: 79.44 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 15/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
		73	67	50	11	10.30 10.70 10.73	69.14 68.74 68.71	8.35m - 9.45m : Waulsortian Biomicrite Detail 8.35m - 9.45m : Strong, massive, pale to medium grey fine grained biomicrite LIMESTONE 9.45m - 9.55m : Waulsortian Karst Detail 9.45m - 9.55m : Karst - Light brown clay infill 9.55m - 10.30m : Waulsortian Biomicrite Detail 9.55m - 10.30m : Strong, massive, medium grey, fine grained, partially weathered stromatactid biomicrite LIMESTONE numerous clay infills (2-3cm) to 10.3m	
	12.00					12.00 12.20	67.44 67.24	Waulsortian Biomicrite Strong, massive, medium grey, fine grained, partially weathered stromatactid biomicrite LIMESTONE Waulsortian Karst Karst - Light brown clay infill Waulsortian Biomicrite Strong, massive, medium grey, fine grained, stromatactid biomicrite LIMESTONE Waulsortian Karst Karst - Light brown / buff clay infill	
	15.00	70	63	60	4	14.00 15 15.40	65.44 64.04	Waulsortian Biomicrite Strong, massive, medium grey, fine grained, stromatactid biomicrite LIMESTONE with numerous calcite veins Waulsortian Biomicrite Strong, massive, medium grey, fine grained, stromatactid biomicrite LIMESTONE	
	18.00	100	83	77	7	17 17.10	62.34	Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
		73	72	72	2	18 19			

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Borehole No

**15-HTC-07**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 310722E - 241010N

Hole Type  
Rotary

Location: Huntstown

Level: 79.44 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 15/06/2015

Logged By  
TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	21.00					21.00 21.20	58.44 58.24		Waulsortian Veines Bleues
									Waulsortian Karst Karst - Light brown / buff clay infill
		73	53	36	10	22 23			Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
	24.00					23.50 23.55	55.94 55.89		Waulsortian Karst Karst - Light brown / buff clay infill
		100	93	87	6	24 25			Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
	27.00					26 27			
		45	40	38	5	28 29			

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310722E - 241010N	Hole Type Rotary
Location: Huntstown		Level: 79.44 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 15/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description	
	Drill Tag	TCR	SCR	RQD	FI					
	30.00					30.00	49.44		Waulsortian Stromatactid Biomicrite Strong, massive, medium grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
		100	97	83	3					
	33.00					33				
		65	60	60	4					
	36.00					36.00 36.10	43.44 43.34			Waulsortian Karst Karst - Light brown / buff clay infill
										Waulsortian Stromatactid Biomicrite Strong, massive, medium grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE, partially dolomitised in places with occasional irregularly occurring calcite veins
		82	70	70	4					
	39.00					39				
		95	95	95	2					

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End of Borehole at 40.00 m

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310599E - 241062N	Hole Type Rotary
Location: Huntstown		Level: 81.41 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 09/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
	0.00							Overburden Non - Intact returns of limestone with stif dark grey CLAY	
		10	0	0	25				
	3.00								
		20	7	0	25				
	4.50								
		17	13	13	25				
	6.00								
		7	0	0	25				
	7.50								
		93	40	40	5	88.00	73.41	Waulsortian Veines Bleues Strong, massive, medium grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE	
	9.00								
		100	100	100	0				

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310599E - 241062N	Hole Type Rotary
Location: Huntstown		Level: 81.41 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 09/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	10.50								Waulsortian Veines Bleues
		100	100	100	2	11			
						11.60	69.81		
						11.63	69.78		Waulsortian Karst Karst - Light brown / buff clay infill
	12.00					12			Waulsortian Biomicrite Strong, massive, medium grey, fine grained, stromatactid biomicrite LIMESTONE with occasional veines bleues LIMESTONE
		100	87	80	3	12.20	69.21		Waulsortian Micrite Strong, massive, light grey, fine grained biomicrite LIMESTONE
						13			
						13.30	68.11		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
	13.50					14			
		93	80	80	2	15			
	15.00					15			
		100	100	100	0	16			
	16.50					17			
		65	47	47	3	17.40	64.01		Waulsortian Karst Karst - Cavity
	18.00					18.00	63.41		Waulsortian Micrite Strong, massive, light grey, fine grained biomicrite LIMESTONE
		47	33	33	1	19			
						19.30	62.11		
	19.50					19.50	61.91		Waulsortian Karst Karst - Solution feature with light brown to yellow clay infill

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www.slrconsulting.com

Borehole No

**15-HTC-08**

Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310599E - 241062N	Hole Type Rotary
Location: Huntstown		Level: 81.41 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 09/06/2015	Logged By TM

Piezo	Drill Tag	Core Geotechnical Data				Depth (m)	Level (m OD)	Litho	Stratum Description
		TCR	SCR	RQD	FI				
	21.00	53	53	53	0	20.70	60.71	Waulsortian Veines Bleues Detail 19.50m - 20.70m : Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
						21.00	60.41	Waulsortian Micrite Strong, massive, light grey, fine grained biomicrite LIMESTONE	
	22.50	53	53	53	0	21.80	59.61	Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
						22		Waulsortian Karst Karst - Light brown / buff clay infill with occasional limestone cobbles	
	24.00	7	0	0	25	23			
							24		
	26.50	64	60	60	3	25.00	56.41	Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE	
						26			
						27			
						27.80	53.61	Waulsortian Karst Karst - Light brown / buff clay infill	
		40	39	39	25	28			
						29			

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 310599E - 241062N	Hole Type Rotary
Location: Huntstown		Level: 81.41 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 09/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	30.00								Waulsortian Karst
		56	34	32	3	31 31.40	50.01		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
	32.50					32 33			
		93	93	90	2				
	34.00					34.00	47.41		Waulsortian Karst Karst - Non intact returns of limestone cobbles and clay
		100	57	50	13	35.00	46.41		Waulsortian Veines Bleues Strong, massive, medium to dark grey, veines bleues LIMESTONE with occasional stromatactid biomicrite LIMESTONE
	36.00					36			
		100	100	97	3	37			
	37.50					38			
		73	73	73	2				
	39.00					39			
		70	60	50	4				
									End of Borehole at 40.00 m

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Borehole No

**15-HTC-09**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 311141E - 241331N

Hole Type  
Rotary

Location: Huntstown

Level: 79.41 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 25/06/2015

Logged By  
TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	0.00								Waulsortian Karst Stiff to very stiff dark grey to black sandy gravelly CLAY with occasional cobbles
		8				1			
	3.00					3			
		17				4			
	6.00					6			
		53				8			
	9.00					9			

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Project Name: Geological Assessment	Project No. 501.00180.00119	Co-ords: 311141E - 241331N	Hole Type Rotary
Location: Huntstown		Level: 79.41 m AOD	Scale 1:50,000
Client: Roadstone		Dates: 25/06/2015	Logged By TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
		50				11			Waulsortian Karst
	12.00					12			
		37				14			
	15.00					15.00	64.41		Waulsortian Karst Firm to stiff buff to light brown CLAY with occasional orange interbeds
		27				16			
	18.00					18			
		55				19			

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Borehole No

**15-HTC-09**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 311141E - 241331N

Hole Type  
Rotary

Location: Huntstown

Level: 79.41 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 25/06/2015

Logged By  
TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	21.00					21			Waulsortian Karst
						22			
		53				23			
	24.00					24			
						25			
		90				26			
	27.00					27			
						28			
		53				29			

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Borehole No

**15-HTC-09**

Project Name: Geological Assessment

Project No.  
501.00180.00119

Co-ords: 311141E - 241331N

Hole Type  
Rotary

Location: Huntstown

Level: 79.41 m AOD

Scale  
1:50,000

Client: Roadstone

Dates: 25/06/2015

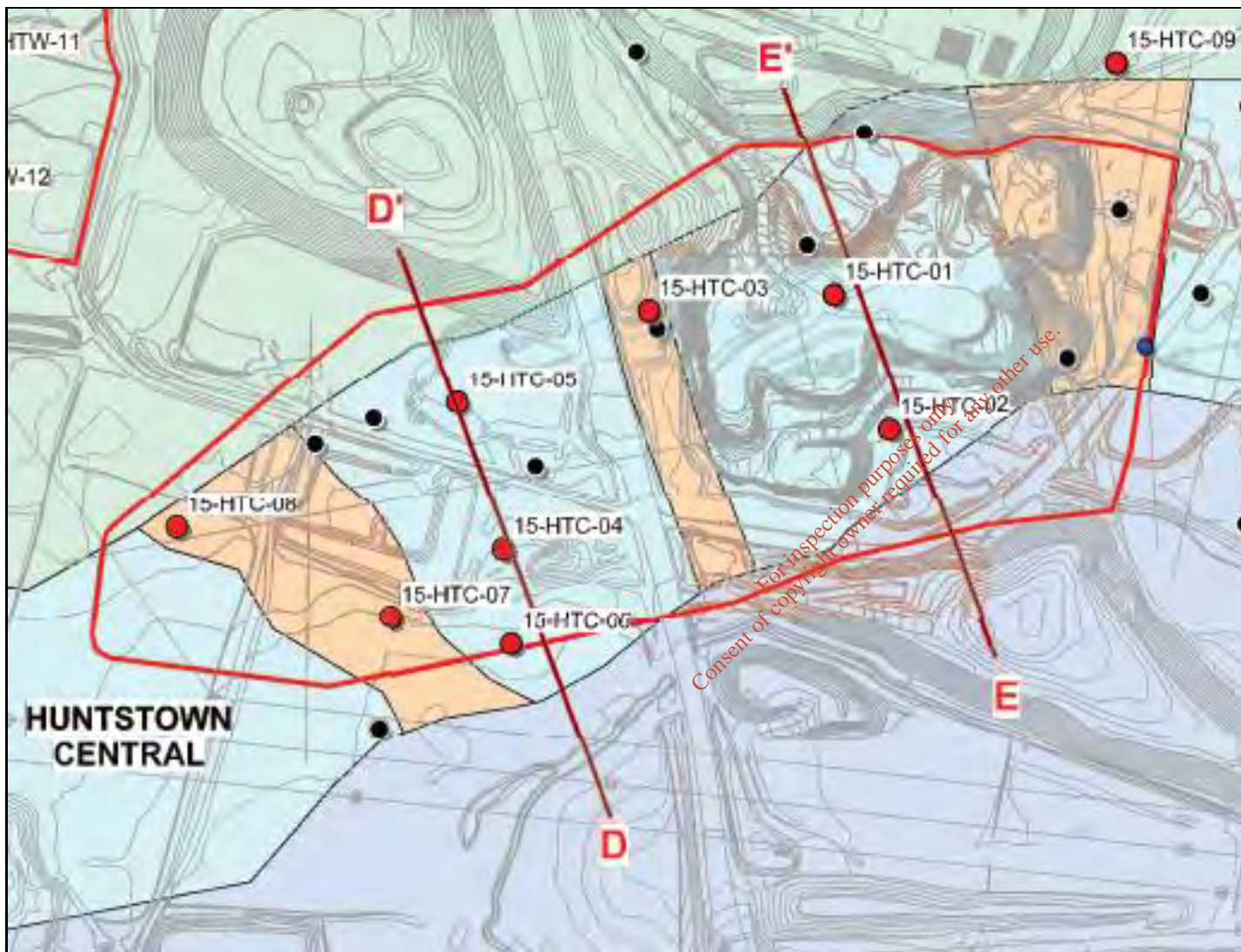
Logged By  
TM

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	30.00								Waulsortian Karst
					31				
		28							
					32				
	33.00								
					33				
					34				
		100							
					35				
	36.00								
					36				
					37				
		100			37.50	41.91			Waulsortian Karst Firm to stiff pale to light yellow CLAY
					38				
					38.40	41.01			Waulsortian Karst Stiff dark grey to black silty CLAY with occasional cobbles
	39.00								
		90			39				
									End of Borehole at 40.00 m

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**LEGEND**

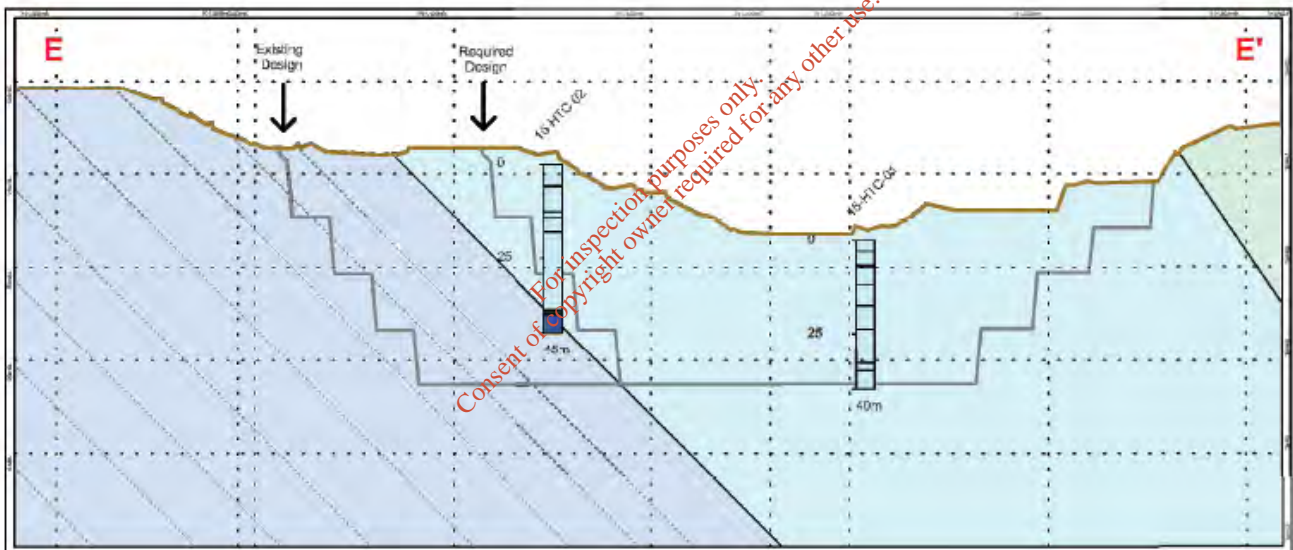
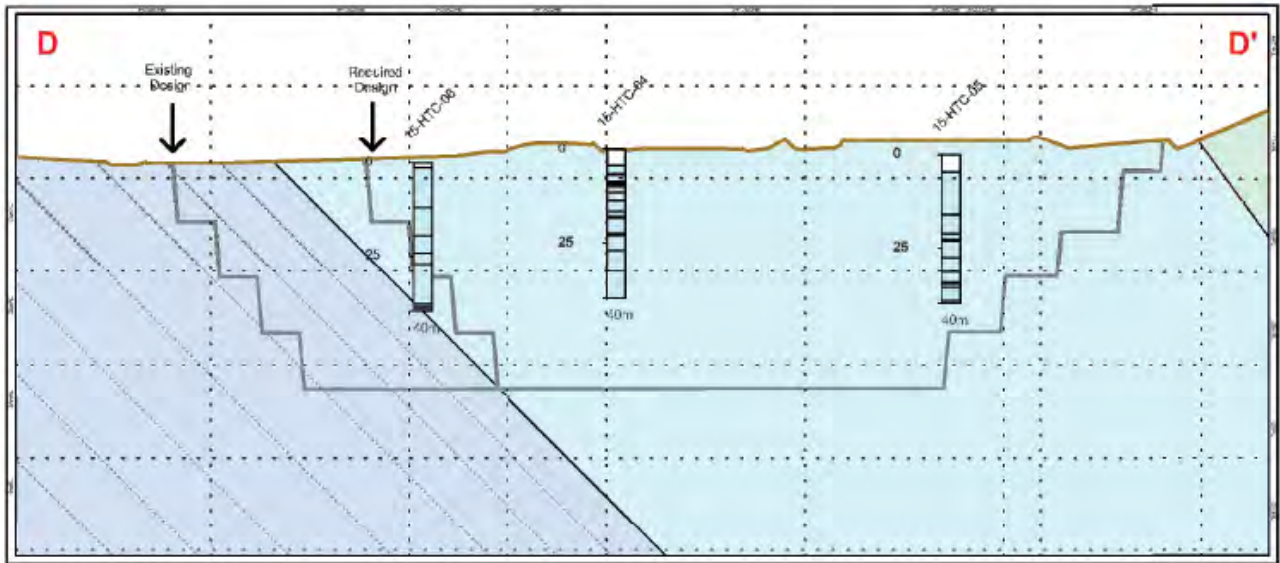
- 2015 RC Borehole
- 1980s RC Borehole (no data)

**Huntstown Bedrock Geology**

- Tober Colleen (& Rush?) Formation
- Feltrim Limestone Formation (Waulsortian)
- Waulsortian - Karstic Infill Clays
- Malahide Limestone Formation

Reverse Faults

Huntstown Central Quarry : Bedrock Geology, Borehole Location and Cross-Sections



**Huntstown Quarry Geology Sections**  
Lithology Legend

	Tober Colleen Formation
	Waulsortian Limestones
	Malahide Formation
	Malahide Formation - Muds
	Fault Associated Dolomite